I B.TECH I SEMESTER

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(AUTONOMOUS)
NARASARAOPET - 522 601.
Guntur (Dist.), A.P.

I B. Tech. - I SEMESTER

S.No	Subject Name	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Functional English	HS	4	-	-	40	60	100	3
2	Engineering Mathematics	BS	3	1	-	40	60	100	3
3	Mathematical Methods	BS	3	1	-	40	60	100	3
4	Engineering Chemistry	BS	3	1	-	40	60	100	3
5	Programming with C	ES	3	1	-	40	60	100	3
6	Professional Ethics, Values & Patents	HS	4	-	-	40	60	100	3
7	Basic Communication Skills Lab	HS	-	-	3	25	50	75	2
8	Engineering Chemistry Lab	BS	-	-	3	25	50	75	2
9	Computer Programming Lab	ES	-	-	3	25	50	75	2
	TOTAL		**20**	**4**	**9**	**315**	**510**	**825**	**24**

HS: Humanities and Social Sciences

ES: Engineering Sciences

BS: Basic Sciences

PC: Professional Course

PE: Professional Elective

OE: Open Elective

PW: Project Work

MC: Mandatory Course (No Credits)

L: Lecture

T: Tutorial

P: Practical

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I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3

PROGRAMMING WITH C
(Common to ECE,EEE,CIVIL and Mechanical)

COURSE OBJECTIVE:

- To gain experience about structured programming
- To help students to understand the implementation of C language
- To understand various features in C

COURSE OUTCOME:

CO1: Study and Understand basics of computer Hardware and Software.
CO2: Study, Analyze and Understand logical structure of computer programming and different constructs to develop programs in C language.
CO3: Understand and Analyze simple data structures and use of pointers and dynamic memory allocation technique.
CO4: Create files and apply file I/O operations.

UNIT - I:
INTRODUCTION: Computer systems, Hardware and Software Concepts,
PROBLEM SOLVING: Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and high-level languages, Creating and Running Programs: Writing, Editing(vi/emacs editor), Compiling(gcc), Linking and Executing in under Linux.
BASICS OF C: Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arthmetic , relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

UNIT - II:
SELECTION – MAKING DECISION: TWO WAY SELECTION: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples.
ITERATIVE: loops- while, do-while and for statements, break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.
ARRAYS: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix.
STRINGS: concepts, c strings.

UNIT - III:
FUNCTIONS MODULAR PROGRAMMING: Functions, basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

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UNIT - IV:

POINTERS: pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and multi-dimensional arrays, dynamic memory management functions, command line arguments

UNIT - V:

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types -structures-declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields, program applications.

UNIT - VI:

FILE HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs.

TEXT BOOKS:

1. Programming in C, Reema Thareja, OXFORD.
2. The C programming Language by Dennis Richie and Brian Kernighan 2nd ed..

REFERENCE BOOKS:

1. Programming in ANSI C, Dr.E.Balaguruswamy, Tata McGraw-Hill Education.
2. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PEARSON.
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
4. Programming in C, Second Edition by Ashok N.Kamthane, Pearson.

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I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2

COMPUTER PROGRAMMING LAB
(Common to ECE,EEE,CIVIL and Mechanical)

COURSE OBJECTIVE:

The purpose of this course is to introduce to students to the field of language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

COURSE OUTCOMES:

- After completion of this C Programming Lab, students should be able to:
- : Study, analyse and understand logical structure of computer programming and different constructs to develop programs in C Language.
- Know how to write, compile and debug programs in C Language.
- Understand and analyse data types, typecasting and operator precedence.
- Analyse the use of conditional and looping statements to solve problems associated with conditions and repetitions.
- Explain and analyse simple data structures, use of pointers and dynamic memory allocation techniques.
- Summarize the role of functions involving the idea of modularity, know how to create files and apply file I/O operations.

SYLLABUS:

EXERCISE 1:

a) Write an Algorithm, Flowchart and Program to calculate the area of triangle using the formula Area = (s (s-a) (s-b) (s-c)) 1/2 where s= (a+b+c)/2.
b) Write an Algorithm, Flowchart and Program to find the largest of three numbers using ternary operator.
c) Write an Algorithm, Flowchart and Program to swap two numbers without using a temporary variable.

EXERCISE 2:

a) Write a C program to find the roots of a quadratic equation.
b) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement).

EXERCISE 3:

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.
b) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

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EXERCISE 4:

a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.
b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.
c) Write a C Program to check whether the given number is Armstrong number or not.

EXERCISE 5:

a) Write a C program to interchange the largest and smallest numbers in the array.
b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them.

EXERCISE 6:

a) Write a C Program to find both the largest and smallest number of an array of integers
b) Write a C Program to find transpose of a matrix.

EXERCISE 7:

Write C programs that use both recursive and non-recursive functions for the following

a) To find the factorial of a given integer.
b) To find the GCD (greatest common divisor) of two given integers.

EXERCISE 8:

Write a C Program for the following.

a) To find Fibonacci sequence
b) Write C programs illustrating call by value and call by reference concepts.

EXERCISE 9:

Write C Programs for the following string operations without using the built in functions - to concatenate two strings

a) To append a string to another string
b) To compare two strings

EXERCISE 10:

Write C Programs for the following string operations without using the built in functions

a) To find the length of a string
b) To find whether a given string is palindrome or not

EXERCISE 11:

Write a C program that uses functions to perform the following operations:

a) To insert a sub-string in to given main string from a given position.
b) To delete n Characters from a given position in a given string.
c) To replace a character of string either from beginning or ending or at a specified location.

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EXERCISE 12:

a) Write a C program to implement a linear search.
b) Write a C program to implement binary search
c) Write a C program to implement sorting of an array of elements.

EXERCISE 13:

a) Write C Program to reverse a string using pointers
b) Write a C Program to compare two arrays using pointers
c) Write a C program to swap two numbers using pointers

EXERCISE 14:

Examples which explores the use of structures, union and other user defined variables

EXERCISE 15:

a) Write a C program which copies one file to another.
b) Write a C program to count the number of characters and number of lines in a file.
c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

TEXT BOOKS:

1. Programming in C, Reema Thareja, OXFORD .
2. The C programming Language by Dennis Richie and Brian Kernighan 2nd ed..

REFERENCE BOOKS:

1. Programming in ANSI C, Dr.E.Balaguruswamy, Tata McGraw-Hill Education.
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I B.TECH II SEMESTER

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I B. Tech. - II SEMESTER

S.No	Subject Name	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Interactive English	HS	4	-	-	40	60	100	3
2	Engineering Physics	BS	3	1	-	40	60	100	3
3	Integral Transforms & Vector Calculus	BS	3	1	-	40	60	100	3
4	Engineering Mechanics	ES	3	1	-	40	60	100	3
5	Engineering Drawing	ES	1	-	4	40	60	100	3
6	Environmental Studies	ES	4	-	-	40	60	100	3
7	Enhancing Communication Skills Lab	BS	-	-	3	25	50	75	2
8	Engineering Physics Lab	BS	-	-	3	25	50	75	2
9	Engg Work Shop	ES	-	-	3	25	50	75	2
	TOTAL		**18**	**3**	**13**	**315**	**510**	**825**	**24**

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<table>
<tr><td rowspan="2">I B.TECH-II-SEMESTER</td><td>L</td><td>T</td><td>P</td><td>INTERNAL MARKS</td><td>EXTERNAL MARKS</td><td>TOTAL MARKS</td><td>CREDITS</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>40</td><td>60</td><td>100</td><td>3</td></tr>
<tr><td colspan="8">ENGINEERING MECHANICS
(Common to ME,CE STUDENTS)</td></tr>
</table>

COURSE OBJECTIVES:

The course is mainly intended

- To impart the basic concepts and fundamentals of Engineering Mechanics and the principles of various force systems under static and dynamic conditions
- To develop the problem solving skills of engineering mechanics essential for mechanical engineering

COURSE OUTCOMES:

At the end of this course student will acquire ability to

- Determine the resultant of the given force systems.
- Construct free body diagrams and develop equilibrium equations.
- Understand the concepts of friction and to apply in real life problems.
- Determine the centroid, center of gravity and Moment of Inertia of areas, bodies and composite sections.
- Understand the dynamic analysis of rigid body motion and analyze the dynamic equilibrium of moving bodies
- Apply the work-energy principle to particles and connected systems

UNIT – I:

Introduction to Engineering Mechanics-Basic concepts

RESULTANT OF COPLANAR CONCURRENT FORCE SYSTEM: Parallelogram law, Graphical method, Method of resolution.

EQUILIBRIUM OF FORCE SYSTEMS: Free body diagrams, Equations of Equilibrium for coplanar concurrent force system, Lami's theorem.

MOMENTS: Moment of Force and its Applications, Principle of moments – Couples and Resultant of Force Systems.

UNIT - II:

FRICTION: Introduction, Classification of friction, Laws of Friction, Coefficent of Friction, Angle of Friction, Angle of Repose, Frictional Forces on moving bodies, Wedge friction, Ladder friction.

UNIT - III:

CENTROID: Centroids of simple figures (from basic principles)-Centroids of composite figures, Centre of Gravity: Centre of Gravity of simple body (from basic principles), Centre of gravity of composite bodies, pappus theorem.

UNIT - IV:

AREA MOMENTS OF INERTIA: Definition, Radius of gyration, Parallel axis theorem, perpendicular axis theorem, Moments of Inertia of composite figures, polar moment of Inertia.

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UNIT – V:

MASS MOMENT OF INERTIA: Moment of Inertia of Rigid body-Moment of Inertia from basic principles-Slender bar, Rectangular Plate, Circular Plate, Moment of Inertia of 3D Bodies Cone, Solid Cylinder, Solid Sphere.

UNIT - VI:

KINETICS: Analysis as a particle, Newton's laws of motion, D'Alembert's principle –simple applications- analysis as a rigid body in translation-fixed axis rotation-Simple applications.
WORK-ENERGY METHOD: Equations for Translation, work-Energy applications to particle motion, connected system-Impulse momentum method-simple applications.

TEXT BOOKS:

1. Engg. Mechanics by S.Timoshenko & D.H.Young., 4th Edn - ,Mc Graw Hill publications.
2. Engg. Mechanics by S.S. Bhavikatti-New age publications

REFERENCES:

1. Engineering Mechanics by Fedinand . L. Singer , Harper – Collins.
2. Engineering Mechanics by A.K.Tayal-Umesh Publications.

<table>
<tr><td rowspan="2">I B.TECH-II-SEMESTER</td><td>L</td><td>T</td><td>P</td><td>INTERNAL MARKS</td><td>EXTERNAL MARKS</td><td>TOTAL MARKS</td><td>CREDITS</td></tr>
<tr><td>1</td><td>0</td><td>4</td><td>40</td><td>60</td><td>100</td><td>4</td></tr>
<tr><td colspan="8">ENGINEERING DRAWING
(COMMON TO ME, CE STUDENTS)
(NOTE: USE IST ANGLE PROJECTION ONLY)</td></tr>
</table>

COURSE OBJECTIVES:

The course is mainly intended to

- Impart basic knowledge and skills required to prepare engineering drawing which is an universal language of engineers for communication, designing and production
- Get enhanced imagination capacity, visualize and communicate geometrical elements
- Understand the fundamentals of geometry like engineering curves, planes, solids, sections, developments & isometric views and its applications in design and manufacturing of various engineering components

COURSE OUTCOMES:

At the end of this course student will acquire ability to

- Apply principles of drawing to represent dimensions of an object and use the different types of scales for drawing of various sizes of engineering curves
- Draw various polygons and conic sections of Ellipse, Parabola and Hyperbola
- Draw different orientations of points, lines, planes and solids with reference to principal planes.
- Understand Development of surfaces and their representation
- Draw orthographic views (2D) from the given isometric view (3D) and vice versa

UNIT - I:

INTRODUCTION TO ENGINEERING DRAWING: Importance, construction of regular polygons. Conic sections: Construction of Ellipse, parabola & Hyperbola by general Method, ellipse by others methods- Arcs of circles Method, Concentric Circles Method and Oblong Method. Scales: Representation fraction-Construction of plain, diagonal and vernier scale.

UNIT - II:

ORTHOGRAPHIC PROJECTIONS: Principle of orthographic projections, projections, of points. Projection of Straight lines: parallel to both the planes, parallel to one plane and inclined to the other plane.

UNIT - III:

Projection of Straight lines inclined to both the planes, determination of true length, angles of inclination and Traces.

UNIT – IV:

PROJECTIONS OF PLANES: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT - V:

PROJECTIONS OF SOLIDS: prisms, pyramids, cones and cylinders with the axis inclined toone of the planes **DEVELOPMENT OF SURFACES** of right regular solids- Prisms, Cylinder, Pyramids, Cone.

UNIT - VI:

Conversion of isometric views to orthographic views; Conversion orthographic views to isometric views

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers.
3. Engineering Graphics by PI Varghese, McGrawHill Publishers

REFERENCE BOOKS:

1. Engineering Graphics for Degree by K.C. John, PHI Publishers
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

I B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	2
ENIGINEERING WORKSHOP (COMMON TO ME,CE STUDENTS)							

COURSE OBJECTIVES:

- To impart knowledge to students to develop their technical skill sets for creating entities from raw material.
- To give hands on training and practice to students for use of various tools, devices, machines.
- To develop ability of students to understand, plan and implement various processes and operations to be performed on the raw material to create object of desired shape and size.

COURSE OUTCOMES:

- Thorough knowledge of various tools, machines, devices used in engineering practice for creating objects from material.
- Thorough knowledge of carrying out various operations in basic engineering shops.
- Ability of interpretation of job drawing, application of processes and operations to produce basic components from raw material.

LIST OF EXPERIMENTS:

TRADES FOR EXERCISE:

- **CARPENTRY**
  1. Cross-Lap joint
  2. Dove tail joint
  3. Mortise & Tenon joint

- **FITTING**
  1. V-fit
  2. Square fit
  3. Dovetail fit

- **TINSMITHY**
  1. Funnel
  2. Square box without lid
  3. Tapper tray

- **HOUSE WIRING**
  1. Two lamps series connection & parallel connection
  2. Fluorescent Tube Wiring & Stair Case Wiring

TRADES FOR DEMONSTRATION

- **BLACK SMITHY**
  1. S-Hook
  2. Round rod to square rod

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- **WELDING**
    1. Lap Joint
    2. Butt Joint

TEXT BOOKS:

1. K.C. John, –Mechanical Workshop‖ 2nd Edn., PHI,2010.
2. Kannaiah P. & Narayana K. C., "Manual on Work Shop Practice", Scitech Publications, Chennai, 1999.

REFERENCE BOOKS:

1. Hajra Choudary, –Elements of Workshop Technology-Vol. 1, Asian Publishers, 6th Edn., 1993.
2. G.S. Sawhney, –Mechanical Experiments and Workshop Practice‖, I.K.International Publishing House, New Delhi, 2009.

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II Year – I SEMESTER

T	P	C
3+1	0	3

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Preamble:
This course covers the topics related to analysis of various electrical circuits, operation of various electrical machines, various electronic components to perform well in their respective fields.

Learning Objectives:

i. To learn the basic principles of electrical law's and analysis of networks.
ii. To understand the principle of operation and construction details of DC machines.
iii. To understand the principle of operation and construction details of transformer.
iv. To understand the principle of operation and construction details of alternator and 3-Phase induction motor.
v. To study the operation of PN junction diode, half wave, full wave rectifiers and OP-AMPs.
vi. To learn the operation of PNP and NPN transistors and various amplifiers.

UNIT - I

ELECTRICAL CIRCUITS: Basic definitions, Types of network elements, Ohm's Law, Kirchhoff's Laws, inductive networks, capacitive networks, series, parallel circuits and star-delta and delta-star transformations.

UNIT - II

DC MACHINES : Principle of operation of DC generator – emf equation - types – DC motor types –torque equation – applications – three point starter, swinburn's Test, speed control methods.

UNIT - III

TRANSFORMERS: Principle of operation of single phase transformers – e.m.f equation – losses –efficiency and regulation.

UNIT - IV

AC MACHINES: Principle of operation of alternators – regulation by synchronous impedance method –principle of operation of 3-Phase induction motor – slip-torque characteristics - efficiency – applications.

UNIT V

RECTIFIERS & LINEAR ICs: PN junction diodes, diode applications (Half wave and bridge rectifiers). Characteristicsof operation amplifiers (OP-AMP) - application of OP-AMPs (inverting, non inverting, integrator and differentiator).

UNIT VI

TRANSISTORS: PNP and NPN junction transistor, transistor as an amplifier, single stage CE Amplifier, frequency response of CE amplifier, concepts of feedback amplifier.

Outcomes:

i. Able to analyse the various electrical networks.
ii. Able to understand the operation of DC generators,3-point starter and conduct the Swinburne's Test.
iii. Able to analyse the performance of transformer.
iv. Able to explain the operation of 3-phase alternator and 3-phase induction motors.
v. Able to analyse the operation of half wave, full wave rectifiers and OP-AMPs.
vi. Able to explain the single stage CE amplifier and concept of feedback amplifier.

TEXT BOOKS:

1. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.
2. Electrical Technology by Surinder Pal Bali, Pearson Publications.
3. Electrical Circuit Theory and Technology by John Bird, Routledge Taylor &Francis Group

REFERENCE BOOKS:

1. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah,TMH Publications.
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications, 2nd edition.
3. Basic Electrical Engineering by Nagsarkar, Sukhija, Oxford Publications, 2nd edition.
4. Industrial Electronics by G.K. Mittal, PHI.

II Year – I SEMESTER

	T	P	C
	3+1	0	3

STRENGTH OF MATERIALS-I

Course Learning Objectives:

1. To give preliminary concepts of Strength of Material and Principles of Elasticity and Plasticity Stress strain behavior of materials and their governing laws. Introduce student the moduli of Elasticity and their relations.
2. To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions and to draw the diagrams of variation across the length.
3. To give concepts of stresses developed in the cross section and bending equations calculation of section modulus of sections with different cross sections.
4. The concepts above will be utilized in measuring deflections in beams under various loading and support conditions.
5. To classify cylinders based on their thickness and to derive equations for measurement of stresses across the cross section when subjected to external pressure.

Course Outcomes:

1. The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions.
2. The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces.
3. The student will have knowledge of bending concepts and calculation of section modulus and for determination of stressed developed in the beans due to various loading conditions.
4. The student will be able to assess stresses across section of the thin and thick cylinders to arrive at optimum sections to withstand the internal pressure.

Syllabus :

UNIT – I: SIMPLE STRESSES AND STRAINS and STRAIN ENERGY: Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses.

STRAIN ENERGY – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT – II:

SHEAR FORCE AND BENDING MOMENT: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contraflexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III:

FLEXURAL STRESSES: Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel sections – Design of simple beam sections.

UNIT –IV:

SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections, built up beams, shear centre.

UNIT – V:

DEFLECTION OF BEAMS: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load.-Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

UNIT – VI:

THIN AND THICK CYLINDERS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in diameter, and volume of thin cylinders – Thin spherical shells.

THICK CYLINDERS: Introduction Lame's theory for thick cylinders – Derivation of Lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

TEXT BOOKS:
Strength of Materials by S. S. Bhavakatti

REFERENCES:
1. Strength of Materials by S.S. Rattan, Tata McGraw Hill Education Pvt., Ltd.,
2. Strength of materials by R.K. Rajput, S. Chand & Co, New Delhi

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II Year – I SEMESTER

	T	P	C
	3+1	0	3

BUILDING MATERIALS AND CONSTRUCTION

UNIT.I : STONES, BRICKS AND TILES

Properties of building stones – relation to their structural requirements, classification of stones – stone quarrying – precautions in blasting, dressing of stone, composition of good brick earth, various methods of manufacturing of bricks. Characteristics of good tile - manufacturing methods, types of tiles. Uses of materials like Aluminium, Gypsum, Glass and Bituminous materials – their quality.

UNIT. II MASONRY

Types of masonry, English and Flemish bonds, Rubble and Ashlar Masonry.Cavity and partition walls.

WOOD: Structure – Properties- Seasoning of timber- Classification of various types of woods used in buildings- Defects in timber. Alternative materials for wood – Galvanized Iron, Fiver – Reinforced Plastics, Steel, Aluminium.

UNIT. III: LIME AND CEMENT

Lime: Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime.

Cement: Portland cement- Chemical Composition – Hydration, setting and fineness of cement. Various types of cement and their properties.Various field and laboratory tests for Cement.Various ingredients of cement concrete and their importance – various tests for concrete.

UNIT. IV:BUILDING COMPONENTS

Lintels, arches, vaults, stair cases – types. Different types of floors – Concrete, Mosaic, Terrazzo floors, Pitched, flat roofs. Lean to roof, Coupled Roofs. Trussed roofs – King and Queen post Trusses. R.C.C Roofs, Madras Terrace and Pre fabricated roofs.

UNIT.V : FINISHINGS

Damp Proofing and water proofing materials and uses – Plastering Pointing, white washing and distempering –

Paints: Constituents of a paint – Types of paints – Painting of new/old wood- Varnish.

Form Works and Scaffoldings.

UNIT. VI: AGGEGATES

Classification of aggregate – Coarse and fine aggregates- particle shape and texture – Bond and Strength of aggregate – Specific gravity – Bulk Density, porosity and absorption – Moisture content of Aggregate- Bulking of sand – Sieve analysis.

TEXT BOOKS:

1. Building Materials by S.S. Bhavikatti, Vices publications House private ltd.
2. Building Construction by S.S. Bhavikatti, Vices publications House private ltd.
3. Building Materials by B.C. Punmia, Laxmi Publications private ltd.
4. Building Construction by B.C. Punmia, Laxmi Publications (p) ltd.

References:

1. Building Materials by S.K.Duggal, New Age International Publications.
2. Building Materials by P.C.Verghese, PHI learning (P) ltd.
3. Building Materials by M.L.Gambhir, Tata McGraw Hill Publishing Co. Ltd. New Delhi.
4. Building construction by P.C.Verghese, PHI Learning (P) Ltd.

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SURVEYING

Course Learning Objectives:

To introduce the students to basic principles of surveying, various methods of linear and angles measuring instruments and enable the students to use surveying equipments.

Course Outcomes:

Upon successful completion of the course, the student will be able:

- To demonstrate the basic surveying skills
- To use various surveying instruments.
- To perform different methods of surveying
- To compute various data required for various methods of surveying.
- To integrate the knowledge and produce topographical map.

Syllabus :

UNIT – I

INTRODUCTION: definition-Uses of surveying- overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications – Errors in survey measurements

UNIT – II

DISTANCES AND DIRECTION: Distance measurement conventions and methods; use of chain and tape, Electronic distance measurements (EDM)- principles of of electro optical EDM-errors and corrections to linear measurements - compass survey - Meridians, Azimuths and Bearings, declination, computation of angle.

Traversing - Purpose-types of traverse-traverse computation - traverse adjustments - omitted measurements.

UNIT – III

LEVELING AND CONTOURING: Concept and Terminology, Levelling Instruments and their Temporary and permanent adjustments- method of levelling. Characteristics and Uses of contours- methods of conducting contour surveys and their plotting.

UNIT – IV

THEODOLITE: Theodolite, description, principles-uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite - Trigonometrical leveling,.

TACHEOMETRIC SURVEYING: Stadia and tangential methods of Tacheometry. Distance and Elevation formulae for Staff vertical position.

UNIT – V

Curves: Types of curves, design and setting out – simple and compound curves- transition curves. Introduction to geodetic surveying, Total Station and Global positioning system.

UNIT – VI

COMPUTATION OF AREAS AND VOLUMES: Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

Text books:

1. Surveying (Vol No.1, 2 &3) by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P)ltd, New Delhi.
2. Advance Surveying by Satish Gopi, R. Sathi Kumar and N. Madhu, Pearson Publications.
3. Text book of Surveying by C. Venkataramaiah, University press, India (P) limited.
4. Surveying and levelling by R. Subramanian, Oxford University press.

References:

1. Text book of Surveying by S.K. Duggal (Vol No. 1&2), Tata McGraw Hill Publishing Co. Ltd. New Delhi.
2. Text book of Surveying by Arora (Vol No. 1&2), Standard Book House, Delhi.
3. Higher Surveying by A.M. Chandra, New Age International Pvt ltd.
4. Fundamentals of surveying by S.K. Roy – PHI learning (P) Ltd.
5. Plane Surveying by Alak de, S. Chand & Company, New Delhi.

II Year – I SEMESTER

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FLUID MECHANICS

UNIT I

INTRODUCTION : Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motion, pressure at a point, Pascal's law, Hydrostatic law - atmospheric, gauge and vacuum pressure- measurement of pressure. Pressure gauges, Manometers: Differential and Micro Manometers.

UNTI – II

HYDROSTATICS: Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.

FLUID KINEMATICS: Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows: Steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two , three dimensional flows – stream and velocity potential functions, flow net analysis.

UNIT – III

FLUID DYNAMICS: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, Navier – Stokes equations (Explanationary) Momentum equation and its application – forces on pipe bend.

UNIT – IV

BOUNDARY LAYER THEORY: Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers, no deviations BL in transition, separation of BL, Control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

UNIT – V

LAMINAR FLOW: Reynold's experiment – Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes.

CLOSED CONDUIT FLOW: Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line.Pipe network problems, variation of friction factor with Reynold's number – Moody's Chart.

UNIT – VI

MEASUREMENT OF FLOW: Pitot tube, Venturi meter and Orifice meter – classification of orifices, small orifice and large orifice, flow over rectangular, triangular and trapezoidal and Stepped notches - –Broad crested weirs.

TEXT BOOKS:

1. Fluid Mechanics by Modi and Seth, TEXT BOOKS house.
2. Introduction to Fluid Machines by S.K. Som & G. Biswas, Tata Mc Graw Hill Pvt. Ltd.
3. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) Ltd., New Delhi

REFERENCES:

1. Fluid Mechanics by Merie C. potter and David C. Wiggert, Cengage learning
2. Introduction to Fluid Machines by Edward J. Shaughnessy, Jr, Ira M. Katz and James P. Schaffer, Oxford University Press, New Delhi
3. Fluid Mechanics by A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi

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II Year – I SEMESTER

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SURVEYING FIELD WORK-I

List of Field Works:

1. Survey by chain survey of road profile with offsets in case of road widening .
2. Survey in an area by chain survey (Closed circuit).
3. Determination of distance between two inaccessible points by using compass.
4. Finding the area of the given boundary using compass (Closed Traverse).
5. Plane table survey : finding the area of a given boundary by the method of Radiation.
6. Plane table survey : finding the area of a given boundary by the method of intersection.
7. Two Point Problem by the plane table survey.
8. Fly levelling : Height of the instrument method (differential levelling) .
9. Fly levelling : rise and fall method.
10. Fly levelling : closed circuit/ open circuit.
11. Fly levelling : Longitudinal Section and Cross sections of a given road profile.

Note: Any 10 field work assignments must be completed.

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II Year – I SEMESTER

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STRENGTH OF MATERIALS LAB

List of Experiments

1. Tension test on Steel bar
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of Electrical resistance strain gauges
12. Continuous beam – deflection test.

List of Major Equipment:

1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell's / Rock well's hardness testing machine
6. Setup for spring tests
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell's theorem verification.
11. Continuous beam setup
12. Electrical Resistance gauges.

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BUILDING PLANNING & DRAWING

UNIT. I:

BUILDING BYELAWS AND REGULATIONS

Introduction- terminology- objectives of building byelaws- floor area ratio- floor space index- principles under laying building bye laws- classification of buildings- open space requirements – built up area limitations- height of buildings- wall thickness – lightening and ventilation requirements.

UNIT. II:

RESIDENTIAL BUILDINGS

Minimum standards for various parts of buildings- requirements of different rooms and their grouping- characteristics of various types residential buildings.

UNIT. III:

PUBLIC BUILDINGS

Planning of educational institutions, hospitals, dispensaries, office buildings, banks, industrial buildings, hotels & motels, buildings for recreation.

UNIT.IV :

SIGN CONVENTIONS AND BONDS

Brick, stone, plaster, sand filling, concrete, glass, steel, cast iron, copper alloys, aluminium alloys etc., lead, zinc, tin etc., earth, rock, timber and marbles.

English bond and Flemish bond- odd and even courses for one, one-half, two and two & half brick walls in thickness at the junction of a corner.

UNIT.V:

DOORS, WINDOWS, VENTILATORS AND ROOFS

Panelled door, panelled and glassed door, glassed windows, panelled windows, swing ventilators, fixed ventilators, coupled roof, collar roofs.

King Post truss, Queen Post truss

Sloped and flat roof buildings : drawing plans, Elevations and Cross Sections of given sloped roof buildings.

UNIT. VI:

PLANNING AND DESIGNING OF BUILDINGS

Draw the Plan, Elevation and sections of a Residential & Public buildings from the given line diagram.

TEXT BOOKS:

1. Planning and Design of buildings by Y.S. Sane
2. Planning, designing and Scheduling by Gurucharan Singh and Jagadish Singh
3. Building planning and drawing by M. Chakravarthi.
4. 3. 'A' Series & 'B' Series of JNTU Engineering College, Anantapur,

REFERENCES:

1. Building drawing by Shah and Kale

INTERNAL EXAMINATION PATTERN:

The total internal marks (30) are distributed in three components as follows:

1. Descriptive (subjective type) examination : 25 marks
2. Assignment : 05 marks

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consist of five questions in planning portion out of which three questions are to be answered. Part B should consist of two questions from drawing part out of which one is to be answered in drawing sheet. Weight age for Part – A is 60% and Part- B is 40%.

II Year – II SEMESTER

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MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Unit – I: (*The Learning objective of this Unit is to understand the concept and nature of Managerial Economic s and its relationship with other disciplines, Concept of Demand and Demand forecasting)

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concepts of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement-Demand forecasting and its Methods.

(**The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand).

Unit – II: (*The Learning objective of this Unit is to understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis)

Production and Cost Analyses:

Production function-Isoquants and Isocosts-Law of Variable proportions-Cobb-Douglas Production function-Economics of Sale-Cost Concepts-Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs-Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis-Determination of Break-Even Point (Simple Problem)

(**One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs).

Unit – III: (*The Learning Objective of this Unit is t understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods)

Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.

(** One has to understand the nature of different markets and Price Output determination under various market conditions).

Unit – IV: (*The Learning objective of this Unit is to know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles)

Types of Business Organization and Business Cycles:
Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.

(**One should equipped with the knowledge of different Business Units)

Unit – V: (*The Learning objective of this Unit is to understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation)

Introduction to Accounting & Financing Analysis:
Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow cash flow statements (Simple Problems)
(**The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis)

Unit – VI: (*The Learning objective of this Unit is to understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods).

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.
(**The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making).

Note: *Learning Objective
** Learning Assessment

TEXT BOOKS

1. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakara rao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

REFERENCES:

1. V. Maheswari : Managerial Economics, Sultan Chand.
2. Suma Damodaran : Managerial Economics, Oxford 2011.
3. Dr. B. Kuberudu and Dr. T. V. Ramana : Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.
4. Vanitha Agarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja : Financial Accounting for Managers, Pearson.
6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui & A. S. Siddiqui : Managerial Economics and Financial Analysis, New Age International Publishers, 2012.

II Year – II SEMESTER

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STRENGTH OF MATERIALS- II

Course Learning Objectives:

1. To give preliminary concepts of Principal stresses and strains developed in cross section of the beams analytically as well as graphically due to stresses acting on the cross section and stresses on any inclined plane. To impart concepts of failures in the material considering different theories.
2. To give concepts of torsion and governing torsion equation, and there by calculate the power transmitted by shafts and springs and design the cross section when subjected to loading using different theories of failures.
3. To classify columns and calculation of load carrying capacity using different empirical formulas and to assess stresses due to axial and lateral loads for different edge conditions and to calculate combined effect of direct and bending stresses with different engineering structures.
4. Introduce the concept of unsymmetrical bending in beams Location of neutral axis Deflection of beams under unsymmetrical bending.
5. Impart concepts for determination of Forces in members of plane, pin-jointed, perfect trusses by different methods.

Course Outcomes:

Upon successful completion of this course

1. The student will be able to understand the basic concepts of Principal stresses developed when subjected to stresses along different axes and design the sections.
2. The student can asses stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions .
3. The student will be able to assess forces in different types of trusses used in construction.

Syllabus :

UNIT- I

PRINCIPAL STRESSES AND STRAINS AND THEORY OF FAILURES: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

THEORIES OF FAILURES: Introduction – Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNIT – II

TORSION OF CIRCULAR SHAFTS AND SPRINGS: Theory of pure torsion – Derivation of Torsion equations: $T/J = q/r = N\phi/L$ – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

SPRINGS: Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs.

UNIT – III

COLUMNS AND STRUTS: Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions- derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula.

Laterally loaded struts – subjected to uniformly distributed and concentrated loads – Maximum B.M. and stress due to transverse and lateral loading.

UNIT – IV

DIRECT AND BENDING STRESSES: Stresses under the combined action of direct loading and B.M. Core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and B.M. about both axis.

UNIT – V

UNSYMMETRICAL BENDING: Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis Deflection of beams under unsymmetrical bending.

UNIT – VI

ANALYSIS OF PIN-JOINTED PLANE FRAMES: Determination of Forces in members of plane, pin-jointed, perfect trusses by (i) method of joints and (ii) method of sections. Analysis of various types of cantilever and simply supported trusses by method of joints, method of sections.

TEXT BOOKS:

1. Mechanics of Materials- by R. C. Hibbler
2. Strength of materials by S. S. Bhavakatti

REFERENCES:

1. Fundamentals of Solid Mechanics M.L. Gambhir, PHI Learning Pvt. Ltd., New Delhi.
2. Introduction to text book of Strength of Material by U.C. Jindal, Galgotia publications.
3. Strength of materials by R. Subramanian, Oxford university press, New Delhi.

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II Year – II SEMESTER

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HYDRAULICS AND HYDRAULIC MACHINERY

UNIT – I

OPEN CHANNEL FLOW: Types of flows - Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy's, Manning's; and Bazin formulae for uniform flow – Most Economical sections.

Critical flow : Specific energy-critical depth – computation of critical depth – critical sub-critical and super critical flows.

UNIT II

OPEN CHANNEL FLOW II: Non uniform flow-Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT – III

HYDRAULIC SIMILITUDE: Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

UNIT – IV

BASICS OF TURBO MACHINERY: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Applications to radial flow turbines. Layout of a typical Hydropower installation – Heads and efficiencies - classification of turbines.

UNIT – V

HYDRAULIC TURBINES – I: Pelton wheel - Francis turbine - Kaplan turbine - working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and function efficiency.

HYDRAULIC TURBINES – II: Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation.

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UNIT – VI

CENTRAIFUGAL-PUMPS: Pump installation details-classification-work done- Manometric head-minimum starting speed-losses and efficiencies-specific speed, multistage pumps-pumps in parallel- performance of pumps-characteristic curves- NPSH- Cavitation.

RECIPROCATING PUMPS: Introduction, classification of reciprocating pumps, main components of reciprocating pumps, working of a reciprocating pumps, discharge through pumps, indicator diagram, work done by reciprocating pumps, slip of reciprocating pumps.

TEXT BOOKS:

1. Open Channel flow by K. Subramanya, Tata McGraw Hill Publishers
2. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) Ltd., New Delhi.
3. Fluid Mechanics by Modi and Seth, TEXT BOOKS house.

REFERENCES:

1. Fluid mechanics and fluid machines by Rajput, S. Chand & Co.
2. Hydraulic Machines by Banga & Sharma Khanna Publishers.
3. Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria & Sons.

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II Year – II SEMESTER

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CONCRETE TECHNOLOGY

Course Learning Objectives:

- To learn the concepts of Concrete production and its behaviour in various environments.
- To learn the test procedures for the determination of properties of concrete.
- To understand durability properties of concrete in various environments.

Course Outcomes:

Upon successful completion of this course, student will be able to

- understand the basic concepts of concrete.
- realise the importance of quality of concrete.
- familiarise the basic ingredients of concrete and their role in the production of concrete and its behaviour in the field.
- test the fresh concrete properties and the hardened concrete properties.
- evaluate the ingredients of concrete through lab test results.
- design the concrete mix by BIS method.
- familiarise the basic concepts of special concrete and their production and applications.
- understand the behaviour of concrete in various environments.

Syllabus :

UNIT I : INGREDIENTS OF CONCRETE

CEMENTS & ADMIXTURES: Portland cement – Chemical composition – Hydration, Setting of cement, Fineness of cement, Structure of hydrate cement – Test for physical properties – Different grades of cements – Admixtures – Mineral and chemical admixtures – accelerators, retarders, air entrainers, plasticizers, super plasticizers, fly ash and silica fume.

AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregates – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand –Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis –

Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded and well graded aggregate as per relevant IS code – Maximum aggregate size.
Quality of mixing water

UNIT – II

FRESH CONCRETE: Steps inManufacture of Concrete–proportion, mixing, placing, compaction, finishing, curing – including various types in each stage. Properties of fresh concrete-Workability – Factors affecting workability – Measurement of workability by different tests, Setting times of concrete, Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete, Ready mixed concrete, Shotcrete.

UNIT – III

HARDENED CONCRETE: Water / Cement ratio – Abram's Law – Gelspaoe ratio – Nature of strength of concrete –Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compression & tensile strength – Curing, Testing of Hardened Concrete:Compression tests – Tension tests – Factors affecting strength – Flexure tests –Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT – IV

ELASTICITY, CREEP & SHRINKAGE – Modulus of elasticity – Dynamic modulus of elasticity – Poisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage –types of shrinkage.

UNIT – V

MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Concepts Proportioning of concrete mixes by various methods – BIS method of mix design.

UNIT – VI

SPECIAL CONCRETES: Ready mixed concrete, Shotcrete -Light weight aggregate concrete – Cellular concrete – No-fines concrete, High density concrete, Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C, Polymer concrete – Types of Polymer concrete – Properties of polymer concrete, High performance concrete – Self consolidating concrete, SIFCON, self healing concrete.

TEXT BOOKS:

1. Concrete Technology by M.S.Shetty. – S.Chand & Co.; 2004.
2. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi.

REFERENCES:

1. Properties of Concrete by A.M.Neville – PEARSON – 4th edition.
2. Concrete Technology by A.R. Santha Kumar, Oxford University Press, New Delhi.

II Year – II SEMESTER

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STRUCTURAL ANALYSIS - I

Course Learning Objectives:

1. To give preliminary concepts of assessment of bending moment and shear force in Propped cantilevers, fixed beams and continuous beams due to various loading conditions.
2. To impart concepts of Bending Moment and Shear force for beams with different boundary and loading conditions and to draw the diagrams of variation across the length.
3. The procedure for development of slope deflection equations and to solve application to continuous beams with and without settlement of supports.
4. The concepts of moving loads and influence lines are imparted for assessment of maximum SF and BM at a given section when loads of varying spans are passing over beams of different spans of Pratt and Warren trusses.

Course Outcomes:

Upon successful completion of this course,

1. The student will be able to estimate the bending moment and shear forces in beams of different fixity conditions.
2. The student can analyze the continuous beams using tan important method of slope deflection which impart basic concepts for other methods of analysis to be discussed in next level analysis course.
3. The student will be able to analyze the loads in Pratt and Warren trusses when loads of different types and spans ware passing over the truss. These concepts will be used in to understand the performance and to design of bridge structures in next level courses.

Syllabus :

UNIT – I

PROPPED CANTILEVERS: Analysis of propped cantilevers-shear force and Bending moment diagrams-Deflection of propped cantilevers.

UNIT – II

FIXED BEAMS – Introduction to statically indeterminate beams with U. D. load central point load, eccentric point load. Number of point loads, uniformly varying load, couple and combination of loads shear force and Bending moment diagrams-Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT – III

CONTINUOUS BEAMS: Introduction-Clapeyron's theorem of three moments- Analysis of continuous beams with constant moment of inertia with one or both ends fixed-continuous beams with overhang, continuous beams with different moment of inertia for different spans-Effects of sinking of supports-shear force and Bending moment diagrams.

UNIT-IV

SLOPE-DEFLECTION METHOD: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

UNIT – V

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT – VI

MOVING LOADS and INFLUENCE LINES: Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U. D load longer than the span, U. D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length.

INFLUENCE LINES: Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a sections, ingle point load, U.D. load longer than the span, U.D. load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

TEXT BOOKS:

1. Structural Analysis by V.D. Prasad Galgotia publications, 2nd Editions.
2. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.

REFERENCES:

1. Theory of Structures by Gupta, Pandit & Gupta; Tata McGraw Hill, New Delhi.
2. Theory of Structures by R.S. Khurmi, S. Chand Publishers.
3. Structural analysis by R.C. Hibbeler, Pearson, New Delhi.

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II Year – II SEMESTER

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FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

List of Experiments

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Efficiency test on reciprocating pump.

List of Equipment:

1. Venturimeter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli's theorem setup.
8. Impact of jets.
9. Hydraulic jump test setup.
10. Pelton wheel and Francis turbines.
11. Centrifugal and Reciprocating pumps.

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II Year – II SEMESTER

T	P	C
0	3	2

CONCRETE TECHNOLOGY LAB

Course Learning Objectives:

To test the basic properties ingredients of concrete, fresh and hardened concrete properties.

Course Outcomes:

Upon successful completion of this course, student will be able to

- Determine the consistency and fineness of cement.
- Determine the setting times of cement.
- Determine the specific gravity and soundness of cement.
- Determine the compressive strength of cement.
- Determine the workability of cement concrete by compaction factor, slump and Vee – Bee tests
- Determine the specific gravity of coarse aggregate and fine aggregate by Sieve analysis.
- Determine the flakiness and elongation index of aggregates.
- Determine the bulking of sand.
- Understand the non-destructive testing procedures on concrete.

List of Experiments:

At least 10 experiments must be conducted (at least one for each property)

1. Determination of normal Consistency and fineness of cement.
2. Determination of initial setting time and final setting time of cement.
3. Determination of specific gravity and soundness of cement.
4. Determination of compressive strength of cement.
5. Dtermination of grading and fineness modulus of Coarse aggregate by sieve analysis.
6. Determination of specific gravity of coarse aggregate
7. Determination of grading and fineness modulus of fine aggregate (sand) by sieve analysis.
8. Determination of bulking of sand.
9. Determination of workability of concrete by compaction ~~factor~~ method.

10. Determination of workability of concrete by slump test
11. Determination of workability of concrete by Vee-bee test.
12. Determination of compressive strength of cement concrete and its young's modulus.
13. Determination of split tensile strength of concrete.
14. Non-Destructive testing on concrete (for demonstration)

List of Equipment:

1. Standard set of sieves for coarse aggregate and fine aggregate
2. Vicat's apparatus
3. Specific gravity bottle.
4. Lechatlier's apparatus.
5. Slump Test Apparatus.
6. Compaction Factor Test Apparatus.
7. Vee- Bee test apparatus
8. Longitudinal compresso meter
9. Universal testing Machine (UTM)/Compression Testing Machine (CTM).
10. Rebound hammer, Ultrasonic pulse velocity machine, micro cover meter etc.

II Year – II SEMESTER

	T	P	C
	0	3	2

SURVEYING FIELD WORK- II

List of Experiments

1. Theodolite Survey: Determining the Horizontal and Vertical Angles by the method of repetition method.
2. Theodolite Survey: Finding the distance between two inaccessible points.
3. Theodolite Survey: Finding the height of far object.
4. Tacheomatric survey: Heights and distance problems using tacheomatric principles.
5. One Exercise on Curve setting.
6. One Exercise on contours.
7. Total Station : Introduction to total station and practicing setting up, levelling up and elimination of parallax error.
8. Total Station : Determination of area using total station.
9. Total Station : Traversing
10. Total Station : Contouring
11. Total Station : Determination of Remote height.
12. Total Station : distance between two inaccessible points.

Note: Any 10 field work assignments must be completed.

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III Year – I SEMESTER

	T	P	C
	3+1*	0	3

CE 501 - ENGINEERING GEOLOGY

Lecture :	3 hrs/Week	Internal Assessment :	30 Marks
Tutorial :	1 hrs/Week	Semester End Examination :	70 Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To introduce the Engineering Geology as a subject in Civil Engineering.
2. To enable the student to use subject in civil engineering applications.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. Identify and classify the geological minerals.

b. Measure the rock strengths of various rocks.

c. Classify and measure the earthquake prone areas to practice the hazard zonation.

d. Classify, monitor and measure the Landslides and subsidence.

e. Prepares, analyses and interpret the Engineering Geologic maps

f. Analyses the ground conditions through geophysical surveys.

g. Test the geological material and ground to check the suitability of civil engineering project construction.

h. Investigate the project site for mega/mini civil engineering projects.Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc…

SYLLABUS:

UNIT-I:

Introduction: Branches of Geology, Importance of Geology in Civil Engineering with case studies.

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Weathering: Weathering of rocks, Geological agents, weathering process of Rock, River process and their development.

UNIT-II

Mineralogy And Petrology: Definitions of mineral and rock, Different methods of study of mineral and rock, The study of physical properties of minerals and rocks for megascopic study for the following minerals and rocks, Common rock forming minerals are Feldspar, Quartz Group, Olivine, Augite, Hornblende, Mica Group, Asbestos, Talc, Chlorite, Kyanite, Garnet, Calcite and other ore forming minerals are Pyrite, Hematite, Magnetite, Chlorite, Galena, Pyrolusite, Graphite, Chromite, Magnetite And Bauxite. Classification, structures ,textures and forms of Igneous rocks, Sedimentary rocks, Metamorphic rocks, and their megascopic study of granite varieties, (pink, gray, green). Pegmatite, Dolerite, Basalt etc., Shale, Sand Stone, Lime Stone, Laterite, Quartzite, Gneiss, Schist, Marble, Khondalite and Slate.

UNIT-III

Structural Geology: Strike , Dip and Outcrop study of common geological structures associating with the rocks such as Folds, Faults, Joints and Unconformities- parts, types, mechanism and their importance in Civil Engineering.

UNIT-IV

Ground Water: Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques.

Earthquakes And Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Land slides.

UNIT-V

Geophysics: Importance of Geophysical methods, Classification, Principles of Geophysical study by Gravity method, Magnetic method, Electrical methods, Seismic methods, Radiometric method and Electrical resistivity, Seismic refraction methods and Engineering properties of rocks.

UNIT-VI

Geology Of Dams, Reservoirs And Tunnels: Types and purpose of Dams, Geological considerations in the selection of a Dam site. Life of Reservoirs Purpose of Tunnelling, effects, Lining of Tunnels. Influence of Geology for successful Tunnelling.

TEXT BOOKS:

1. 'Engineering Geology' by Subinoy Gangopadhay, Oxford University press.
2. 'Engineering Geology' by D. Venkat Reddy, Vikas Publishing House pvt. Ltd, 2013.
3. 'Engineering Geology' by N. Chenn Kesavulu, Trinity Press (Laxmi Publications), 2nd Edition, 2014.
4. 'Engineering Geology' by Vasudev Kanithi, University Press.

REFERENCES:

1. 'Engineering Geology for Civil Engineers' by P.C. Varghese,PHI learning pvt. Ltd.
2. 'Geology for Engineers and Environmental Society' by Alan E Kehew, person publications, 3rd edition
3. 'Fundamentals of Engineering Geology' by P.G. Bell, B.S.P. Publications, 2012.
4. 'Engineering Geology' by V.Parthesarathi et al., Wiley Publications
5. 'Environmental Geology' by K.S. Valdiya, McGraw Hill Publications, 2nd ed.

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III Year – I SEMESTER

T	P	C
3+1*	0	3

CE502 - STRUCTURAL ANALYSIS – II

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. Familiarize Students with Different types of Structures
2. Equip student with concepts of Arches
3. Understand Concepts of lateral Load analysis
4. Familiarize Cables and Suspension Bridges
5. Understand Analysis methods Moment Distribution, Kanis Method and Matrix methods.

Course Outcomes:

At the end of this course; the student will be able to

a. Differentiate Determinate and Indeterminate Structures
b. Carryout lateral Load analysis of structures
c. Analyze Cable and Suspension Bridge structures
d. Analyze structures using Moment Distribution, Kani's Method and Matrix methods.

SYLLABUS:

UNIT I

Three Hinged Arches: Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature.

Two Hinged Arches: Determination of horizontal thrust, bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches – fixed arches – (No analytical question).

UNIT-II

Lateral Load Analysis Using Approximate Methods: application to building frames. (i) Portal method (ii) Cantilever method.

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UNIT – III

Cable Structures And Suspension Bridges: Introduction, characteristics of cable, analysis of cables subjected to concentrated and uniformly distributed loads, anchor cable, temperature stresses, analysis of simple suspension bridge, three hinged and two hinged stiffening girder suspension bridges.

UNIT – IV

Moment Distribution Method: Stiffness and carry over factors – Distribution factors – Analysis of continuous beams with and without sinking of supports – Portal frames – including Sway-Substitute frame analysis by two cycle.

UNIT – V

Kani's Method: Analysis of continuous beams – including settlement of supports and single bay portal frames with and without side sway.

UNI – VI

Introduction to Matrix Methods:

Flexibility methods: Introduction, application to continuous beams (maximum of two unknowns) including support settlements.

Stiffness method: Introduction, application to continuous beams (maximum of two unknowns) including support settlements.

TEXT BOOKS:

1. 'Structural Analysis' by T.S.Thandavamoorthy, Oxford university press, India.
2. 'Structural Analysis' by R.C. Hibbeler, Pearson Education, India
3. 'Theory of Structures – II' by B.C.Punmia, Jain & Jain, Laxmi Publications, India.
4. 'Structural Analysis' by C.S. Reddy, Tata Mc-Graw hill, New Delhi.

REFERENCES:

1. 'Intermediate Structural Analysis' by C. K. Wang, Tata McGraw Hill, India.
2. 'Theory of structures' by Ramamuratam, Dhanpatrai Publications.
3. 'Analysis of structures' by Vazrani & Ratwani – Khanna Publications.
4. 'Comprehensive Structural Analysis-Vol.I&2' by Dr. R. Vaidyanathan & Dr. P. Perumal- Laxmi Publications Pvt. Ltd., New Delhi.

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III Year – I SEMESTER

	T	P	C
	3+1*	0	3

CE503-DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. Familiarize Students with different types of design philosophies
2. Equip student with concepts of design of flexural members
3. Understand Concepts of shear, bond and torsion
4. Familiarize students with different types of compressions members and Design
5. Understand different types of footings and their design

Course Outcomes:

At the end of this course the student will be able to

a. Work on different types of design philosophies
b. Carryout analysis and design of flexural members and detailing
c. Design structures subjected to shear, bond and torsion
d. Design different type of compression members and footings

SYLLABUS:

UNIT –I

Introduction: Working stress method Design codes and handbooks, loading standards – Dead, live, wind and earthquake loads, elastic theory, design constants, modular ratio, neutral axis depth and moment of resistance, balanced, under-reinforced and over-reinforced sections, working stress method of design of singly and doubly reinforced beams.

Limit State Design: Concepts of limit state design – Basic statistical principles – Characteristic loads –Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design – stress - block parameters – limiting moment of Resistance.

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UNIT –II

Design for Flexure: Limit state analysis and design of singly reinforced sections- effective depth- Moment of Resistance- Doubly reinforced and flanged (T and L) beam sections- Minimum depth for a given capacity- Limiting Percentage of Steel- Minimum Tension Reinforcement-Maximum Flexural Steel- Design of Flanged Sections (T&L)- Effective width of flange –Behavior- Analysis and Design.

UNIT – III

Design for Shear, Torsion and Bond: Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing.**Limit state design for serviceability:** Deflection, cracking and code provision, Design of formwork for beams and slabs.

UNIT – IV

Design of Compression members: Effective length of a column, Design of short and long columns – under axial loads, uniaxial bending and biaxial bending – Braced and un-braced columns – I S Code provisions.

UNIT –V

Footings: Different types of footings – Design of isolated and combined footings - rectangular and circular footings subjected to axial loads, uni-axial and bi-axial bending moments.

UNIT – VI

Slabs: Classification of slabs, design of one - way slabs, two - way slabs, and continuous slabs using IS Coefficients (conventional), design of waist-slab staircase.

NOTE: All the designs to be taught in Limit State Method

Following plates should be prepared by the students.

1. Reinforcement detailing of T-beams, L-beams and continuous beams.
2. Reinforcement detailing of columns and isolated footings.
4. Detailing of one-way, two-way and continuous slabs and waist-slab staircase.

INTERNAL EXAMINATION PATTERN:

The total internal marks (30) are distributed in three components as follows:

1. Descriptive (subjective type) examination : 25 marks
2. Assignment : 05 marks

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FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. Part A consists of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS:

1. 'Limit State Design' by A. K. Jain
2. 'Design of Reinforced concrete Structures' by N. Subrahmanyian
3. 'Reinforced Concrete Structures' by S. Unnikrishna Pillai & Devdas Menon, Tata McGraw Hill, New Delhi.

REFERENCES:

1. 'Design of concrete structures'by Arthus H.Nilson, David Darwin, and Chorles W. Dolar, Tata McGrawHill,3rd Edition, 2005.
2. 'Reinforced Concrete Structures' by Park and Pauley, John Wiley and Sons.

IS Codes:

1) IS -456-2000 (Permitted to use in examination hall)
2) IS – 875
3) SP-16

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III Year – I SEMESTER

	T	P	C
	3+1*	0	3

CE504-GEOTECHNICAL ENGINEERING – I

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To enable the student to determine the index properties of the soil and classify it.
2. To impart the concept of seepage of water through soils and determine the discharge of water through soils.
3. To impart the principles of compaction and consolidation of soils and determine the magnitude and the rate of consolidation settlement.
4. To enable the student to understand the concept of shear strength of soils, determine the shear parameters of sands and clays and the areas of their application.

Course Outcomes:

Upon the successful completion of this course

a. The student must know the definition of the various quantities related to soil mechanics and establish their inter-relationships.
b. The student should be able to know the methods of determination of the various index properties of the soils and classify the soils.
c. The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
d. The student should be able to apply the above concepts in day-to-day civil engineering practice.

SYLLABUS:

UNIT – I

Introduction: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship –Relative density - Mechanism of compaction – factors affecting – effects of compaction on soil properties - compaction control.

UNIT – II

Index Properties Of Soils: Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – Various Types of soil Classifications – Unified soil classification and I.S. Soil classification.

UNIT –III

Permeability: Soil water – capillary rise – One dimensioned flow of water through soils – Darcy's law- permeability – Factors affecting –laboratory determination of coefficient of permeability –Permeability of layered systems. Total, neutral and effective stresses –quick sand condition – 2-D flow and Laplace's equation - Seepage through soils –Flow nets: Characteristics and Uses.

UNIT – IV

Stress Distribution In Soils: Stresses induced by applied loads - Boussinesq's and Westergaard's theories for point loads and areas of different shapes– Newmark's influence chart – 2:1 stress distribution method.

UNIT – V

Consolidation: Compressibility of soils – e-p and e-log p curves – Stress history – Concept of consolidation - Spring Analogy - Terzaghi's theory of one-dimensional Consolidation – Time rate of consolidation and degree of consolidation – Determination of coefficient of consolidation (c_v) - Over consolidated and normally consolidated clays.

UNIT - VI

Shear Strength of Soils: Basic mechanism of shear strength - Mohr – Coulomb Failure theories – Stress-Strain behavior of Sands - Critical Void Ratio – Stress-Strain behavior of clays – Shear Strength determination- various drainage conditions.

TEXT BOOKS:

1. 'Basic and Applied Soil Mechanics' by Gopal Ranjan and A.S.R.Rao, New Age International Publishers.
2. 'Soil Mechanics and Foundation Engineering' by V.N.S.Murthy ,CBS publishers.
3. 'Soil Mechanics' by M.Palani Kumar, PHI Learning.

REFERENCES:

1. 'Fundamentals of Soil Mechanics' by D.W.Taylor., Wiley.
2. 'An introduction to Geotechnical Engineering' by Holtz and Kovacs; Prentice Hall.

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III Year – I SEMESTER

	T	P	C
	3+1*	0	3

CE505-TRANSPORTATION ENGINEERING – I

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To impart different concepts in the field of Highway Engineering.
2. To acquire design principles of Highway Geometrics and Pavements
3. To learn various highway construction and maintenance procedures.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. Plan highway network for a given area.
b. Determine Highway alignment and design highway geometrics.
c. Design Intersections and prepare traffic management plans.
d. Judge suitability of pavement materials and design flexible and rigid pavements.
e. Construct and maintain highways

SYLLABUS:

UNIT I

Highway Planning and Alignment:Highway development in India; Classification of Roads; Road Network Patterns; Necessity for Highway Planning; Different Road Development Plans – First, second, third road development plans, road development vision 2021, Rural Road Development Plan – Vision 2025; Planning Surveys; Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT – II

Highway Geometic Design: Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements-Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance- Design of Horizontal Alignment-Design of

Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

UNIT – III

Traffic Engineering: Basic Parameters of Traffic-Volume, Speed and Density- Traffic Volume Studies; Speed studies –spot speed and speed & delay studies; Parking Studies; Road Accidents-Causes and Preventive measures - Condition Diagram and Collision Diagrams; PCU Factors, Capacity of Highways – Factors Affecting; LOS Concepts; Road Traffic Signs; Road markings; Types of Intersections; At-Grade Intersections – Design of Plain, Flared, Rotary and Channelized Intersections; Design of Traffic Signals –Webster Method –IRC Method.

UNIT – IV

Highway Materials: Subgrade soil: classification –Group Index – Subgrade soil strength – California Bearing Ratio – Modulus of Subgrade Reaction. Stone aggregates: Desirable properties – Tests for Road Aggregates – Bituminous Materials: Types – Desirable properties – Tests on Bitumen – Bituminous paving mixes: Requirements – Marshall Method of Mix Design.

UNIT – V

Design Of Pavements: Types of pavements; Functions and requirements of different components of pavements; Design Factors

Flexible Pavements: Design factors – Flexible Pavement Design Methods – CBR method – IRC method – Burmister method – Mechanistic method – IRC Method for Low volume Flexible pavements.

Rigid Pavements: Design Considerations – wheel load stresses – Temperature stresses – Frictional stresses – Combination of stresses – Design of slabs – Design of Joints – IRC method – Rigid pavements for low volume roads – Continuously Reinforced Cement Concrete Pavements – Roller Compacted Concrete Pavements.

UNIT – VI

Highway Construction and Maintenance: Types of Highway Construction – Earthwork; Construction of Earth Roads, Gravel Roads, Water Bound Macadam Roads, Bituminous Pavements and Construction of Cement Concrete Pavements.

Pavement Failures, Maintenance of Highways, pavement evaluation, strengthening of existing pavements.

TEXT BOOKS:

1. 'Highway Engineering'by Khanna S.K., Justo C.E.G and Veeraragavan A, Nem Chand Bros, Roorkee.
2. 'Traffic Engineering and Transportation' Planning by Kadiyali L.R, Khanna Publishers, New Delhi.
3. 'Highway Engineering' by Srinivasa Kumar R, Universities Press, Hyderabad.

REFERENCES:

1. 'Transportation Engineering and Planning' by Papacostas C.S. and PD Prevedouros, Prentice Hall of India Pvt. Ltd; New Delhi.
2. 'Principles of Highway Engineering' by Kadiyali LR, Khanna Publishers, New Delhi.
3. 'Transportation Engineering - An Introduction' byJotin Khisty C, Prentice Hall, Englewood Cliffs,New Jersey.
4. 'Highway Engineering' by Paul H. Wright and Karen K Dixon, Wiley Student Edition, Wiley India (P) Ltd., New Delhi .
5. 'Principles of Transportation Engineering' by Partha Chakroborthy and Animesh Das, PHI Learning Private Limited, Delhi
6. 'Practice and Design of Highway Engineering' by Sharma SK, Principles, S.Chand & Company Private Limited, New Delhi.

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III Year – I SEMESTER

T	P	C
3+1*	0	2

INTELLECTUAL PROPERTY RIGHTS AND PATENTS

Unit I

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement - Regulatory – Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues.

Unit II

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of performers – Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law-Semiconductor Chip Protection Act.

Unit III

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

Unit IV

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law

Unit V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement – Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law.

Unit VI

Introduction to Cyber Law – Information Technology Act - Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy - International aspects of Computer and Online Crime.

REFERENCE BOOKS:

1. Deborah E.Bouchoux: "Intellectual Property". Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections
4. Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi
5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
6. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
7. M.Ashok Kumar and Mohd.Iqbal Ali: "Intellectual Property Right" Serials Pub.

III Year – I SEMESTER

	T	P	C
	0	0	2

CE507-GEOTECHNICAL ENGINEERING LAB

Lecture :	--	Internal Assessment :	25 Marks
Tutorial :	--	Semester End Examination :	50 Marks
Practical :	3 hrs/Week	Credits :	2

Course Learning Objectives:

The objective of this course is:

1. To impart knowledge of determination of index properties required for classification of soils.
2. To teach how to determine compaction characteristics and consolidation behavior from relevant lab tests; to determine permeability of soils.
3. To teach how to determine shear parameters of soil through different laboratory tests.

Course Outcomes:

Upon successful completion of this course, student will be able to

a. Determine index properties of soil and classify them.
b. Determine permeability of soils.
c. Determine Compaction, Consolidation and shear strength characteristics.

SYLLABUS:

LIST OF EXPERIMENTS

1. Specific gravity, G
2. Atterberg's Limits.
3. Field density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Hydrometer Analysis Test
6. Permeability of soil - Constant and Variable head tests
7. Compaction test
8. Consolidation test (to be demonstrated)
9. Direct Shear test
10. Triaxial Compression test (UU Test)

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11. Unconfined Compression test
12. Vane Shear test
13. Differential free swell (DFS)
14. CBR Test

At least **Ten**experiments shall be conducted.

LIST OF EQUIPMENT:

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and shrinkage limits
3. Field density apparatus for
   a) Core cutter method
   b) Sand replacement method
4. Set of sieves: 4.75 mm, 2 mm, 1 mm, 0.6 mm, 0.42 mm, 0.3 mm, 0.15 mm, and 0.075 mm.
5. Hydrometer
6. Permeability apparatus for
   a) Constant head test
   b) Variable head test
7. Universal auto compactor for I.S light and heavy compaction tests.
8. Shaking table, funnel for sand raining technique.
9. Apparatus for CBR test
10. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolation test apparatus with all accessories.
12. Triaxial cell with provision for accommodating 38 mm dia specimens.
13. Box shear test apparatus
14. Laboratory vane shear apparatus.
15. Hot air ovens (range of temperature 50^0 - 150^0C

Reference:

1. 'Determination of Soil Properties' by J. E. Bowles.
2. IS Code 2720 – relevant parts.

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III Year – I SEMESTER	T	P	C
	0	3	2

CE508-ENGINEERING GEOLOGY LAB

Lecture :	--	Internal Assessment :	Marks
Tutorial :	--	Semester End Examination :	Marks
Practical :	3 hrs/Week	Credits :	2

Course Learning Objectives:

The objective of this course is:

1. To identify the mega-scopic types of Ore minerals & Rock forming minerals.
2. To identify the mega-scopic types of Igneous, Sedimentary, Metamorphic rocks.
3. To identify the topography of the site & material selection

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. Identify Mega-scopic minerals & their properties.
b. Identify Mega-scopic rocks & their properties.
c. Identify the site parameters such as contour, slope & aspect for topography.
d. Know the occurrence of materials using the strike & dip problems.

SYLLABUS:

LIST OF EXPERIMENTS

1. Physical properties of minerals: Mega-scopic identification of
   a. Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…
   b. Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…
2. Megascopic description and identification of rocks.
   a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc…
   b) Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, Etc.

c) Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc…

3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
4. Simple Structural Geology problems.
5. Bore hole data.
6. Strength of the rock using laboratory tests.
7. Field work – To identify Minerals, Rocks, Geomorphology& Structural Geology.

LAB EXAMINATION PATTERN:

1. Description and identification of FOUR minerals
2. Description and identification of FOUR (including igneous, sedimentary and metamorphic rocks)
3. ONE Question on Interpretation of a Geological map along with a geological section.
4. TWO Questions on Simple strike and Dip problems.
5. Bore hole problems.
6. Project report on geology.

REFERENCE:

1. 'Applied Engineering Geology Practicals' by M T Mauthesha Reddy, New Age International Publishers, 2^{nd} Edition.
2. 'Foundations of Engineering Geology' by Tony Waltham, Spon Press, 3^{rd} edition, 2009.

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III Year – II SEMESTER

	T	P	C
	3+1*	0	3

CE601-DESIGN AND DRAWING OF STEEL STRUCTURES

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is to:

1. Familiarize Students with different types of Connections and relevant IS codes
2. Equip student with concepts of design of flexural members
3. Understand Design Concepts of tension and compression members in trusses
4. Familiarize students with different types of Columns and column bases and their Design
5. Familiarize students with Plate girder and Gantry Girder and their Design

Course Outcomes:

At the end of this course the student will be able to

a. Work with relevant IS codes.
b. Carryout analysis and design of flexural members and detailing.
c. Design compression members of different types with connection detailing.
d. Design Plate Girder and Gantry Girder with connection detailing
e. Produce the drawings pertaining to different components of steel structures.

SYLLABUS:

UNIT – I

Connections: Riveted connections – definition, rivet strength and capacity, Welded connections: Introduction, Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements. Design of fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

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UNIT – II

Beams: Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

UNIT –III

Tension Members and compression members: General Design of members subjected to direct tension and bending –effective length of columns. Slenderness ratio – permissible stresses. Design of compression members, struts etc.**Roof Trusses:** Different types of trusses – Design loads – Load combinations as per IS Code recommendations, structural details –Design of simple roof trusses involving the design of purlins, members and joints – tubular trusses.

UNIT – IV

Design of Columns: Built up compression members – Design of lacings and battens. Design Principles of Eccentrically loaded columns, Splicing of columns.

UNIT – V

Design of Column Foundations: Design of slab base and gusseted base. Column bases subjected moment.

UNIT – VI

Design of Plate Girder: Design consideration – I S Code recommendations Design of plate girder-Welded – Curtailment of flange plates, stiffeners – splicing and connections.

Design of Gantry Girder: impact factors - longitudinal forces, Design of Gantry girders.

NOTE: Welding connections should be used in Units II – VI.

The students should prepare the following plates.

Plate 1 Detailing of simple beams

Plate 2 Detailing of Compound beams including curtailment of flange plates.

Plate 3 Detailing of Column including lacing and battens.

Plate 4 Detailing of Column bases – slab base and gusseted base

Plate 5 Detailing of steel roof trusses including joint details.

Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

INTERNAL EXAMINATION PATTERN:

The total internal marks (30) are distributed in three components as follows:

1. Descriptive (subjective type) examination : 25 marks
2. Assignment : 05 marks

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

TEXT BOOKS

1. 'Steel Structures Design and Practice' by N.Subramanian, Oxford University Press.
2. 'Design of Steel Structures' by Ramachandra, Vol – 1, Universities Press.
3. 'Design of steel structures' by S.K. Duggal, Tata Mcgraw Hill, and New Delhi

REFERENCES

1. 'Structural Design in Steel' by Sarwar Alam Raz, New Age International Publishers, New Delhi
2. 'Design of Steel Structures' by P. Dayaratnam; S. Chand Publishers
3. 'Design of Steel Structures' by M. Raghupathi, Tata Mc. Graw-Hill
4. 'Structural Design and Drawing' by N. Krishna Raju; University Press,

IS Codes:

1) IS -800 – 2007

2) IS – 875

3) Steel Tables.

These codes and steel tables are permitted to use in the examinations.

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III Year – II SEMESTER

	T	P	C
	3+1*	0	3

CE602-GEOTECHNICAL ENGINEERING – II

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To impart to the student knowledge of types of shallow foundations and theories required for the determination of their bearing capacity.
2. To enable the student to compute immediate and consolidation settlements of shallow foundations.
3. To impart the principles of important field tests such as SPT and Plate bearing test.
4. To enable the student to imbibe the concepts of pile foundations and determine their load carrying capacity.

Course Outcomes:

Upon the successful completion of this course:

a. The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics.
b. The student must be able to compute the magnitude of foundation settlement and decide on the size of the foundation accordingly.
c. The student must be able to use the field test data and arrive at the bearing capacity.
d. The student must be able to apply the principles of bearing capacity of piles and design them accordingly.

SYLLABUS:

UNIT – I

Soil Exploration: Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Pressure meter – planning of Programme and preparation of soil investigation report.

UNIT – II

Earth And Earth-Retaining Structures: Infinite and finite earth slopes in sand and clay – types of failures – factor of safety of infinite slopes – stability

analysis by Swedish arc method, standard method of slices – Taylor's Stability Number-Stability of slopes of dams and embankments - different conditions.
Rankine's & Coulomb's theory of earth pressure – Culmann's graphical method - earth pressures in layered soils.

UNIT-III
Shallow Foundations – Bearing Capacity Criteria: Types of foundations and factors to be considered in their location - Bearing capacity – criteria for determination of bearing capacity – factors influencing bearing capacity – analytical methods to determine bearing capacity – Terzaghi's theory - IS Methods.

UNIT-IV
Shallow Foundations – Settlement Criteria: Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – Types of foundation settlements and their determination - allowable settlements of structures.

UNIT -V
Pile Foundation: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae– Pile load tests - Load carrying capacity of pile groups in sands and clays.

UNIT-VI
Well Foundations: Types – Different shapes of well – Components of well – functions – forces acting on well foundations - Design Criteria – Determination of steining thickness and plug - construction and Sinking of wells – Tilt and shift.

TEXT BOOKS:

1. 'Principles of Foundation Engineering'by Das, B.M., - (2011) –6th edition (Indian edition) Cengage learning
2. 'Basic and Applied Soil Mechanics' by Gopal Ranjan & ASR Rao, New Age International Pvt. Ltd, (2004).

REFERENCES:

1. Foundation Analysis and Design'by Bowles, J.E., (1988) – 4th Edition, McGraw-Hill Publishing Company, Newyork.
2. 'Theory and Practice of Foundation Design' by N.N.SOM & S.C.DAS PHI Learning Private limited.

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III Year – II SEMESTER

	T	P	C
	3+1*	0	3

CE605-TRANSPORTATION ENGINEERING – II

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To know various components and their functions in a railway track
2. To acquire design principles of geometrics in a railway track.
3. To know various techniques for the effective movement of trains.
4. To acquire design principles of airport geometrics and pavements.
5. To know the planning, construction and maintenance of Docks and Harbours.

Course Outcomes:

At the end of course, Student can

a. Design geometrics in a railway track.
b. Provide good transportation network
c. Design airport geometrics and airfield pavements.
d. Plan, construct and maintain Docks and Harbours.

SYLLABUS:

A.RAILWAY ENGINEERING

UNIT – I

Components of Railway Engineering: Permanent way components – Railway Track Gauge - Cross Section of Permanent Way - Functions of various Components like Rails, Sleepers and Ballast –Rail Fastenings – Creep of Rails- Theories related to creep – Adzing of Sleepers- Sleeper density – Rail joints.

UNIT – II

Geometric Design of Railway Track: Alignment – Engineering Surveys - Gradients- Grade Compensation- Cant and Negative Super elevation- Cant Deficiency – Degree of Curve – safe speed on curves – Transition curve –

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Compound curves – Reverse curves – Extra clearance on curves – widening of gauge on curves – vertical curves – cheek rails on curves.

UNIT – III

Turnouts & Controllers: Track layouts – Switches – Design of Tongue Rails – Crossings – Turnouts – Layout of Turnout – Double Turnout – Diamond crossing – Scissors crossing.

Signal Objectives – Classification – Fixed signals – Stop signals – Signalling systems – Mechanical signalling system – Electrical signalling system – System for Controlling Train Movement – Interlocking – Modern signalling Installations.

B.AIRPORT ENGINEERING

UNIT – IV

Airport Planning & Design: Airport Master plan – Airport site selection – Air craft characteristics – Zoning laws – Airport classification – Runway orientation – Wind rose diagram – Runway length – Taxiway design – Terminal area and Airport layout – Visual aids and Air traffic control.

UNIT – V

Runway Design: Various Design factors – Design methods for Flexible pavements – Design methods for Rigid pavements – LCN system of Pavement Design – Airfield Pavement Failures – Maintenance and Rehabilitation of Airfield pavements – Evaluation & Strengthening of Airfield pavements – Airport Drainage – Design of surface and subsurface drainage.

C.DOCKS & HARBOURS

UNIT – VI

Planning, Layout, Construction & Maintenance Of Docks & Harbours: Classification of ports – Requirement of a good port – classification of Harbours – Docks - Dry & wet docks – Transition sheds and workhouses – Layouts; Quays – construction of Quay walls – Wharves – Jetties – Tides - Tidal data and Analysis – Break waters – Dredging – Maintenance of Ports and Harbours – Navigational aids.

TEXT BOOKS:

1. Railway Engineering by Satish Chandra and Agarwal M.M., Oxford University Press, New Delhi
2. Airport Engineering by Khanna & Arora - Nemchand Bros, New Delhi.

3. Docks and Harbour Engineeringby Bindra S.P. - Dhanpathi Rai & Sons, New Delhi.

REFERENCES:

1. 'Railway Engineering'by Saxena & Arora - Dhanpat Rai, New Delhi.
2. 'Transportation Engineering Planning Design' by Wright P.H. & Ashfort N.J. - John Wiley & Sons.
3. 'Airport Engineering' by Virendra Kumar, Dhanpat Rai Publishers, New Delhi.
4. 'Transportation Engineering' by Srinivasa Kumar R, University Press, Hyderabad
5. 'Highway, Railway, Airport and Harbour Engineering' by Subramanian KP, Scitech Publications (India) Pvt. Limited, Chennai.

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III Year – II SEMESTER

T	P	C
3+1*	0	3

CE604- ENVIRONMENTAL ENGINEERING – I

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The course will address the following:

1. Outline planning and the design of water supply systems for a community/town/city.
2. Provide knowledge of water quality requirement for domestic usage
3. Impart understanding of importance of protection of water source quality and enlightens the efforts involved in converting raw water into clean potable water.
4. Selection of valves and fixture in water distribution systems.
5. Impart knowledge on design of water distribution network.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. Plan and design the water and distribution networks and sewerage systems.
b. Identify the water source and select proper intake structure.
c. Characterisation of water .
d. Select the appropriate appurtenances in the water supply .
e. Selection of suitable treatment flow for raw water treatments.

SYLLABUS:

UNIT–I

Introduction: Importance and Necessity of Protected Water Supply systems, Water borne diseases, Flow chart of public water supply system, Role of Environmental Engineer, Agency activities.

Water Demand and Quantity Estimation: Estimation of water demand for a town or city, Per capita Demand and factors influencing it - Types of water demands and its variations- factors affecting water demand, Design Period, Factors affecting the Design period, Population Forecasting.

UNIT-II

Sources of Water: Lakes, Rivers, Impounding Reservoirs, comparison of sources with reference to quality, quantity and other considerations- Capacity of storage reservoirs, Mass curve analysis. Groundwater sources of water: Types of water bearing formations, springs, Wells and Infiltration galleries, Yields from infiltration galleries.

Collection and Conveyance of Water: Factors governing the selection of the intake structure, Types of Intakes. Conveyance of Water: Gravity and Pressure conduits, Types of Pipes, Pipe Materials, Pipe joints, Design aspects of pipe lines, laying of pipe lines.

UNIT-III

Quality and Analysis of Water: Characteristics of water–Physical, Chemical and Biological-Analysis of Water – Physical, Chemical and Biological characteristics. Comparison of sources with reference to quality- I.S. Drinking water quality standards and WHO guidelines for drinking water

UNIT–IV

Treatment of Water: Flowchart of water treatment plant, Treatment methods: Theory and Design of Sedimentation, Coagulation, Sedimentation with Coagulation, Filtration.

UNIT-V

Disinfection: Theory of disinfection-Chlorination and other Disinfection methods, Softening of Water, Removal of color and odours - Iron and manganese removal –Adsorption-fluoridation and deflouridation–aeration–Reverse Osmosis-Iron exchange–Ultra filtration.

UNIT–VI

Distribution of Water: Requirements- Methods of Distribution system, Layouts of Distribution networks, Pressures in the distribution layouts, Analysis of Distribution networks: Hardy Cross and equivalent pipe methods -Components of Distribution system: valves such as sluice valves, air valves, scour valves and check valves, hydrants, and water meters–Laying and testing of pipe lines- selection of pipe materials, pipe joints.

TEXT BOOKS

1. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985.

2. Elements of Environmental Engineering – K.N. Duggal, S. Chand & Company Ltd., New Delhi, 2012.

REFERENCES

3. Water Supply Engineering – Dr. P.N. Modi
4. Water Supply Engineering – B.C. Punmia
5. Water Supply and Sanitary Engineering – G.S.Birdie and J.S. Birdie
6. Environmental Engineering by D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.

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III Year – II SEMESTER

T	P	C
3+1*	0	3

CE603-WATER RESOURCES ENGINEERING–I

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The course is designed to

1. Introduce hydrologic cycle and its relevance to Civil engineering.
2. Make the students understand physical processes in hydrology and, components of the hydrologic cycle.
3. Appreciate concepts and theory of physical processes and interactions.
4. Learn measurement and estimation of the components hydrologic cycle.
5. Provide an overview and understanding of Unit Hydrograph theory and its analysis.
6. Understand flood frequency analysis, design flood, flood routing.
7. Appreciate the concepts of groundwater movement and well hydraulics.

Course Outcomes

At the end of the course the students are expected to

a. Have a thorough understanding of the theories and principles governing the hydrologic processes.
b. Be able to quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects.
c. Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
d. Be able to develop design storms and carry out frequency analysis.
e. Be able to determine storage capacity and life of reservoirs.
f. Develop unit hydrograph and synthetic hydrograph.
g. Be able to estimate flood magnitude and carry out flood routing.
h. Be able to determine aquifer parameters and yield of wells.
i. Be able to model hydrologic processes.

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SYLLABUS:

UNIT I

Introduction: Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data.

Precipitation:Types and forms, measurement, raingauge network, presentation of rainfall data, average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm.

UNIT-II

Abstractions from Precipitation: Initial abstractions.

Evaporation: factors affecting, measurement, reduction

Evapotranspiration: factors affecting, measurement, control

Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

UNIT-III

Runoff :Catchment characteristics, Factors affecting runoff, components, computation- empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve.

Hydrograph analysis: Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, synthetic unit hydrograph.

UNIT-IV

Floods: Causes and effects, frequency analysis- Gumbel's and Log-Pearson type III distribution methods, Standard Project Flood (SPF) and Probable Maximum Flood (MPF), flood control methods and management.

Flood Routing: Hydrologic routing, channel and reservoir routing-Muskingum and Puls methods of routing.

UNIT-V

Groundwater: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's equation- steady radial flow to wells in confined and unconfined aquifers, yield of a open well-recuperation test.

UNIT VI

Advanced Topics in Hydrology: Rainfall-runoff Modelling, instantaneous unit hydrograph (IUH) - conceptual models - Clark and Nash models, general hydrological models- Chow - Kulandaiswamy model.

TEXT BOOKS:

1. 'Engineering Hydrology' by Subramanya, K, Tata Mc Graw-Hill Education Pvt. Ltd, (2013), New Delhi.
2. 'Engineering Hydrology' by Jayarami Reddy, P, Laxmi Publications Pvt. Ltd., (2013), New Delhi
3. 'Applied hydrology'by Chow V.T., D.R Maidment and L.W. Mays, Tata McGraw Hill Education Pvt. Ltd., (2011), New Delhi.
4. 'Engineering Hydrology'by Ojha C.S.P, R. Berndtsson and P. Bhunya, Oxford University Press, (2010).

REFERENCES:

1. 'Water Resources Engineering', Mays L.W, Wiley India Pvt. Ltd, (2013).
2. 'Hydrology'by Raghunath. H.M., New Age International Publishers, (2010).
3. 'Engineering Hydrology –Principles and Practice'by Ponce V.M., Prentice Hall International, (1994).
4. 'Hydrology and Water Resources Engineering' by Patra K.C., Narosa Publications, (2011).

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III Year – II SEMESTER	T	P	C
	0	3	2

CE607-COMPUTER AIDED ENGINEERING DRAWING

Lecture :	--	Internal Assessment :	Marks
Tutorial :	--	Semester End Examination :	Marks
Practical :	3 hrs/Week	Credits :	2

Course Objectives:

The objective of this course is:

- To enhance the students knowledge and skills in engineering drawing
- To introduce computer aided drafting packages and commands for modeling and sketching.
- To learn surface modeling techniques required designing and machining
- To draw the geometric entities and create 2D and 3D wire frame models.
- To learn various modelling techniques such as edit, zoom, cross hatching, pattern filling,rotation, etc.

Course outcomes:

Up on completion of the course, the student shall be able to :

1) Understand the paper –space environment thoroughly
2) Develop the components using 2D and 3D wire frame models through various editing commands.
3) Generate assembly of various components of compound solids.

UNIT-I

Objective: The knowledge of projections of solids is essential in 3D modelling and animation. The student will be able to draw projections of solids. The objective is to enhance the skills they already acquired in their earlier course in drawing of projection and sections of solids.

Projections Of Planes & Solids : Projections of Regular Solids inclined to both planes – Auxiliary Views. Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

UNIT-II

Objective: The knowledge of development of surfaces of solids is required in designing and manufacturing of the objects. Whenever two or more solids combine, a definite curve is seen at their intersection. The intersection of solids also plays an important role in designing and manufacturing. The objective is to impart this knowledge through this topic.

Development And Interpenetration Of Solids: Development of Surfaces of Right Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts. Interpenetration of Right Regular Solids – Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone.

UNIT-III

Objective: Isometric projections provide a pictorial view with a real appearance. Perspective views provides a realistic 3D View of an object. The objective is to make the students learn the methods of Iso and Perspective views.

Isometric Projections : Principles of Isometric Projection – Isometric Scale – Isometric Views
– Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – IsometricProjection of objects having non- isometric lines. Isometric Projection of Spherical Parts.

Transformation of Projections: Conversion of Isometric Views to Orthographic Views – Conventions.

Perspective Projections: Perspective View: Points, Lines, Plane Figures and Simple Solids,Vanishing Point Methods(General Method only).

PART- B COMPUTER AIDED DRAFTING

UNIT- IV

Introduction To Computer Aided Drafting: Generation of points, lines, curves, polygons, dimensioning. Types of modelling: object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modelling, 3D wire frame modelling.

UNIT -V

Objective: By going through this topic the student will be able to understand the paper-space environment thoroughly.

View Points And View Ports: view point coordinates and view(s) displayed, examples to exercise different options like save, restore, delete, joint, single option.

UNIT -VI

Computer Aided Solid Modelling: Isometric projections, orthographic projections of isometric projections, Modelling of simple solids, Modelling of Machines & Machine Parts.

TEXT BOOKS :

1.Engineering Graphics, K.C. john, PHI Publications.

2.Engineering drawing by N.D Bhatt, Charotar publications.

REFERENCES:

1. Mastering Auto CAD 2013 and Auto CAD LT 2013 – George Omura, Sybex.
2. Auto CAD 2013 fundamentals- Elisemoss, SDC Publ.
3. Engineering Drawing and Graphics using Auto Cad–T Jeyapoovan, vikas
4. Engineering Drawing + AutoCAD – K Venugopal, V. Prabhu Raja, New Age.
5. Engineering Drawing – RK Dhawan, S Chand
6. Engineering Drawing – MB Shaw, BC Rana, Pearson
7. Engineering Drawing – KL Narayana, P Kannaiah, Scitech
8. Engineering Drawing – Agarwal and Agarwal, Mc Graw Hill
9. Engineering Graphics – PI Varghese, Mc Graw Hill
10. Text book of Engineering Drawing with auto-CAD, K.Venkata Reddy/B.S . Publications.

Internal Evaluation: Max. Marks: 30

The total internal evaluation marks are distributed in following two components:

1. Day-to-day work : 20 marks
2. Internal test : 10 marks

I Mid (Internal Test 1) Examination Part A - Conventional drawing Exam II Mid (Internal Test 2) Examination Part B - In Computer Lab

(Note: The duration of the internal test is 2 hours and it must be conducted as per the schedules notified. The internal test may be conducted for 40 marks and it may be reduced to 10 marks).

End Semester Examination (Total Duration: 4 Hours, Max. Marks: 70)

PART A – Conventional drawing pattern (Duration: 2 Hours, Marks: 35)

PART B – Computer lab pattern using any drafting packages (Duration: 2 Hours, Marks: 35)

(Note: both PART A and PART B are compulsory and are to be conducted in separate sessions)

Since the pattern of the internal and external examination is not specified in the R13 academic regulation, it is requested that the above pattern may be approved.

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III Year – II SEMESTER

T	P	C
0	3	2

CE608-TRANSPORTATION ENGINEERING LAB

Lecture :	--	Internal Assessment :	25 Marks
Tutorial :	--	Semester End Examination :	50 Marks
Practical :	3 hrs/week	Credits :	2

Course Learning Objectives:

The objective of this course is:

1. To test crushing value, impact resistance, specific gravity and water absorption, percentage attrition, percentage abrasion, flakiness index and elongation index for the given road aggregates.
2. To know penetration value, ductility value, softening point, flash and fire point, viscosity and stripping for the given bitumen grade.
3. To test the stability for the given bitumen mix.
4. To carry out surveys for traffic volume, speed and parking.

Course outcomes:

a. Ability to test aggregates and judge the suitability of materials for the road construction
b. Ability to test the given bitumen samples and judge their suitability for the road construction
c. Ability to obtain the optimum bitumen content for the mix design
d. Ability to determine the traffic volume, speed and parking characteristics.

SYLLABUS:

I. ROAD AGGREGATES:

1. Aggregate Crushing value
2. Aggregate Impact Test.
3. Specific Gravity and Water Absorption.
4. Attrition Test
5. Abrasion Test.
6. Shape tests

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II. BITUMINOUS MATERIALS:

1. Penetration Test.
2. Ductility Test.
3. Softening Point Test.
4. Flash and fire point tests.
5. Stripping Test
6. Viscosity Test.

III. BITUMINOUS MIX:

1. Marshall Stability test.

IV. TRAFFIC SURVEYS:

1. Traffic volume study at mid blocks.
2. Traffic Volume Studies (Turning Movements) at intersection.
3. Spot speed studies.
4. Parking study.

V. DESIGN & DRAWING:

1. Earthwork calculations for road works.
2. Drawing of road cross sections.
3. Rotors intersection design.

LIST OF EQUIPMENT:

1. Apparatus for aggregate crushing test.
2. Aggregate Impact testing machine
3. Pycnometers.
4. Los angles Abrasion test machine
5. Deval's Attrition test machine
6. Length and elongation gauges
7. Bitumen penetration test setup.
8. Bitumen Ductility test setup.
9. Ring and ball apparatus
10. Viscometer.
11. Marshal Mix design apparatus.
12. Enoscope for spot speed measurement.
13. Stop Watches

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TEXT BOOKS:

1. 'Highway Material Testing Manual' by S.K. Khanna, C.E.G Justo and A.Veeraraghavan, Neam Chan Brothers New Chand Publications, New Delhi.

REFERENCE BOOKS:

1. IRC Codes of Practice
2. Asphalt Institute of America Manuals
3. Code of Practice of B.I.S.

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IV Year – I SEMESTER

	T	P	C
	3+1*	0	3

CE701-ENVIRONMENTAL ENGINEERING – II

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. Outline planning and the design of wastewater collection, conveyance and treatment systems for a community/town/city.
2. Provide knowledge of characterisation of wastewater generated in a community.
3. Impart understanding of treatment of sewage and the need for its treatment.
4. Summarize the appurtenance in sewerage systems and their necessity.
5. Teach planning, and design of septic tank and imhoff tank and the disposal of the effluent from these low cost treatment systems.
6. Effluent disposal method and realise the importance of regulations in the disposal of effluents in rivers.

Course Outcomes:

By the end of successful completion of this course, the students will be able to:

a. Plan and design the sewerage systems
b. Characterisation of Sewage
c. Select the appropriate appurtenances in the sewerage systems
d. Selection of suitable treatment flow for sewage treatment
e. Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river

SYLLABUS:

UNIT – I:

Introduction to sanitation – systems of sanitation – relative merits & demerits – collection and conveyance of waste water – sewerage classification of sewerage systems- Estimation of sewage flow and storm water drainage – fluctuations – types of sewers - Hydraulics of sewers and storm drains– design of sewers – appurtenances in sewerage – cleaning and ventilation of sewers.

UNIT – II:

Pumping of wastewater: Pumping stations – location – components– types of pumps and their suitability with regard to wastewaters.

House Plumbing: systems of plumbing-sanitary fittings and other accessories–one pipe and two pipe systems – Design of building drainage.

UNIT – III:

Sewage characteristics – Sampling and analysis of wastewater - Physical, Chemical and Biological Examination-Measurement of BOD and COD - BOD equations.

Treatment of sewage : Primary treatment-Screens-grit chambers-grease traps–floatation– sedimentation – design of preliminary and primary treatment units.

UNIT – IV:

Secondary treatment: Aerobic and anaerobic treatment process-comparison.

Suspended growth process: Activated Sludge Process, principles, designs, and operational problems, modifications of Activated Sludge Processes, Oxidation ponds, Aerated Lagoons.

Attached Growth Process: Trickling Filters–mechanism of impurities removal- classification–design-operation and maintenance problems. RBCs, Fluidized bed reactors.

UNIT V:

Miscellaneous Treatment Methods: Nitrification and Denitrification – Removal of Phosphates –UASB–Membrane reactors-Integrated fixed film reactors. Anaerobic Processes: Septic Tanks and Imhoff tanks- working Principles and Design–disposal of septic tank effluent.

UNIT – VI:

Bio-solids (Sludge) management: Characteristics- handling and treatment of sludge-thickening – anaerobic digestion of sludge.

Disposal of sewage: methods of disposal – disposal into water bodies- Oxygen Sag Curve-disposal on land- sewage sickness.

Text Books

1. Wastewater Engineering Treatment and Reuse by Metcalf & Eddy, Tata McGraw-Hill edition.
2. Elements of Environmental Engineering by K.N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.
3. Environmental Engineering by Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985.
4. Wastewater Treatment for Pollution Control and Reuse, by Soli. J Arceivala, Sham R Asolekar, Mc-GrawHill, NewDelhi; 3rd Edition.

References

1. Environmental Engineering –II: Sewage disposal and Air Pollution Engineering, by Garg, S.K.; Khanna Publishers.
2. Sewage treatment and disposal by Dr. P.N. Modi& Sethi.
3. Environmental Engineering, by Ruth F. Weiner and Robin Matthews – 4th Edition Elsevier, 2003.
4. Environmental Engineering by D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.

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IV Year – I SEMESTER

	T	P	C
	3+1*	0	3

CE704-WATER RESOURCES ENGINEERING–II

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The course is designed to

1. introduce the types of irrigation systems
2. introduce the concepts of planning and design of irrigation systems
3. discuss the relationships between soil, water and plant and their significance in planning an irrigation system.
4. understand design methods of erodible and non-erodible canals
5. know the principles of design of hydraulic structures on permeable foundations.
6. know the concepts for analysis and design principles of storage and diversion head works.
7. learn design principles of canal structures

Course Outcomes

At the end of the course the student will be able to

a. estimate irrigation water requirements
b. design irrigation canals and canal network
c. plan an irrigation system
d. design irrigation canal structures
e. plan and design diversion head works
f. analyse stability of gravity and earth dams
g. design ogee spillways and energy dissipation works

SYLLABUS:

UNIT-I

Irrigation: Necessity and importance, principal crops and crop seasons, types, methods of application, soil-water-plant relationship, soil moisture constants, consumptive use, estimation of consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of

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irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.

UNIT-II

Canals: Classification, design of non-erodible canals - methods of economic section and maximum permissible velocity, economics of canal lining, design of erodible canals -Kennedy's silt theory and Lacey's regime theory, balancing depth of cutting.

UNIT III

Canal Structures:

Falls: Types and location, design principles of Sarda type fall and straight glacis fall.

Regulators: Head and cross regulators, design principles

Cross Drainage Works: Types, selection, design principles of aqueduct, siphon aqueduct and super passage.

Outlets: types, proportionality, sensitivity and flexibility

River Training: Objectives and approaches

UNIT-IV

Diversion Head Works: Types of diversion head works, weirs and barrages, layout of diversion head works, components. causes and failures of weirs on permeable foundations, Bligh's creep theory, Khosla's theory, design of impervious floors for subsurface flow, exit gradient.

UNIT-V

Reservoir Planning: Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation.

Dams: Types of dams, selection of type of dam, selection of site for a dam.

Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a dam, stability analysis, drainage galleries, grouting.

UNIT-VI

Earth Dams: Types, causes of failure, criteria for safe design, seepage, measures for control of seepage-filters, stability analysis-stability of downstream slope during steady seepage and upstream slope during sudden drawdown conditions.

Spillways: Types, design principles of Ogee spillways, types of spillways crest gates. Energy dissipation below spillways-stilling basin and its appurtenances.

TEXT BOOKS:

1. 'Irrigation and Water Power Engineering'by Punmia B C,P.B.B Lal, A.K. Jain and A.K. Jain (2009), Laxmi Publications Pvt. Ltd., New Delhi.
2. 'Irrigation and Water Resources Engineering'by Asawa G L (2013), New Age International Publishers.
3. 'Irrigation Engineering'by Raghunath H.M (2012), Wiley India.
4. 'Irrigation Water Resources and Water Power Engineering'by Modi P N (2011), Standard Book House, New Delhi.

REFERENCES:

1. 'Water Resources Engineering' by Mays L.W (2013), Wiley India Pvt. Ltd, New Delhi.
2. 'Irrigation Engineering' by Sharma R.K. and Sharma, T.K (2012), S.Chand & Co Publishers.
3. 'Water Resources Engineering'by Satyanarayana Murthy Challa (2008), New Age International Publishers.

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IV Year – I SEMESTER

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	3+1*	0	3

CE703-CONSTRUCTION TECHNOLOGY AND MANAGEMENT

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To introduce to the student the concept of project management including network drawing and monitoring.
2. Tto introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery.
3. To introduce the importance of safety in construction projects.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Appreciate the importance of construction planning.
2. Understand the functioning of various earth moving equipment.
3. Know the methods of production of aggregate products and concreting.
4. Apply the gained knowledge to project management and construction techniques.

SYLLABUS:

UNIT- I

Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical path method.

UNIT -II

Project evaluation and review technique – cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources.

UNIT- III

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers.

UNIT -IV

Hoisting and earthwork equipment – hoists – cranes – tractors - bulldozers – graders – scrapers– draglines - clamshell buckets.

UNIT -V

Concreting equipment – crushers – jaw crushers – gyratory crushers – impact crushers – selection of crushing equipment - screening of aggregate – concrete mixers – mixing and placing of concrete – consolidating and finishing.

UNIT -VI

Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering.

TEXT BOOKS:

1. 'Construction Planning , Equipment and Methods' by Peurifoy and Schexnayder , Shapira, Tata Mcgrawhill.
2. 'Construction Project Management Theory and Practice'by Kumar Neeraj Jha (2011), Pearson.
3. 'Construction Technology' by Subir K. Sarkar and Subhajit Saraswati, Oxford University press.

REFERENCES:

1. 'Construction Project Management - An Integrated Approach' by Peter Fewings , Taylor and Francis
2. 'Construciton Management Emerging Trends and Technologies' by Trefor Williams , Cengage learning .

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IV Year – I SEMESTER

	T	P	C
	3+1*	0	3

CE702-PRESTRESSED CONCRETE

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. Familiarize Students with concepts of prestressing.
2. Equip student with different systems and devices used in prestressing.
3. Understand the different losses of prestress including short and long term losses.
4. Familiarize students with the analysis and design of prestressed concrete members under flexure, shear and torsion.

Course Outcomes:

At the end of this course the student will be able to

a. Understand the different methods of prestressing.
b. Estimate the effective prestress including the short and long term losses.
c. Analyze and design prestressed concrete beams under flexure and shear.
d. Understand the relevant IS Codal provisions for prestressed concrete

SYLLABUS:

UNIT-I

Basic concepts of Prestressing- Advantages and Applications of Prestressed Concretes, High Strength Concrete- Permissible Stresses, Shrinkage, Creep, Deformation Characteristics, High strength Steel- Types, Strength-Permissible Stresses- Relaxation of Stress, Stress Corrosion- Durability, Fire Resistance, Cover Requirements.

UNIT-II

Prestressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems, Basic Assumptions in Analysis of prestress and design, Analysis of prestress, Resultant Stresses at a section-

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pressure line- Concepts of load balancing- Stresses in Tendons, Cracking moment.

UNIT-III

Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes -Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage, differential shrinkage- bending of members and frictional losses- Total losses allowed for design.

UNIT-IV

Design for Flexural resistance- Types of flexural failure – Code procedures- Design of sections for flexure- Control of deflections- Factors influencing- Prediction of short term and long term deflections.

UNIT-V

Design for Shear and Torsion- Shear and Principal Stresses- Design of Shear reinforcements- Codal Provisions- Design for Torsion, Design for Combined bending, shear and torsion.

UNIT-IV

Transfer of Prestress in pre tensioned members- Transmission length- Bond stresses- end zone reinforcement- Codal provisions- Anchorage zone Stresses in Post tensioned members- Stress distribution in end block- Anchorage Zone reinforcement.

TEXT BOOKS

1. 'Prestressed Concrete' by N. Krishna Raju, Tata McGraw hill
2. 'Prestressed Concrete' by S. Ramamrutham

REFERENCES:

1. 'Prestressed Concrete' by P. Dayaratnam
2. 'Prestressed Concrete' by T. Y. Lin & Burns, Wiley Publications

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IV Year – I SEMESTER

	T	P	C
	3+1*	0	3

CE802-REMOTE SENSING AND GIS APPLICATIONS

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The course is designed to

1. Introduce the basic principles of Remote Sensing and GIS techniques.
2. Learn various types of sensors and platforms
3. learn concepts of visual and digital image analyses
4. Understand the principles of spatial analysis
5. Appreciate application of RS and GIS to Civil engineering

Course outcomes

At the end of the course the student will be able to

a. Be familiar with ground, air and satellite based sensor platforms.
b. Interpret the aerial photographs and satellite imageries
c. Create and input spatial data for GIS application
d. Apply RS and GIS concepts in water resources engineering

SYLLABUS:

UNIT – I

Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces characteristics of remote sensing systems.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, spaceborne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT.

UNIT – II

Image analysis: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

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UNIT – III

Geographic Information System: Introduction, key components, application areas of GIS, map projections.

Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT – IV

Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing.

UNIT – V

RS and GIS applications General: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications.

UNIT - VI

Application to Hydrology and Water Resources: Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management.

TEXT BOOKS:

1. Bhatta B (2008), 'Remote sensing and GIS', Oxford University Press
2. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi
3. Schowenger, R. A (2006) 'Remote Sensing' Elsevier publishers.
4. 'Fundamentals of Remote Sensing' by George Joseph, Universities Press, 2013.
5. 'Fundamentals of Geographic Information Systems' by Demers, M.N, Wiley India Pvt. Ltd, 2013.

REFERENCES:

1. 'Remote Sensing and its Applications' by Narayan LRA, Universities Press, 2012.
2. 'Concepts and Techniques of Geographical Information System' by Chor Pang Lo and A K W Yeung, Prentice Hall (India), 2006
3. 'Introduction to Geographic Information Systems' by Kand Tsung Chang, McGraw Hill Higher Education, 2009.
4. 'Basics of Remote sensing & GIS' by Kumar S, Laxmi Publications, New Delhi, 2005.
5. 'Principals of Geographical Information Systems' by Burrough P A and R.A. McDonnell, Oxford University Press, 1998.

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IV Year – I SEMESTER

	T	P	C
	3+1*	0	3

CE701-ENVIRONMENTAL ENGINEERING – II

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. Outline planning and the design of wastewater collection, conveyance and treatment systems for a community/town/city.
2. Provide knowledge of characterisation of wastewater generated in a community.
3. Impart understanding of treatment of sewage and the need for its treatment.
4. Summarize the appurtenance in sewerage systems and their necessity.
5. Teach planning, and design of septic tank and imhoff tank and the disposal of the effluent from these low cost treatment systems.
6. Effluent disposal method and realise the importance of regulations in the disposal of effluents in rivers.

Course Outcomes:

By the end of successful completion of this course, the students will be able to:

a. Plan and design the sewerage systems
b. Characterisation of Sewage
c. Select the appropriate appurtenances in the sewerage systems
d. Selection of suitable treatment flow for sewage treatment
e. Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river

SYLLABUS:

UNIT – I:

Introduction to sanitation – systems of sanitation – relative merits & demerits – collection and conveyance of waste water – sewerage –

classification of sewerage systems- Estimation of sewage flow and storm water drainage – fluctuations – types of sewers - Hydraulics of sewers and storm drains– design of sewers – appurtenances in sewerage – cleaning and ventilation of sewers.

UNIT – II:

Pumping of wastewater: Pumping stations – location – components– types of pumps and their suitability with regard to wastewaters.

House Plumbing: systems of plumbing-sanitary fittings and other accessories–one pipe and two pipe systems – Design of building drainage.

UNIT – III:

Sewage characteristics – Sampling and analysis of wastewater - Physical, Chemical and Biological Examination-Measurement of BOD and COD - BOD equations.

Treatment of sewage : Primary treatment-Screens-grit chambers-grease traps–floatation– sedimentation – design of preliminary and primary treatment units.

UNIT – IV:

Secondary treatment: Aerobic and anaerobic treatment process-comparison.

Suspended growth process: Activated Sludge Process, principles, designs, and operational problems, modifications of Activated Sludge Processes, Oxidation ponds, Aerated Lagoons.

Attached Growth Process: Trickling Filters–mechanism of impurities removal- classification–design-operation and maintenance problems. RBCs, Fluidized bed reactors.

UNIT V:

Miscellaneous Treatment Methods: Nitrification and Denitrification – Removal of Phosphates –UASB–Membrane reactors-Integrated fixed film reactors. Anaerobic Processes: Septic Tanks and Imhoff tanks- working Principles and Design–disposal of septic tank effluent.

UNIT – VI:

Bio-solids (Sludge) management: Characteristics- handling and treatment of sludge-thickening – anaerobic digestion of sludge.

Disposal of sewage: methods of disposal – disposal into water bodies-Oxygen Sag Curve-disposal on land- sewage sickness.

Text Books

1. Wastewater Engineering Treatment and Reuse by Metcalf & Eddy, Tata McGraw-Hill edition.
2. Elements of Environmental Engineering by K.N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.
3. Environmental Engineering by Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985.
4. Wastewater Treatment for Pollution Control and Reuse, by Soli. J Arceivala, Sham R Asolekar, Mc-GrawHill, NewDelhi; 3rd Edition.

References

1. Environmental Engineering –II: Sewage disposal and Air Pollution Engineering, by Garg, S.K.; Khanna Publishers.
2. Sewage treatment and disposal by Dr. P.N. Modi& Sethi.
3. Environmental Engineering, by Ruth F. Weiner and Robin Matthews – 4th Edition Elsevier, 2003.
4. Environmental Engineering by D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.

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IV Year – I SEMESTER	T	P	C
	3+1*	0	3

CE702-PRESTRESSED CONCRETE

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. Familiarize Students with concepts of prestressing.
2. Equip student with different systems and devices used in prestressing.
3. Understand the different losses of prestress including short and long term losses.
4. Familiarize students with the analysis and design of prestressed concrete members under flexure, shear and torsion.

Course Outcomes:

At the end of this course the student will be able to

a. Understand the different methods of prestressing.
b. Estimate the effective prestress including the short and long term losses.
c. Analyze and design prestressed concrete beams under flexure and shear.
d. Understand the relevant IS Codal provisions for prestressed concrete

SYLLABUS:

UNIT-I

Basic concepts of Prestressing- Advantages and Applications of Prestressed Concretes, High Strength Concrete- Permissible Stresses, Shrinkage, Creep, Deformation Characteristics, High strength Steel- Types, Strength-Permissible Stresses- Relaxation of Stress, Stress Corrosion- Durability, Fire Resistance, Cover Requirements.

UNIT-II

Prestressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems, Basic Assumptions in Analysis of prestress and design, Analysis of prestress, Resultant Stresses at a section-pressure line- Concepts of load balancing- Stresses in Tendons, Cracking moment.

UNIT-III

Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes -Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of steel, slip in anchorage, differential shrinkage- bending of members and frictional losses- Total losses allowed for design.

UNIT-IV

Design for Flexural resistance- Types of flexural failure – Code procedures- Design of sections for flexure- Control of deflections- Factors influencing- Prediction of short term and long term deflections.

UNIT-V

Design for Shear and Torsion- Shear and Principal Stresses- Design of Shear reinforcements- Codal Provisions- Design for Torsion, Design for Combined bending, shear and torsion.

UNIT-IV

Transfer of Prestress in pre tensioned members- Transmission length- Bond stresses- end zone reinforcement- Codal provisions- Anchorage zone Stresses in Post tensioned members- Stress distribution in end block- Anchorage Zone reinforcement.

TEXT BOOKS

1. ‘Prestressed Concrete’ by N. Krishna Raju, Tata McGraw hill
2. ‘Prestressed Concrete’ by S. Ramamrutham

REFERENCES:

1. ‘Prestressed Concrete’ by P. Dayaratnam
2. ‘Prestressed Concrete’ by T. Y. Lin & Burns, Wiley Publications

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IV Year – I SEMESTER	T	P	C
	3+1*	0	3

CE703-CONSTRUCTION TECHNOLOGY AND MANAGEMENT

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To introduce to the student the concept of project management including network drawing and monitoring.
2. Tto introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery.
3. To introduce the importance of safety in construction projects.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

1. Appreciate the importance of construction planning.
2. Understand the functioning of various earth moving equipment.
3. Know the methods of production of aggregate products and concreting.
4. Apply the gained knowledge to project management and construction techniques.

SYLLABUS:

UNIT- I

Construction project management and its relevance – qualities of a project manager – project planning – coordination –scheduling - monitoring – bar charts – milestone charts – critical path method.

UNIT -II

Project evaluation and review technique – cost analysis - updating – crashing for optimum cost – crashing for optimum resources – allocation of resources.

UNIT- III

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks.

and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers.

UNIT -IV

Hoisting and earthwork equipment – hoists – cranes – tractors - bulldozers – graders – scrapers– draglines - clamshell buckets.

UNIT -V

Concreting equipment – crushers – jaw crushers – gyratory crushers – impact crushers – selection of crushing equipment - screening of aggregate – concrete mixers – mixing and placing of concrete – consolidating and finishing.

UNIT -VI

Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection – quality control and safety engineering.

TEXT BOOKS:

1. 'Construction Planning , Equipment and Methods' by Peurifoy and Schexnayder , Shapira, Tata Mcgrawhill.
2. 'Construction Project Management Theory and Practice'by Kumar Neeraj Jha (2011), Pearson.
3. 'Construction Technology' by Subir K. Sarkar and Subhajit Saraswati, Oxford University press.

REFERENCES:

1. 'Construction Project Management - An Integrated Approach' by Peter Fewings , Taylor and Francis
2. 'Construciton Management Emerging Trends and Technologies' by Trefor Williams , Cengage learning .

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IV Year – I SEMESTER

	T	P	C
	3+1*	0	3

CE704-WATER RESOURCES ENGINEERING–II

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The course is designed to

1. introduce the types of irrigation systems
2. introduce the concepts of planning and design of irrigation systems
3. discuss the relationships between soil, water and plant and their significance in planning an irrigation system.
4. understand design methods of erodible and non-erodible canals
5. know the principles of design of hydraulic structures on permeable foundations.
6. know the concepts for analysis and design principles of storage and diversion head works.
7. learn design principles of canal structures

Course Outcomes

At the end of the course the student will be able to

a. estimate irrigation water requirements
b. design irrigation canals and canal network
c. plan an irrigation system
d. design irrigation canal structures
e. plan and design diversion head works
f. analyse stability of gravity and earth dams
g. design ogee spillways and energy dissipation works

SYLLABUS:

UNIT-I

Irrigation: Necessity and importance, principal crops and crop seasons, types, methods of application, soil-water-plant relationship, soil moisture constants, consumptive use, estimation of consumptive use, crop water requirement, duty and delta, factors affecting duty, depth and frequency of irrigation, irrigation efficiencies, water logging and drainage, standards of quality for irrigation water, crop rotation.

UNIT-II

Canals: Classification, design of non-erodible canals - methods of economic section and maximum permissible velocity, economics of canal lining, design of erodible canals -Kennedy's silt theory and Lacey's regime theory, balancing depth of cutting.

UNIT III

Canal Structures:

Falls: Types and location, design principles of Sarda type fall and straight glacis fall.

Regulators: Head and cross regulators, design principles

Cross Drainage Works: Types, selection, design principles of aqueduct, siphon aqueduct and super passage.

Outlets: types, proportionality, sensitivity and flexibility

River Training: Objectives and approaches

UNIT-IV

Diversion Head Works: Types of diversion head works, weirs and barrages, layout of diversion head works, components. causes and failures of weirs on permeable foundations, Bligh's creep theory, Khosla's theory, design of impervious floors for subsurface flow, exit gradient.

UNIT-V

Reservoir Planning: Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation.

Dams: Types of dams, selection of type of dam, selection of site for a dam.

Gravity dams: Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a dam, stability analysis, drainage galleries, grouting.

UNIT-VI

Earth Dams: Types, causes of failure, criteria for safe design, seepage, measures for control of seepage-filters, stability analysis-stability of downstream slope during steady seepage and upstream slope during sudden drawdown conditions.

Spillways: Types, design principles of Ogee spillways, types of spillways crest gates. Energy dissipation below spillways-stilling basin and its appurtenances.

TEXT BOOKS:

1. 'Irrigation and Water Power Engineering'by Punmia B C,P.B.B Lal, A.K. Jain and A.K. Jain (2009), Laxmi Publications Pvt. Ltd., New Delhi.
2. 'Irrigation and Water Resources Engineering'by Asawa G L (2013), New Age International Publishers.
3. 'Irrigation Engineering'by Raghunath H.M (2012), Wiley India.
4. 'Irrigation Water Resources and Water Power Engineering'by Modi P N (2011), Standard Book House, New Delhi.

REFERENCES:

1. 'Water Resources Engineering' by Mays L.W (2013), Wiley India Pvt. Ltd, New Delhi.
2. 'Irrigation Engineering' by Sharma R.K. and Sharma, T.K (2012), S.Chand & Co Publishers.
3. 'Water Resources Engineering'by Satyanarayana Murthy Challa (2008), New Age International Publishers.

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IV Year – I SEMESTER

T	P	C
0	3	2

CE707-ENVIRONMENTAL ENGINEERING LAB

Lecture :	--	Internal Assessment :	Marks
Tutorial :	--	Semester End Examination :	Marks
Practical :	3 hrs/week	Credits :	2

Course Learning Objectives:

The course will address the following:

1. Estimation some important characteristics of water and wastewater in the laboratory.
2. It also gives the significance of the characteristics of the water and wastewater.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. Estimation some important characteristics of water and wastewater in the laboratory.
b. Draw some conclusion and decide whether the water is potable or not.
c. Decide whether the water body is polluted or not with reference to the state parameters in the list of experiments.
d. Estimation of the strength of the sewage in terms of BOD and COD.

SYLLABUS:

List of Experiments

1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil.
2. Determination and estimation of Total Hardness–Calcium & Magnesium.
3. Determination of Alkalinity/Acidity
4. Determination of Chlorides in water and soil.
5. Determination and Estimation of total solids, organic solids and inorganic solids and settleable solids by Imhoff Cone.
6. Determination of Iron.
7. Determination of Dissolved Oxygen with D.O. Meter & Wrinklers Method and B.O.D.

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8. Determination of N, P, K values in solid waste
9. Physical parameters – Temperature, Colour, Odour, Turbidity, Taste.
10. Determination of C.O.D.
11. Determination of Optimum coagulant dose.
12. Determination of Chlorine demand.
13. Presumptive Coliform test.

NOTE: At least 10 of the above experiments are to be conducted.

List of Equipments

1) pH meter
2) Turbidity meter
3) Conductivity meter
4) Hot air oven
5) Muffle furnace
6) Dissolved Oxygen meter
7) U–V visible spectrophotometer
8) COD Reflux Apparatus
9) Jar Test Apparatus
10) BOD incubator
11) Autoclave
12) Laminar flow chamber
13) Hazen's Apparatus

Text Books

1. Standard Methods for Analysis of Water and Waste Water – APHA.
2. Chemical Analysis of Water and Soil by KVSG Murali Krishna, Reem Publications, New Delhi.

Reference

1. Relevant IS Codes.
2. Chemistry for Environmental Engineering by Sawyer and Mc. Carty.

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IV Year – II SEMESTER

	T	P	C
	3+1*	0	3

CE801-ESTIMATING, SPECIFICATIONS & CONTRACTS

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is to enable the students to:

1. Understand the quantity calculations of different components of the buildings.
2. Understand the rate analysis of different quantities of the buildings components.
3. Learn various specifications and components of the buildings.

Course Outcomes:

Upon the successful completion of this course:

a. The student should be able to determine the quantities of different components of buildings.
b. The student should be in a position to find the cost of various building components.
c. The student should be capable of finalizing the value of structures.

SYLLABUS:

UNIT – I

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates –Approximate method of Estimating.

UNIT – II

Rate Analysis – Working out data for various items of work over head and contigent charges.

UNIT-III

Earthwork for roads and canals, Reinforcement bar bending and bar requirement schedules.

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UNIT – IV

Contracts – Types of contracts – Contract Documents – Conditions of contract, Valuation of buildings-
Standard specifications for different items of building construction.

UNIT-V

Detailed Estimation of Buildings using individual wall method.

UNIT -VI

Detailed Estimation of Buildings using centre line method.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of SIX questions from Unit 1 to Unit 4, out of which THREE are to be answered (60% weight-age) & ONE mandatory question (40% weight-age) from Units 5 & 6 is to be answered.

TEXT BOOKS:

1. 'Estimating and Costing' by B.N. Dutta, UBS publishers, 2000.
2. 'Civil Engineering Contracts and Estimates' by B. S. Patil, Universities Press (India) Pvt. Ltd., Hyd.
3. 'Construction Planning and Technology' by Rajiv Gupta, CBS Publishers & Distributors Pvt. Ltd. New Delhi.
4. 'Estimating and Costing' by G.S. Birdie.

REFERENCES:

1. 'Standard Schedule of rates and standard data book' by public works department.
2. IS 1200 (Parts I to XXV-1974/ Method of Measurement of Building & Civil Engg Works – B.I.S.)
3. 'Estimation, Costing and Specifications' by M. Chakraborthi; Laxmi publications.
4. National Building Code

IV Year – I SEMESTER

	T	P	C
	3+1*	0	3

CE802-REMOTE SENSING AND GIS APPLICATIONS

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The course is designed to

1. Introduce the basic principles of Remote Sensing and GIS techniques.
2. Learn various types of sensors and platforms
3. learn concepts of visual and digital image analyses
4. Understand the principles of spatial analysis
5. Appreciate application of RS and GIS to Civil engineering

Course outcomes

At the end of the course the student will be able to

a. Be familiar with ground, air and satellite based sensor platforms.
b. Interpret the aerial photographs and satellite imageries
c. Create and input spatial data for GIS application
d. Apply RS and GIS concepts in water resources engineering

SYLLABUS:

UNIT – I

Introduction to remote sensing: Basic concepts of remote sensing, electromagnetic radiation, electromagnetic spectrum, interaction with atmosphere, energy interaction with the earth surfaces characteristics of remote sensing systems.

Sensors and platforms: Introduction, types of sensors, airborne remote sensing, spaceborne remote sensing, image data characteristics, digital image data formats-band interleaved by pixel, band interleaved by line, band sequential, IRS, LANDSAT, SPOT.

UNIT – II

Image analysis: Introduction, elements of visual interpretations, digital image processing- image preprocessing, image enhancement, image classification, supervised classification, unsupervised classification.

UNIT – III

Geographic Information System: Introduction, key components, application areas of GIS, map projections.

Data entry and preparation: spatial data input, raster data models, vector data models.

UNIT – IV

Spatial data analysis: Introduction, overlay function-vector overlay operations, raster overlay operations, arithmetic operators, comparison and logical operators, conditional expressions, overlay using a decision table, network analysis-optimal path finding, network allocation, network tracing.

UNIT – V

RS and GIS applications General: Land cover and land use, agriculture, forestry, geology, geomorphology, urban applications.

UNIT - VI

Application to Hydrology and Water Resources: Flood zoning and mapping, groundwater prospects and potential recharge zones, watershed management.

TEXT BOOKS:

1. Bhatta B (2008), 'Remote sensing and GIS', Oxford University Press
2. Lillesand, T.M, R.W. Kiefer and J.W. Chipman (2013) 'Remote Sensing and Image Interpretation', Wiley India Pvt. Ltd., New Delhi
3. Schowenger, R. A (2006) 'Remote Sensing' Elsevier publishers.
4. 'Fundamentals of Remote Sensing' by George Joseph, Universities Press, 2013.
5. 'Fundamentals of Geographic Information Systems' by Demers, M.N, Wiley India Pvt. Ltd, 2013.

REFERENCES:

1. 'Remote Sensing and its Applications' by Narayan LRA, Universities Press, 2012.
2. 'Concepts and Techniques of Geographical Information System' by Chor Pang Lo and A K W Yeung, Prentice Hall (India), 2006
3. 'Introduction to Geographic Information Systems' by Kand Tsung Chang, McGraw Hill Higher Education, 2009.
4. 'Basics of Remote sensing & GIS' by Kumar S, Laxmi Publications, New Delhi, 2005.
5. 'Principals of Geographical Information Systems' by Burrough P A and R.A. McDonnell, Oxford University Press, 1998.

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IV Year – I SEMESTER

T	P	C
0	3	2

CE806-GIS & CAD LAB

Lecture :	--	Internal Assessment :	30 Marks
Tutorial :	--	Semester End Examination :	70 Marks
Practical :	3 hrs/Week	Credits :	2

Course Learning Objectives:

The course is designed to

1. introduce image processing and GIS software
2. familiarize structural analysis software
3. understand the process of digitization, creation of thematic map from toposheets and maps.
4. learn to apply GIS software to simple problems in water resources and transportation engineering.
5. learn to analyse 2 D and 3D frame steel tubular truss using structural analysis software.
6. learn to analyse and design retaining wall and simple towers.

Course outcomes

At the end of the course the student will be able to

a. work comfortably on GIS software
b. digitize and create thematic map and extract important features
c. develop digital elevation model
d. use structural analysis software to analyse and design 2D and 3D frames.
e. design and analyse retaining wall and simple towers using CADD software.

GIS:

SOFTWARES:

1. Arc GIS 9.0
2. ERDAS 8.7
3. Mapinfo 6.5

Any one or Equivalent.

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EXCERCISES IN GIS:

1. Digitization of Map/Toposheet
2. Creation of thematic maps.
3. Estimation of features and interpretation
4. Developing Digital Elevation model
5. Simple applications of GIS in water Resources Engineering & Transportation Engineering.

COMPUTER AIDED DESIGN AND DRAWING:

SOFTWARE:

1. STAAD PRO / Equivalent/
2. STRAAP
3. STUDDS

EXCERCISIES:

1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple Tower Analysis and Design

TEXT BOOK:

1. 'Concept and Techniques of GIS' by C.P.L.O. Albert, K.W. Yong, Printice Hall Publishers.

	T	P	C
IV Year – II SEMESTER	0	0	9

Project Work

CE805-PROJECT WORK

Contact Hours :	9 hrs/Week	Internal Assessment :	60 Marks
Tutorial :	---	Semester End Examination :	140 Marks
Practical :	---	Credits :	9

The main objective of the Project work is

a. To enable the student apply engineering knowledge that has been taught all through the programme for solving practical engineering problem.
b. To enable the student capable for prblem solving / problem shooting.
c. To instill and inculcate team spirit/ team work in to the minds of the students.
d. To enable/ train the students report making/ documnetation.
e. To provide students an opportunity to use any civil engineering software for their project work.

Out comes of the Project work.

Up on completion of the Project work, the student will be able to

1. Apply all levels of Engineering knowledge in solving the Engineering problems.
2. Work together with team spirit.
3. Use Civil Engineering software at least one.
4. Document the projects

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III Year – II SEMESTER

T	P	C
3+1*	0	3

(Open Elective)

CE606 (a) - ENVIRONMENTAL POLLUTION AND CONTROL

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. Impart knowledge on fundamental aspects of air pollution & control, noise pollution, and solid waste management.
2. Provide basic knowledge on sustainable development.
3. Introduces some basics of sanitation methods essential for protection of community health.
4. Differentiate the solid and hazardous waste based on characterization.

Course Learning Outcomes:

By the end of successful completion of this course, the students will be able to:

a. Identify the air pollutant control devices
b. Have knowledge on the NAAQ standards and air emission standards
c. Differentiate the treatment techniques used for sewage and industrial wastewater treatment methods.
d. Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.
e. Appreciate the methods of environmental sanitation and the management of community facilities without spread of epidemics.
f. Appreciate the importance of sustainable development while planning a project or executing an activity.

SYLLABUS:

UNIT – I

Air Pollution: Air pollution Control Methods–Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards.

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Noise Pollution: Noise standards, Measurement and control methods – Reducing residential and industrial noise – ISO14000.

UNIT –II

Industrial wastewater Management: – Strategies for pollution control - Volume and Strength reduction – Neutralization – Equalization – Proportioning – Common Effluent Treatment Plants - Recirculation of industrial wastes – Effluent standards.

UNIT – III

Solid Waste Management: solid waste characteristics – basics of on-site handling and collection – separation and processing - Incineration-Composting-Solid waste disposal methods – fundamentals of Land filling.

UNIT – IV

Environmental Sanitation: Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation-low cost waste disposal methods.

UNIT – V

Hazardous Waste: Characterization - Nuclear waste – Biomedical wastes – Electronic wastes - Chemical wastes – Treatment and management of hazardous waste-Disposal and Control methods.

UNIT- VI

Sustainable Development: Definition- elements of sustainable developments-Indicators of sustainable development- Sustainability Strategies- Barriers to Sustainability–Industrialization and sustainable development – Cleaner production in achieving sustainability- sustainable development.

TEXT BOOKS:

1. Environmental Engineering, by Ruth F. Weiner and Robin Matthews – 4th Edition Elesevier, 2003.
2. Environmental Science and Engineering by J.G. Henry and G.W. Heinke – Pearson Education.
3. Environmental Engineering by Mackenzie L Davis & David A Cornwell. McGraw Hill Publishing.

REFERENCES:

1. Air Pollution and Control by M.N. Rao & H.N. Rao
2. Solid Waste Management by K. Sasi Kumar, S.A. Gopi Krishna. PHI New Delhi.
3. Environmental Engineering by Gerard Kiley, Tata McGraw Hill.
4. Environmental Sanitation by KVSG Murali Krishna, Reem Publications, New Delhi.
5. Industrial Water Pollution Control by Nemerow Jr., McGraw Hill Publishing.
6. Unit Operations and Processes in Environmental Engineering by Reynolds. Richard – Cengage Learning.
7. Environmental Engineering by D. Srinivasan, PHI Learning Private Limited, New Delhi, 2011.
8. Environmental Engineering – Howard S. Peavy, Donald R. Rowe, Teorge George Tchobanoglus – Mc-Graw-Hill Book Company, New Delhi, 1985.

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CE606 (b) - DISASTER MANAGEMENT

(Open Elective)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
2. Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
3. Understand the 'relief system' and the 'disaster victim.'
4. Describe the three planning strategies useful in mitigation.
5. Identify the regulatory controls used in hazard management.
6. Describe public awareness and economic incentive possibilities.
7. Understand the tools of post-disaster management.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. Affirm the usefulness of integrating management principles in disaster mitigation work
b. Distinguish between the different approaches needed to manage pre- during and post- disaster periods
c. Explain the process of risk management
d. Relate to risk transfer

SYLLABUS:

UNIT-I

Natural Hazards And Disaster Management: Introduction of DM – Inter disciplinary -nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: floods, draughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

UNIT-III

Man Made Disastar And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics –

solid waste management – post disaster – bio terrotirism -threat in mega cities, rail and air craft's accidents, and Emerging infectious diseases & Aids and their management.

UNIT-III

Risk And Vulnerability: Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.

UNIT-IV

Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges- mitigation programme for earth quakes –flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training-transformable indigenous knowledge in disaster reduction.

UNIT-V

Education And Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building community capacity for action.

UNIT-VI

Multi-sectional Issues: Impact of disaster on poverty and deprivation-Climate change adaptation and human health -Exposure , health hazards and environmental risk-Forest management and disaster risk reduction.-Institutional capacity in disaster management -The Red cross and red crescent movement.-Corporate sector and disaster risk reduction-A community focused approach.

TEXT BOOKS:

1. 'Disaster Management – Global Challenges and Local Solutions' by Rajib shah & R R Krishnamurthy(2009),Universities press.
2. 'Disaster Science & Management' by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. 'Disaster Management – Future Challenges and Opportunities' by Jagbir Singh (2007), I K International Publishing House Pvt. Ltd.

REFERENCE BOOKS:

1. 'Disaster Management' edited by H K Gupta (2003),Universities press.

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CE606 (c) -INDUSTRIAL WATER & WASTE WATER MANAGEMENT

(Open Elective)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The course will address the following:

1. Enables the student to distinguish between the quality of domestic and industrial water requirements and wastewater quantity generation.
2. To impart knowledge on selection of treatment methods for industrial wasteswater.
3. To know the common methods of treatment in different industries.
4. To acquire knowledge on operational problems of common effluent treatment plant.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. Suggest treatment methods for any industrial wastewater.
b. Learn the manufacturing process of various industries.
c. Student will be in a position to decide the need of common effluent treatment plant for the industrial area in their vicinity.

SYLLABUS:

UNIT – I

Industrial water Quantity and Quality requirements: Boiler and cooling waters–Process water for Textiles, Food processing, Brewery Industries, power plants, fertilizers, sugar mills.

UNIT – II

Miscellaneous Treatment: Use of Municipal wastewater in Industries – Advanced water treatment - Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, elutriation, Removal of Iron and Manganese, Removal of Colour and Odour.

UNIT – III

Basic theories of Industrial Wastewater Management: Industrial waste survey - Measurement of industrial wastewater Flow-generation rates – Industrial wastewater sampling and preservation of samples for analysis -

Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction – Neutralization – Equalization and proportioning- recycling, reuse and resources recovery.

UNIT – IV
Industrial wastewater disposal management: discharges into Streams, Lakes and oceans and associated problems, Land treatment - Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method.

UNIT – V
Process and Treatment of specific Industries-1: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants.

UNIT – VI
Process and Treatment of specific Industries-2: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Pharmaceutical Plants.

Text book

1. Wastewater Treatment by M.N. Rao and A.K. Dutta, Oxford & IBH, New Delhi.
2. Industrial Wastewater Treatment by KVSG Murali Krishna.
3. Industrial Wastewater treatment by A.D. Patwardhan, PHI Learning, Delhi.
4. Wastewater Treatment for Pollution Control and Reuse, by Soli. J Arceivala, Shyam R Asolekar, Mc-Graw Hill, New Delhi; 3rd Edition.

References

1. Industrial Water Pollution Control by W. Wesley Eckenfelder, Mc-GrawHill, Third Edition
2. Wastewater Engineering by Metcalf and Eddy Inc., Tata McGrawhill Co., New Delhi
3. Wastewater Treatment- Concepts and Design Approach by G.L. Karia & R.A. Christian, Prentice Hall of India.
4. Unit Operations and Processes in Environmental Engineering by Reynolds. Richard, Cengage Learning.

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CE606 (d) - ARCHITECTURE AND TOWN PLANNING

(Open Elective)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. Initiating the students to different architectures of the world. The distinctions between the eastern and western architecture styles are focused.
2. The salient features of Egyptian, Greek, Roman, Indian Vedic, Indus valley civilization, Buddhist, Hindu and Indo-Sarsanic Architecture are introduced.
3. Architectural design concepts, principles of planning and composition are imparted.
4. To enable the student to understand town planning from ancient times to modern times.
5. To impart the concepts of town planning standards, land scaping and expansion of towns.

Course Outcomes:

Upon the successful completion of this course:

a. The student should be able to distinguish architectural styles of eastern and western world.
b. The student should understand the importance of Orders of architecture.
c. Should be able to compose spaces of buildings using design concepts, planning principles.
d. Should understand the town planning standards, landscaping features and regulations controlling expansion of the towns and the cities.

SYLLABUS:

UNIT – I

History of Architecture: Western Architecture:Egyptian, Greek, Roman Architectures- Orders. Indian Architecture: Vedic age, Indus valley civilization– Buddhist period: Stambas, Stupa, Toranas, Chaityas, Viharas – Hindu temples: Dravidian and Indo Aryan Styles-Temple of Aihole, Madurai, Bhuvaneshwar, Mount Abu. Indo Sarsanic (Islamic) Architecture: Mosque - Palace - Fort - Tomb.

UNIT – II

Architectural Design: Principles of designing – Composition of Plan – relationship between plan and elevation- building elements, form, surface texture, mass, line, color, tone- Principles of Composition: Unity, contrast, proportion, scale, balance, circulation, rhythm, character, expression.

UNIT - III

Principles of Planning: Principles of planninga residence- site selection, site orientation- aspect, prospect, grouping, circulation, privacy, furniture requirements, services and other factors.

Post-classic Architecture: Introduction of post-classic architecture-contribution of eminent architects to modern period-Edward Lutyens, Le Corbusier, Frank Lloyd Wrigt, Walter Groping.

UNIT – IV

Histroical Back Ground of Town Planning: Town planning in India – Town plans of mythological Manasa-Town plans of ancient towns: Harappa, Mohenjodaro, Pataliputra, Delhi, Acropolis (Greece), Jerusalem, Mecca, Rome, London.

UNIT – V

Modern Town Planning: Zoning- Roads and road traffic- Housing- Slums, Parks, Play grounds- Public Utility Services- Surveys and maps for planning-Neighborhood Planning.

Standards of Town planning: Planning new towns, planning standards and specifications, national and regional planning, town planning and legislation-planning regulations and limitations.

UNIT – VI

Land Scaping and Expansion of Towns: Land scaping for the towns, horizontal and vertical expansion of towns- garden cities, satellite towns-floating towns- sky scrapers-pyramidal cities.

TEXTBOOKS:

1. 'The great ages of World Architecture' by G.K. Hiraskar.
2. 'Planning and Design of Buildings by Section of Architecture' by Y. S. Sane.

3. 'Professional Practice' by G.K.Krishnamurthy, S.V.Ravindra, PHI Learning, New Delhi.
4. 'Indian Architecture – Vol. I & II' by Percy Brown, Taraporevala Publications, Bombay.
5. 'Fundamentals of Town Planning'by G.K. Haraskar.

REFERENCES:

1. 'Drafting and Design for Architecture' by Hepler, Cengage Learning
2. 'Architect's Portable Handbook' by John Patten Guthrie – Mc Graw Hill International Publications.
3. 'Mordern Ideal Homes for India' by R. S. Deshpande.
4. 'Town and County Planning'by A.J.Brown and H.M.Sherrard.
5. 'Town Design'by Federik Glbbard, Architectural press, London.

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CE606 (e) - FINITE ELEMENT METHOD

(Open Elective)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. Equip the students with the fundamentals of Finite Element Analysis
2. Enable the students to formulate the design problems into FEA.
3. Enable the students to solve Boundary value problems using FEM.

Course Outcomes:

Upon completion of the course, the student will be able to

a. Solve simple boundary value problems using Numerical technique of Finite element method.
b. Develop finite element formulation of one and two dimensional problems and solve them.
c. Assemble Stiffness matrices, Apply boundary conditions and solve for the displacements.
d. Compute Stresses and Strains and interpret the result.

SYLLABUS:

UNIT-I

Introduction: Review of stiffness method- Principle of Stationary potential energy-Potential energy of an elastic body- Rayleigh-Ritz method of functional approximation.

UNIT-II

Principles of Elasticity- Equilibrium Equations- Strain Displacement relationships- Constitutive relationship for plane stress, plane stain and axi symmetric bodies of revolution with axi symmetric loading.

UNIT-III

Finite Element formulation of truss element: Stiffness matrix- properties of stiffness matrix –Selection of approximate displacement functions- solution of a plane truss- transformation matrix- Galerkin's method for 1-D truss – Computation of stress in a truss element.

UNIT-IV

Finite element formulation of Beam elements: Beam stiffness- assemblage of beam stiffness matrix- Examples on Analysis of beams Subjected to Concentrated and Distributed loading.

UNIT-V

Finite element formulation for plane stress and plane strain problems- Derivation of CST and LST stiffness matrix and equations-treatment of body and surface forces

UNIT-VI

Iso-parametric Formulation: An isoparametric bar element- plane bilinear isoparametric element – quadratic plane element - shape functions, evaluation of stiffness matrix, consistent nodal load vector - Gauss quadrature for performing numerical integrations.

TEXT BOOKS

1. ‘A first course in the Finite Element Method’by Daryl L. Logan, Thomson Publications.
2. ‘Introduction to Finite Elements in Engineering’ by Tirupati R. Chandrupatla, Ashok D. Belgundu, PHI publications.
3. ‘Introduction to Finite Element Method’ by Desai & Abel CBS Publications.

REFERENCES:

1. ‘Concepts and applications of Finite Element Analysis’by Robert D. Cook, Michael E Plesha, John Wiley & sons Publications.
2. ‘Text book of Finite Element Analysis’by P. Seshu, Prentice Hall of India.

CE606 (f) - GREEN TECHNOLOGIES

(Open Elective)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To present different concepts of green technologies.
2. To acquire principles of Energy efficient technologies.
3. To impart knowledge on the methods of reducing CO_2 levels in atmosphere.
4. To gain knowledge of the importance of life cycle assessment
5. To learn the importance of green fuels and its impact on environment.

Course Learning Outcomes

Upon successful completion of this course, the students will be able to:

a. Enlist different concepts of green technologies in a project
b. Understand the principles of Energy efficient technologies
c. Estimate the carbon credits of various activities
d. Identify the importance of life cycle assessment
e. Recognize the benefits of green fuels with respect to sustainable development.

SYLLABUS:

UNIT- I

Introduction : Green Technology – definition- Importance – Historical evolution – advantages and disadvantages of green technologies-factors affecting green technologies- Role of Industry, Government and Institutions – Industrial Ecology – role of industrial ecology in green technology.

UNIT- II

Cleaner Production (CP): Definition – Importance – Historical evolution - Principles of Cleaner Production–Benefits–Promotion – Barriers – Role of Industry, Government and Institutions – clean development mechanism, reuse, recovery, recycle, raw material substitution-Wealth from waste, case studies.

UNIT- III

Cleaner Production Project Development and Implementation: Overview of CP Assessment Steps and Skills, Process Flow Diagram, Material Balance,

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CP Option Generation – Technical and Environmental Feasibility analysis – Economic valuation of alternatives - Total Cost Analysis – CP Financing – Preparing a Program Plan – Measuring Progress- ISO 14000.

UNIT- IV

Pollution Prevention and Cleaner Production Awareness Plan – Waste audit – Environmental Statement, carbon credit, carbon sequestration, carbon trading, Life Cycle Assessment - Elements of LCA – Life Cycle Costing – Eco Labelling.

UNIT -V

Availability and need of conventional energy resources, major environmental problems related to the conventional energy resources, future possibilities of energy need and availability. Non-conventional energy sources: Solar Energy-solar energy conversion technologies and devices, their principles, working and application.

UNIT- VI

Green Fuels – Definition-benefits and challenges – comparison of green fuels with conventional fossil fuels with reference to environmental, economical and social impacts- public policies and market-driven initiatives.

Biomass energy: Concept of biomass energy utilization, types of biomass energy, conversion processes, Wind Energy, energy conversion technologies, their principles, equipment and suitability in Indian context; tidal and geothermal energy.

TEXT BOOKS:

REFERENCES:

1. 'Pollution Prevention: Fundamentals and Practice' by Paul L Bishop (2000), McGraw Hill International.
2. 'Pollution Prevention and Abatement Handbook – Towards Cleaner Production' by World Bank Group (1998), World Bank and UNEP, Washington D.C.
3. 'Cleaner Production Audit' by Prasad Modak, C.Visvanathan and Mandar Parasnis (1995), Environmental System Reviews, No.38, Asian Institute of Technology, Bangkok
4. 'Handbook of Organic Waste Conversion' by Bewik M.W.M.
5. 'Energy, The Solar Hydrogen Alternative' by Bokris J.O.
6. 'Non-conventional Energy Sources' by Rai G.D.
7. 'Solar Energy' by Sukhatme S.P.
8. 'Waste Energy Utilization Technology' by Kiang Y. H.

IV Year – I SEMESTER

	T	P	C
	3+1*	0	3

Elective-I

CE705 (a) - GROUND IMPROVEMENT TECHNIQUES

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To make the student appreciate the need for different ground improvement methods adopted for improving the properties of remoulded and in-situ soils by adopting different techniques such as in situ densification and dewatering methods.
2. To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
3. To enable the students to know how geotextiles and geosynthetics can be used to improve the engineering performance of soils.
4. To make the student learn the concepts, purpose and effects of grouting.

Course Outcomes:

a. By the end of the course, the student should be able to possess the knowledge of various methods of ground improvement and their suitability to different field situations.

b. The student should be in a position to design a reinforced earth embankment and check its stability.

c. The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.

d. The student should be able to understand the concepts and applications of grouting.

SYLLABUS:

UNIT- I

In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

UNIT -II

Dewatering – sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis

UNIT- III

Stabilization of soils – methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT- IV

Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing.

UNIT- V

Geosynthetics – geotextiles – types – functions , properties and applications – geogrids , geomembranes and gabions - properties and applications.

UNIT-VI

Grouting – objectives of grouting – grouts and their applications – methods of grouting – stage of grouting – hydraulic fracturing in soils and rocks – post grout tests

TEXT BOOKS:

1. 'Ground Improvement Techniques'by Purushotham Raj, Laxmi Publications, New Delhi.
2. 'Ground Improvement Techniques' by Nihar Ranjan Patro, Vikas Publishing House (P) Limited, New Delhi.
3. 'An introduction to Soil Reinforcement and Geosynthetics' by G.L.Siva Kumar Babu, Universities Press.

REFERENCE BOOKS:

1. 'Ground Improvement' by MP Moseley, Blackie Academic and Professional, USA.
2. 'Designing with Geosynethetics' by RM Koerner, Prentice Hall.

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CE705 (b) - AIR POLLUTION AND CONTROL

(Elective-I)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The course will address the following:

1. To know the analysis of air pollutants
2. To know the Threshold Limit Values (TLV) of various air pollutants
3. To acquire the design principles of particulate and gaseous control
4. To learn plume behaviour in different environmental conditions
5. To learn carbon credits for various day to day activities

Course Learning Outcomes:

Upon successful completion of this course, the students will be able to:

a. Decide the ambient air quality based the analysis of air pollutants.

b. The design principles of particulate and gaseous control measures for an industry.

c. Judge the plume behaviour in a prevailing environmental condition

d. Estimate carbon credits for various day to day activities.

SYLLABUS:

UNIT – I

Air Pollution: Sampling and analysis of air pollutants, conversion of ppm into $\mu g/m^3$. Definition of terms related to air pollution and control - secondary pollutants - Indoor air pollution - Climate Change and its impact - Carbon Trade.

UNIT-II

Thermodynamics and Kinetics of Air-pollution: Applications in the removal of gases like SOx, NOx, CO and HC - Air-fuel ratio- Computation and Control of products of combustion, Automobile pollution. Odour pollution control, Flares.

UNIT – III

Meteorology and Air Pollution: Properties of atmosphere: Heat, Pressure, Wind forces, Moisture and relative Humidity, Lapse Rates - Influence of

Terrain and Meteorological phenomena on plume behaviour and Air Quality - Wind rose diagrams, Plume Rise Models.

UNIT-IV

Ambient Air Quality Management: Monitoring of SPM, SO2; NOx and CO - Stack Monitoring for flue gases - Micro-meteorological monitoring - Weather Station. Emission Standards- Gaussian Model for Plume Dispersion.

UNIT-V

Air Pollution Control: Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control Equipments – Settling Chambers, Cyclone separators –Fabric filters–scrubbers, Electrostatic precipitators.

UNIT – VI

Air Pollution Control Methods: Control of NOx and SOx emissions – Environmental friendly fuels - In-plant Control Measures, process changes, methods of removal and recycling. Environmental criteria for setting industries and green belts.

TEXT BOOKS:

1. Air Pollution by M.N. Rao and H.V.N. Rao – Tata McGraw Hill Company.
2. Air Pollution and Control by KVSG Murali Krishna, Laxmi Publications, New Delhi.

REFERENCE:

1. An Introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.
2. Air pollution by Wark and Warner - Harper & Row, New York.

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CE705 (c) - MATRIX METHODS OF STRUCTURAL ANALYSIS

(Elective-I)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. Learn the fundamental concepts of matrix structural mechanics, such as the stiffness method.
2. The concepts of structural analysis learnt in mechanics of solids and structures course.
3. Understanding the analysis of statically determinate and indeterminate structures such as trusses, beams, frames and plane stress problems.
4. Learn the concepts of the stiffness method and apply it to a variety of structural problems involving trusses, beams, frames, and plane stress.

Course Outcomes:

Upon completion of the course, the student will be able to

a. Perform the structural analysis of determinate and indeterminate structures using classical compatibility methods, such as method of consistent deformations, force and equilibrium methods.
b. Perform structural analysis using the stiffness method.
c. Solve multiple degree of freedom two dimensional problems involving trusses, beams, frames and plane stress.

SYLLABUS:

UNIT-I

Introduction of Matrix methods of analysis – Properties of Matrices, singular matrix, Rank of a Matrix and Rank deficiency- Static indeterminacy and Kinematic indeterminacy – Degree of freedom – Structure idealization-stiffness and flexibility methods – Suitability.

UNIT-II

Generation Element stiffness matrix for truss element, beam element and torsional element- Element force - displacement equations.

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UNIT-III

Stiffness method for beam Elements – Element and global stiffness equation – coordinate transformation and global assembly – structure stiffness matrix equation – analysis of continuous beams.

UNIT-IV

Stiffness method for plane trusses and Grid elements – development of stiffness matrix – coordinate transformation. Examples of pin jointed trusses and simple grid problems.

UNIT-V

Additional topics in stiffness methods – Discussion of band width – semi band width – static condensation – sub structuring –Loads between joints-Support displacements.

UNIT-VI

Space trusses and frames - Member stiffness for space truss and space frame–Transformation matrix from Local to Global – Analysis of simple trusses, beams and frames.

TEXT BOOK :

1. 'Matrix Methods of Structural Analysis' by Pundit and Gupta
2. 'Matrix Methods of Structural Analysis'by Weaver and Gere, CBS Publishers.

REFERENCES:

1. 'Matrix analysis of structures' by Robert E Sennet- Prentice Hall-Englewood cliffs-New Jercy.
2. 'Advanced structural analysis' by Dr. P. Dayaratnam- Tata Mc Graw hill publishing company limited.

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CE705 (d) - URBAN HYDROLOGY

(Elective-I)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The course is designed to:

1. appreciate the impact of urbanization on catchment hydrology
2. understand the importance of short duration rainfall runoff data for urban hydrology studies.
3. learn the techniques for peak flow estimation for storm water drainage system design.
4. understand the concepts in design of various components of urban drainage systems.
5. learn some of the best management practices in urban drainage.
6. understand the concepts of preparation master urban drainage system.

Course Outcomes

At the end of the course the student will be able to

a. develop intensity duration frequency curves for urban drainage systems.
b. develop design storms to size the various components of drainage systems.
c. apply best management practices to manage urban flooding.
d. prepare master drainage plan for an urbanized area.

SYLLABUS:

UNIT I

Introduction: Urbanisation and its effect on water cycle – urban hydrologic cycle – trends in urbanisation – Effect of urbanisation on hydrology.

UNIT II

Precipitation Analysis: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration for design of urban drainage systems, Intensity-Duration -Frequency (IDF)curves, design storms for urban drainage systems.

UNIT III

Approaches to urban drainage: Time of concentration, peak flow estimation approaches , rational method, NRCS curve number approach, runoff quantity and quality, wastewater and stormwater reuse , major and minor systems.

UNIT IV

Elements of drainage systems: Open channel, underground drains, appurtenances, pumping, source control.

UNIT V

Analysis and Management: Stormwater drainage structures, design of stormwater network- Best Management Practices–detention and retention facilities, swales, constructed wetlands, models available for stormwater management.

UNIT IV

Master drainage plans: Issues to be concentrated upon – typical urban drainage master plan, interrelation between water resources investigation and urban planning processes , planning objectives, comprehensive planning , use of models in planning.

TEXT BOOKS:

1. 'Manual on Drainage in Urbanised area'by Geiger W. F., J Marsalek, W. J. Rawls and F. C. Zuidema, (1987 - 2 volumes), UNESCO,
2. 'Urban Hydrology' by Hall M J (1984), Elsevier Applied Science Publisher.
3. 'Hydrology – Quantity and Quality Analysis' by Wanielista M P and Eaglin (1997), Wiley and Sons.
4. 'Urban Hydrology, Hydraulics and Stormwater Quality: Engineering Applications and Computer Modelling' by Akan A.O and R.L. Houghtalen (2006), Wiley International.

REFERENCES

1. 'Stormwater Detention for Drainage' by Stahre P and Urbonas B (1990), Water Quality and CSO Management, Prentice Hall.
2. 'Urban water cycle processes and interactions' by Marsalek et al (2006), Publication No. 78, UNESCO, Paris (http://www.bvsde.paho.org/bvsacd/cd63/149460E.pdf)
3. 'Frontiers in Urban Water Management – Deadlock or Hope' by Maksimovic C and J A Tejada-Guibert (2001), IWA Publishing.

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CE705 (e) - ADVANCED SURVEYING

(Elective-I)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is to enable the students to,

1. Understand the basics of Geodetic Surveying and triangulation systems.
2. Understand the hygrographic surveying and prediction of tides.
3. Understand the Photogrammetric Surveying and Astronomical Surveying.
4. Understand the importance and applications of total stations and GPS.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. The student should be able to conduct different types of surveys for obtaining better results.

b. The student should be able to utilize the total stations for getting the required information.

c. The student should be capable of using the GPS instrument to obtain appropriate information of the objectsand their positions.

SYLLABUS:

UNIT – I

Geodetic Surveying: Definition, importance, triangulation system, order of triangulation, size and shape of triangulation, strength of figure criterion, triangulation fieldwork, base line measurement- tape corrections, problems in baseline measurement, measurement of angles.

UNIT –I I

Hydrographic Surveying: Tides-lunar tides, solar tides, spring and neap tides, measurement of tides- shore lines, soundings, sounding equipments, locating soundings by cross rope method and range and time intervals-mean sea level-prediction of tides.

UNIT – III

Photogrammetric Surveying: Basic principles,-photo theodolite, horizontal and vertical angles from terrestrial photographs, elevation of a point by photographic measurement, determination of focal length of the lens, Aerial camera- scale of vertical photograph, scale of tilted photograph, combined effects of tilt and relief, stereoscopic vision, mosaics.

UNIT – IV

Astronomical Surveying: Spherical Trigonometry, latitude and longitude, solar system, astronomical teams, coordinate systems-altitude, azimuth system, declination, hour angle system, time and astronomical work-sidereal time, apparent solar time, mean solar time, standard time, standard time, application of astronomy in surveying, corrections to astronomical observations.

UNIT – V

Total stations: Importance, measurement of horizontal angles, vertical angles, horizontal distance, slope distance, height of object-remote elevation measurement (REM), remote distance measurement (RDM)-radial and continuous distances for measuring the lengths and sides of the closed circuits, areas and perimeters calculations.

UNIT – VI

Global Positioning System: Principles of GPS, components of GPS, types of GPS and accuracy, applications of GPS, sources of error GPS and limitations.

TEXT 'BOOKS:

1. 'Surveying and Levelling' by R. Subramanian, Oxford University Press, New Delhi.
2. A text book of Surveying' by C. Venkatramaiah, University Press, New Delhi.
3. 'Surveying Vol. II and Vol. III (Higher Surveying)' by Dr. B. C. Punmia, Ashok K. Jain and Arun K. Jain, Laxmi Publications Pvt. Ltd., New Delhi.
4. 'Advanced Surveying' by Satheesh Gopi, R. Sathikumar and N. Madhu, Pearson, New Delhi.

REFERENCES:

1. 'Remote Sensing and its Applications' by L A R Narayan, Universities Press, New Delhi.
2. 'Geographical Information Science' by Narayan Panigrahi, Universities Press, New Delhi.
3. 'Basics of Remote Sensing and GIS' by Dr. S. Kumar, University Science Press, New Delhi.

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CE705 (f) - INTERIOR DESIGNS AND DECORATIONS

(Elective-I)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is to enable the students to

1. Understand the elements and principles of interior designs and decorations.
2. Learn the importance of art elements in the composition of building spaces.
3. Learn the new design concepts for developing interiors of buildings.
4. Learn the application of colors, lightings, furniture in creating beautiful interiors.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

a. understand the importance of interior designs and decorations.
b. Should realize the use of art elements in the composition of building spaces.
c. Should learn the new design concepts for developing interiors of buildings.
d. Learn be able to apply colors, lightings, furniture in creating beautiful interiors.

SYLLABUS:

UNIT-I

Development of interior design concepts- importance for interiors in modern buildings, changing trends and salient features, objectives of aesthetic planning - beauty, expressiveness, functionalism, economy- good taste - meaning and importance- developing skill in aesthetics.

UNIT-II

Designs- concepts, meaning, purpose, types - structural and decorative characteristics, forms to function relationship, elements of designs - line and direction, form and shape, size, colour, light, pattern, texture and space - application of elements to form designs.

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UNIT-III

Application of colour harmonies in the interiors and exteriors –effects of light on colour, Illusion of colour, psychology of colour, effect of colour on each other-uses and application of colours- walls, wall finishes, ceilings, roofs, decorative exteriors.

UNIT-IV

Importance of lighting – artificial lighting - light sources, types and uses of light, specific factors in lighting- measurements of lighting, psychological aspects of light, glare, types of glare and prevention– selection of lamps, lighting fixtures, lighting for various areas and activities.

UNIT-V

Principles of design – balance, rhythm, emphasis, harmony, proportion - meaning and application of design concepts in the interior and exterior houses and other commercial buildings- development of design from motifs, elements of art-selection of different art forms, display of art pieces.

UNIT –VI

Interior furnishings- floors, floor coverings, soft furnishings, furniture-selection and arrangement, placement of accessories, home accessories-interior decorations- flower arrangement, floor decorations, interior decoration trends in India.

TEXT BOOKS:

1. 'Interior Design and Decoration' by Premavathy Seetharaman and Praveen Pannu, CBS Publishers and distributors, New Delhi, 2005.
2. 'Building Construction' by Rangawala, S.C, Charter publishing house, Anand, 1963.
3. 'Interior Design Principles and practice' by Pratap R.M., Standard publishers distribution, Delhi, 1988.

REFERENCES:

1. 'How to see, how to paint it' by Judy M., Harpen Colling publishers,London, 1994.
2. 'Lighting for a beautiful Home' by Jan Orcharchd, Dunestyle publishing Ltd., U.S.A., 1993.
3. 'The Complete Home Decorator' by Stewart and Sally .W., Annes publishers Ltd., New York, 1997.

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IV Year – II SEMESTER	T	P	C
	3+1*	0	3

(Elective-II)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

CE706 (a) - ENGINEERING WITH GEO-SYNTHETICS

Course Learning Objectives:

The Objectives of the course are to impart to the student

1. An overview of the evolution of new construction materials in geotechnical engineering and to initiate geosynthetic materials.
2. Understanding the properties and the testing methods of different types of materials of gosynthetics.
3. The knowhow of manufacturing methods, uses and applications of geotextiles, geogrids, geomembranes and geocomposites.
4. The concepts of designing geosynthetics for the functions of separation, reinforcement, stabilization, filtration, drainage and moisture barriers.
5. Designing criteria of reinforced earth retaining walls, gabions, pond liners, covers for reservoirs, canal liners, landfill liners, caps and closures, dams and embankments.
6. Additional advantages of geocomposites, geowebs and geocells, and moisture barriers and natural geotextiles etc. for applications to meet various functions.

Course Outcomes:

At the successful completion of this course the student will be able to

4. Realize the need and demand for the use of geosynthetic materials in the field of geotechnical construction works.
5. Conduct required laboratory and field tests to obtain the properties of different materials of geosynthetics.
6. Distinguish and describe various manufacturing methods of geotextiles, geogrids, geomembranes and geocomposites.

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7. Understand concepts and could design the geosynthtics for the functions of separation, reinforcement, stabilization, filtration, drainage and moisture barriers.
8. Design reinforced earth retaining walls, gabions, pond liners, covers for reservoirs, canal liners, landfill liners, caps and closures.
9. Distinguish survivability requirements of geocomposites and could design geowebs, geocells, and moisture barriers and natural geotextiles etc.

SYLLABUS:

UNIT-I

Geosynthetics : Introduction to Geosynthetics – Basic description – Polymeric materials– Uses and Applications. Properties of Geotextiles – Geogrids – Geomembranes – Geocomposites.

UNIT-II

Geotextiles: Design criteria for Separation – Reinforcement – Stabilization – Filtration – Drainage and Moisture barriers.
Geogrids: Designing for Reinforcement – Stabilization – Designing Gabions – Construction methods.

UNIT-III

Use of Geosynthetics in Roads: Geosynthetics in road ways- applications-role of subgrade conditions-desidn criteria-survivability-application in paved roads.

UNIT-IV

Reinforced Earth Retaining Walls: Components - External stability – Internal stability-Design of reinforced earth walls with strip, sheet and grid reinforcement.

UNIT-V

Geomembranes: Pond Liners – Covers for Reservoirs – Canal Liners – Landfill Liners– Caps and closures, moisture barriers.
Geocomposites: An added advantage – Geocomposites in Separation – Reinforcement – Filtration – Geocomposites as Geowebs and Geocells.

UNIT-VI

Natural Geotextiles: Natural fibres as geotextiles- factors governing the use-jute fibres-coir geotextiles-bamboo/timber-combination of geotextiles.

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TEXT BOOKS:

1. 'Designing with Geosynthetics by Robert M. Koerner, Prantice Hall, Eaglewood Cliffs, NJ 07632.
2. 'An Introduction to Soil Reinforcement and Geosynthetics' by G.L.Sivakumar Babu (2009), Universities Press (India) Pvt. Ltd.
3. 'Engineering with Geosynthetics', by G. Venkatappa Rao and GVS Suryanarayana Raju – Tata McGraw Hill Publishing Company Limited – New Delhi.

REFERENCES:

1. 'Construction and Geotechnical Engineering using Synthetic Fabries' by Robert M. Koerner and Josoph P. Welsh. John Willey and Sons, New York.
2. 'Foundation Analysis and Design' by J.E. Bowles McGraw Hill Publications.

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CE706 (b) -ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT

(Elective-II)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To impart knowledge on different concepts of Environmental Impact Assessment.
2. To know procedures of risk assessment
3. To learn the EIA methodologies and the criterion for selection of EIA methods.
4. To pre-requisites for ISO 14001 certification
5. To know the procedures for environmental clearances and audit
6. To appreciate the importance of stakeholder participation in EIA

Course Learning Outcomes

Upon successful completion of this course, the students will be able to:

a. Prepare EMP, EIS, and EIA report
b. Identify the risks and impacts of a project
c. Selection of an appropriate EIA methodology
d. Evaluation the EIA report
e. Estimate the cost benefit ratio of a project
f. Know the role of stakeholder and public hearing in the preparation of EIA

SYLLABUS:

UNIT – I

Basic concept of EIA: Elements of EIA-factors affecting EIA-Initial environmental Examination-life cycle analysis preparation of Environmental Base map-Classification of environmental parameters – role of stakeholders in the EIA preparation –stages in EIA.

UNIT – II

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods, cost/benefit Analysis - EIS and EMP.

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UNIT-III

Impact of Developmental Activities and Land use: Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives- application of remote sensing and GIS for EIA.

UNIT-IV

Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures - E I A with reference to surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Generalized approach for assessment of Air pollution Impact.

UNIT – V

Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation.

Environmental Risk Assessment and Risk management in EIA: Risk assessment and treatment of uncertainty-key stages in performing an Environmental Risk Assessment-advantages of Environmental Risk Assessment

UNIT-VI

EIA notification by Ministry of Environment and Forest (Govt. of India): Provisions in the EIA notification, procedure for environmental clearance, procedure for conducting environmental impact assessment report- evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data and preparation of Audit report. Post Audit activities, Concept of ISO and ISO 14000.

Case studies and preparation of Environmental Impact assessment statement for various Industries.

TEXT BOOKS:

1. Environmental Impact Assessment, Canter Larry W.,McGraw-Hill education Edi (1996)
2. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.

REFERENCES:

1. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers.
2. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K. Katania & Sons Publication, New Delhi.
3. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd., Delhi.

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CE706 (c) - ADVANCED STRUCTURAL ENGINEERING

(Elective-II)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. Familiarize Students with Raft Foundations and Retaining walls.
2. Equip student with concepts of design of different types of RCC water tanks.
3. Understand Concepts of flat slabs
4. Familiarize different types of Bunkers, Silos and Chimneys.
5. Understand different types of transmission towers.

Course Outcomes:

At the end of this course the student will be able to

a. Design raft foundations and different types of RCC retaining walls
b. Carryout analysis and design of different types of RCC water tanks
c. Solve the problems design of RCC Bunkers, Silos and Chimneys
d. Understand various types of transmission towers and loading on them.

SYLLABUS:

UNIT – I

Analysis and Design of Raft Foundations – Design of RCC Retaining walls: Cantilever and Counter fort

UNIT – II

Analysis and Design of RCC Water Tanks, Circular and Rectangular types- Intze tank including staging.

UNIT – III

Analysis and Design of Flat Slabs- Direct Design and Equivalent Frame Methods- Check for Punching shear.

UNIT - IV

Analysis and Design of Bunkers and Silos- Concepts of Loading.

UNIT-V
Analysis and Design of Chimney, Concepts of loading

UNIT-VI
Introduction to Transmission Towers- Principles and procedures

TEXT BOOKS:

1. 'Reinforced Concrete Structures' Vol-2 by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
2. 'Reinforced Concrete Structures' by N. Subrahmanian, Oxford Publishers
3. 'Design Drawing of Concrete and Steel Structures' by N. Krishna Raju University Press 2005.

REFERENCES:

1. 'Essentials of Bridge Engineering' by D. Johnson Victor, Oxford and IBM publication Co., Pvt. Ltd.
2. 'Reinforced concrete design' by S. U, Pillai and D. Menon, Tata Mc.Grawhill Publishing Company

Codes: Relevant IS: codes.

INTERNAL EXAMINATION PATTERN:

The total internal marks (30) are distributed in three components as follows:

1. Descriptive (subjective type) examination : 25 marks
2. Assignment : 05 marks

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

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CE706 (d) - GROUND WATER DEVELOPMENT AND MANAGEMENT

(Elective-II)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The course is designed to

1. Appreciate groundwater as an important natural resource.
2. Understand flow towards wells in confined and unconfined aquifers.
3. Understand the principles involved in design and construction of wells.
4. Create awareness on improving the groundwater potential using various recharge techniques.
5. Know the importance of saline water intrusion in coastal aquifers and its control measures.
6. Appreciate various geophysical approaches for groundwater exploration.
7. Learn groundwater management using advanced tools.

Course Outcomes

At the end of the course the student will be able to

a. Estimate aquifer parameters and yield of wells.

b. Analyse radial flow towards wells in confined and unconfined aquifers.

c. Design wells and understand the construction practices.

d. Interpret geophysical exploration data for scientific source finding of aquifers.

e. Determine the process of artificial recharge for increasing groundwater potential.

f. Take effective measures for controlling saline water intrusion.

g. Apply appropriate measures for groundwater management.

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SYLLABUS:

UNIT – I

Introduction

Groundwater in the hydrologic cycle, groundwater occurrence, aquifer parameters and their determination, general groundwater flow equation.

Well Hydraulics

Steady radial flow and unsteady radial flow to a well in confined and unconfined aquifers, Theis solution, Jocob and Chow's methods, Leaky aquifers.

UNIT – II

Well Design

Water well design-well diameter, well depth, well screen-screen length, slot size, screen diameter and screen selection, design of collector wells, infiltration gallery.

UNIT III

Well Construction and Development

Water wells, drilling methods-rotary drilling, percussion drilling, well construction-installation of well screens-pull-back method, open- hole, bail-down and wash-down methods, well development-mechanical surging using compressed air, high velocity jetting of water, over pumping and back washing, well completion, well disinfection, well maintenance.

UNIT IV

Artificial Recharge

Concept of artificial recharge of groundwater, recharge methods-basin, stream-channel, ditch and furrow, flooding and recharge well methods, recharge mounds and induced recharge.

Saline Water Intrusion

Occurrence of saline water intrusion, Ghyben- Herzberg relation, Shape of interface, control of saline water intrusion.

UNIT – V

Geophysics

Surface methods of exploration of groundwater – Electrical resistivity and Seismic refraction methods, Sub-surface methods – Geophysical logging and resistivity logging. Aerial Photogrammetry applications.

UNIT – VI

Groundwater Modelling and Management

Basic principles of groundwater modelling- Analog models-viscous fluid models and membrane models, digital models-Finite difference and finite element models, Concepts of groundwater management, basin management by conjunctive use-case studies.

TEXT BOOKS:

1. 'Groundwater' by Raghunath H M, New Age International Publishers, 2005.
2. 'Groundwater Hydrology'by Todd D.K., Wiley India Pvt Ltd., 2014.
3. 'Groundwater Hydrology'by Todd D K and L W Mays, CBS Publications, 2005.

REFERENCES:

1. 'Groundwater Assessment and Management' by Karanth K R, Tata McGraw Hill Publishing Co., 1987.
2. 'Groundwater Hydrology' by Bouwer H, McGraw Hill Book Company, 1978.
3. 'Groundwater Systems Planning and Management' by Willis R and W.W.G. Yeh, Prentice Hall Inc., 1986.
4. 'Groundwater Resources Evaluation' by Walton W C, Mc Graw Hill Book Company, 1978.

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CE706 (e) - TRAFFIC ENGINEERING

(Elective-II)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To know various components and characteristics of traffic.
2. To know various traffic control devices and principles of highway safety.
3. To understand the detrimental effects of traffic on environment
4. To know highway capacity and level of service concepts.
5. To learn about intelligent vehicle highway systems.

Course Outcomes:

At the end of course, Student can

a. Determine traffic speed, volume, travel time and density.
b. Design traffic signals
c. Determine highway capacity

SYLLABUS:

UNIT- I

Components Of The Traffic System: Human-Vehicle–Environment System; characteristics of Road users, Vehicles, Highways and their classification; Traffic Studies:Inventories; Volume studies; Speed, Travel time and Delay studies; Intersection studies; Pedestrian studies; Parking studies; Accident studies.

UNIT- II

Traffic Characteristics: Microscopic and macroscopic flow characteristics: Time headways; Temporal, spatial and model flow patterns; Interrupted and Un interrupted traffic. Microscopic and macroscopic speed characteristics: Vehicular speed Trajectories; Speed characteristics – Mathematical distribution; Speed and travel time variations; Travel time and delay studies. Microscopic and Macroscopic density characteristics: Distance headway characteristics; Car-following theories; Density measurement techniques; Density contour maps.

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UNIT- III

Traffic Control Devices & Highway Safety: Traffic signs & Markings; Signal Warrants; Signal phasing and Development of phase plans; Fixed and Vehicle activated signals; Webster method; ARRB method; Drew's Method; IRC method; Signal coordination; Area Traffic control. Accident characteristics – Road – Driver – Vehicle; Accident recording and Analysis; Highway Safety Improvement Program; Safety Audit.

UNIT- IV

Environmental Considerations: Air pollution: Kinds of pollutants; Air pollution standards; Measures of air quality; modelling and control. Noise pollution: Measurement of sound levels; Acceptable limits, Prediction of noise levels, Traffic noise control.

UNIT- V

Highway Capacity And Level Of Service: Capacity and level of service; Factors affecting Capacity and LOS; Capacity of Rural Highways, Capacity of Urban Roads; HCM and IRC standards.

UNIT- VI

Intelligent Vehicle – Highway Systems: Traffic surveillance and monitoring; IVHS programs, Role of IVHS, IVHS categories, Benefits and Costs of IVHS.

TEXT BOOKS

1. 'Traffic Engineering: Theory and Practice' by Pignataro LJ., Prentice hall, Inc.
2. 'Traffic and Transport planning' by Kadiyali L.R., Khanna Publishers.

REFERENCES:

1. 'Traffic Engineering Hand Book' by Institute of Transportation Engineers, 4 Ed., Prentice Hall
2. 'Traffic Engineering' by Mc Shane, WR and RP Roess, Prentice Hall.
3. 'Highway Traffic analysis and design' by Salter RJ and NB Hounsell, 3rd ed., Macmillan.
4. 'Traffic Planning and Engineering' by Hobbs FD., Pergamon press
5. 'Traffic flow fundamentals' by May, AD., Prentice Hall.

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CE706 (f) - INFRASTRUCTURE MANAGEMENT

(Elective-II)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

Infrastructure Management focuses on the processes necessary for the planning and development of new infrastructure, and on maintaining and operating mature infrastructure for sustainability. A wide variety of management topics are covered, such as infrastructure planning, infrastructure economics, infrastructure management systems, optimal maintenance management, reliability of infrastructure systems, asset valuation and utilization, and infrastructure planning under risk and uncertainty.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

SYLLABUS:

UNIT-I

Performance Measures & Deterioration Modeling: Defining performance, Common characteristics of infrastructures, Condition assessment and condition indices; Different types of deterioration models; Empirical and Mechanistic models, Markov and Semi-Markov models, Risk-based deterioration modeling

UNIT-II

PRIORITIZATION AND MAINTENANCE PLANNING & POLICY: Needs Analysis, Ranking by single criteria, Ranking by fixed and variable trigger points,Single/multiple-year prioritization; Different types of maintenance planning, Maintenance policy.

UNIT-III

INFRASTRUCTURE ECONOMICS: Costs and benefits, Trade-off Analysis, Cost-effectiveness technique and Budget allocation.

UNIT-IV

OPTIMIZATION: Objective functions, decision variables and constraints, Optimization techniques, Optimal maintenance planning.

UNIT-V

Asset Management System: Management System, Components of Asset Management System.

UNIT-VI

Tools and Technology: Destructive Testing, Nondestructive Testing, Database Management System for Inventory Data Control, Other Information Technology.

TEXT BOOKS:

1. 'Infrastructure Management' by Hudson, Haas and Uddin, McGraw-Hill, 1997.
2. 'Infrastructure Engineering and Management'Grigg, N., John Wiley & Sons, 1998.
3. 'Infrastructure Condition: Art, Science and Practice' by Saito, M., ASCE, 1997.

REFERENCES:

1. 'Markov Chains' by Norris, J. R., Cambridge University Press, 1997.
2. 'Pavement Management for Airports, Roads and Parking Lots' by Kluwer, Shahin M, Kluwer Academic Publisher, 1994.

IV Year – II SEMESTER

	T	P	C
	3+1*	0	3

(Elective-III)

CE803 (a) - ADVANCED FOUNDATION ENGINEERING

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To enable the student to appreciate how Meyerhof's general bearing capacity equations are important over Terzaghi's bearing capacity equation.
2. To teach the student special methods of computation of settlements and the corrections to be applied to settlements.
3. To enable the student to understand the advanced concepts of design of pile foundations.
4. To teach the student the problems posed by expansive soils and the foundation practices appropriate to expansive soils.
5. To enable the student to learn the difference between isolated and combined footings, the determination of bearing capacity of mats and proportioning of footings.

Course Outcomes:

Upon successful completion of this course, student will be able to

a. Compute the safe bearing capacity of footings subjected to vertical and inclined loads.
b. Understand the advanced methods of settlement computations and proportion foundation footings.
c. Appreciate the methods of computing the pull-out capacity and negative skin friction of piles and compute the settlements of pile groups in clays.
d. Appreciate the problems posed by expansive soils and the different foundation practices devised.
e. Appreciate the difference between isolated footings and combined footings and mat foundations.

SYLLABUS:

UNIT-I

Bearing capacity of Foundations using general bearing capacity equation – Meyerhof's, Brinch Hansen's and Vesic's methods.

UNIT-II

Settlement analysis: Immediate settlement of footings resting on granular soils – Schmertmann & Hartman method – De Beer and Martens method - Immediate settlement in clays – Janbu's method – correction for consolidation settlement using Skempton and Bjerrum's method – Correction for construction period.

UNIT-III

Mat foundations – Purpose and types of isolated and combined footings – Mats/ Rafts – Proportioning of footings – Ultimate bearing capacity of mat foundations – allowable bearing capacity of mats founded in clays and granular soils – compensated rafts.

UNIT-IV

Earth-retaining structures – cantilever sheet piles – anchored bulkheads – fixed and free earth support methods – design of anchors – braced excavations – function of different components – forces in ties – stability against bottom heave.

UNIT-V

Pile foundations – single pile versus group of piles – load-carrying capacity of pile groups – negative skin friction (NSF) -settlement of pile groups in sands and clays – laterally loaded piles in granular soils – Reese and Matlock method – laterally loaded piles in cohesive soils – Davisson and Gill method – Broms' analysis.

UNIT-VI

Foundations in expansive soils – definitions of swell potential and swelling pressure – determination of free swell index – factors affecting swell potential and swelling pressure – foundation practices – sand cushion method – CNS layer - drilled piers and belled piers – under-reamed piles – moisture control methods.

TEXT BOOKS:

1. 'Basic and applied soil mechanics' by Gopal Ranjan and ASR Rao, New Age Publishers.

2. 'Soil Mechanics and Foundation Engineering' by VNS Murthy, CBS Publishers.
3. 'Principles of Foundation Engineering' by BM Das, Thomson Brooks/Cole.

REFERENCE BOOKS:

1. 'Foundation Analysis and Design' by JE Bowles, John Wiley.
2. 'Foundation Design' by WC Teng, Prentice Hall Publishers.

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CE803 (b) - SOLID WASTE MANAGEMENT

(Elective-III)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To impart the knowledge the methods of collection and optimization of collection routing of municipal solid waste.
2. To acquire the principles of treatment of municipal solid waste
3. To know the impact of solid waste on the health of the living beings
4. To learn the criterion for selection of landfill and its design
5. To plan the methods of processing such as composting the municipal organic waste.

Course Learning Outcomes

Upon successful completion of this course, the students will be able to:

a. Design the collection systems of solid waste of a town
b. Design treatment of municipal solid waste and landfill
c. To know the criteria for selection of landfill
d. To characterise the solid waste and design a composting facility

SYLLABUS:

UNIT- I

Introduction to Solid Waste Management: Goals and objectives of solid waste management, Classification of Solid Waste - Factors Influencing generation of solid waste - sampling and characterization –Future changes in waste composition, major legislation, monitoring responsibilities.

UNIT- II

Basic Elements In Solid Waste Management: Elements and their inter relationship – principles of solid waste management- onsite handling, storage and processing of solid waste

Collection of Solid Waste: Type and methods of waste collection systems, analysis of collection system - optimization of collection routes– alternative techniques for collection system.

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UNIT- III

Transfer and Transport: Need for transfer operation, compaction of solid waste - transport means and methods, transfer station types and design requirements.

UNIT- IV

Separation and Transformation of Solid Waste:unit operations used for separation and transformation: shredding - materials separation and recovery, source reduction and waste minimization.

UNIT- V

Processing and Treatment: Processing of solid waste - Waste transformation through combustion and composting, anaerobic methods for materials recovery and treatment – Energy recovery – biogas generation and cleaning– Incinerators.

UNIT- VI

Disposal of Solid Waste: Methods of Disposal, Landfills: Site selection, design and operation, drainage and leachate collection systems –designated waste landfill remediation.

TEXT BOOKS

1. George Techobanoglous "Integrated Solid Waste Management", McGraw Hill Publication, 1993

REFERENCES

1. Vesilind, P.A., Worrell, W., Reinhart, D. "Solid Waste Engineering", Cenage learning, New Delhi, 2004
2. Charles A. Wentz; "Hazardous Waste Management", McGraw Hill Publication, 1995.

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CE803 (c) - EARTHQUAKE RESISTANT DESIGN

(Elective-III)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:
The objective of this course is:

1. Familiarize Students with Engineering Seismology
2. Equip student with concepts of Structural Dynamics
3. Understand Concepts of Seismic Design
4. Familiarize with Design philosophies for Seismic loading
5. Familiarize students with various IS codal provisions for ductile design and detailing

Course Outcomes:
At the end of this course the student will be able to

a) Explain fundamentals of Engineering Seismology
b) Acquaint with the principles Structural dynamics
c) Solve SDOF Systems and suggest ductile design
d) Compute equivalent lateral seismic loads and carryout a seismic design as per IS codal provisions

SYLLABUS:

UNIT-I

Engineering seismology – rebound theory – plate tectonics – seismic waves - Earthquake size and various scales – local site effects – Indian seismicity – seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects.

UNIT-II

Introduction to Structural Dynamics: Fundamental objective of Dynamic analysis – Types of prescribed loadings – Formulation of the Equations of Motion– Elements of a Vibratory system – Degrees of Freedom - Oscillatory motion – Simple Harmonic Motion – Free Vibrations of Single Degree of Freedom (SDOF) systems – Undamped and Damped – Critical damping – Logarithmic decrement – Forced vibrations of SDOF systems – Harmonic excitation – Dynamic magnification factor.

UNIT-III

Seismic design concepts – EQ load on simple building – load path – floor and roof diaphragms – seismic resistant building architecture – plan configuration – vertical configuration – pounding effects – mass and stiffness irregularities – torsion in structural system- Provision of seismic code (IS 1893 & 13920) – Building system – frames – shear wall – braced frames – layout design of Moment Resisting Frames (MRF) – ductility of MRF – Infill wall – Non-structural elements.

UNIT-IV

Calculation of equivalent lateral force- Design Base Shear- Storey Shear, Estimation of Natural period of Structure, Computation of Response acceleration Coefficient- Zone factor- Seismic weight- Response reduction factors- Seismic Coefficient Method.

UNIT-V

Design and ductile detailing of Beams and columns of frames -Concept of strong column weak beams, Ductility criteria for earthquake resistant design, Ductile detailing of flexural members as per IS 13920- Longitudinal reinforcement, Shear reinforcement, Anchorage of reinforcement-Development length, Lap Splices.

UNIT-VI

Seismic Analysis and design of simple 2-storied RC Building frame – Equivalent static lateral force method and response spectrum method.

TEXT BOOK

1. 'Earthquake Resistant Design of Structures' -Pankaj Agarwal and Manish ShriKhande, Prentice – Hall of India, 2007, New Delhi.
2. 'Earthquake Resistant Design of Building Structures' by Vinod Hosur, Wiley India Ltd.
3. 'Reinforced Concrete Design'by A. K. Jain.

REFERENCES

1. 'Introduction to the Theory of Seismology' by Bullen K.E., Great Britain at the University Printing houses, Cambridge University Press 1996.
2. Relevant code of practices.

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CE803 (d) - WATERSHED MANAGEMENT

(El3ective-III)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The course is designed to:

1. introduce the concept of watershed management
2. understand the watershed characteristics
3. learn the principles of soil erosion and measures to control erosion
4. appreciate various water harvesting techniques.
5. learn land management practices for various land use/land cover.
6. introduce concepts of watershed modelling.

Course outcomes

At the end of the course the student will be able to

a. calculate watershed parameters and analyse watershed characteristics to take appropriate management action.
b. quantify soil erosion and design control measures.
c. apply land grading techniques for proper land management .
d. suggest suitable harvesting techniques for better watershed management.
e. apply appropriate models for watershed management.

SYLLABUS:

UNIT-I

Introduction: Concept of watershed development, objectives of watershed development, need for watershed development, Integrated and multidisciplinary approach for watershed management.

UNIT-II

Characteristics of Watersheds: Size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socio-economic characteristics, basic data on watersheds.

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UNIT-III

Principles of Erosion: Types and causes of erosion, factors affecting erosion, estimation of soil loss due to erosion- Universal soil loss equation.

Measures to Control Erosion: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, check dams , rock-fill dams, brushwood dam, Gabion.

UNIT-IV

Water Harvesting: Techniques of rain water harvesting- rain water harvesting from roof top, surface flow harvesting, subsurface flow harvesting, stop dams, farm ponds and dugout ponds, percolation tanks.

UNIT-V

Land Management: Land use and Land capability classification, management of forest, agricultural, grassland and wild land, land grading operation, Reclamation of saline and alkaline soils.

UNIT-VI

Watershed Modelling: Data of watershed for modelling, application and comparison of watershed models, model calibration and validation, advances of watershed models.

TEXT BOOKS:

1. 'Watershed Management' by Das MM and M.D Saikia, PHI Learning Pvt. Ltd, 2013.
2. 'Land and Water Management' by Murthy.VVN, Kalyani Publications, 2007.
3. 'Watershed Management' by Murthy J V S, New Age International Publishers, 2006.

REFERENCES:

1. 'Water Resource Engineering'by Wurbs R A and James R A, Prentice Hall Publishers, 2002.
2. 'Watershed Hydrology' by Black P E, Prentice Hall, 1996.

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CE803 (e) - PAVEMENT ANALYSIS AND DESIGN

(Elective-III)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To know various factors affecting pavement design
2. To know various concepts for the stresses in pavements.
3. To understand material characterisation and mix design concepts.
4. To acquire design principles of flexible and rigid pavements.
5. To acquire design principles of shoulders, overlays and drainage.

Course Outcomes:

At the end of course, Student can

a. Design flexible and rigid pavements using various methods
b. Design shoulders, overlays and drainage.

SYLLABUS:

UNIT-I

Factors Affecting Pavement Design: Variables Considered in Pavement Design, Types of Pavements, Functions of Individual Layers, Classification of Axle Types of Rigid Chassis and Articulated Commercial Vehicles, Legal Axle and Gross Weights on Single and Multiple Units, Tire Pressure, Contact Pressure, EAL and ESWL Concepts, Traffic Analysis: ADT, AADT, Truck Factor, Growth Factor, Lane, Directional Distributions & Vehicle Damage Factors, Effect of Transient & Moving Loads.

UNIT-II

Stresses In Pavements: ***Vehicle-Pavement Interaction:***Transient, Random & Damping Vibrations, Steady State of Vibration, Experiments on Vibration, Stress Inducing Factors in Flexible and Rigid pavements; ***Stress in Flexible Pavements:*** Visco-Elastic Theory and Assumptions, Layered Systems Concepts, Stress Solutions for One, Two and Three Layered Systems, Fundamental Design Concepts; ***Stresses in Rigid Pavements:***Westergaard's Theory and Assumptions, Stresses due to Curling, Stresses and Deflections due to Loading, Frictional Stresses, Stresses in Dowel Bars & Tie Bars, Introduction to DAMA, KENLAYER & KENSLABS Programs.

UNIT-III

Material Characterisation & Mix Design Concepts: CBR and Modulus of Subgrade Reaction of Soil, Mineral aggregates – Blending of aggregates, binders, polymer and rubber modified bitumen, Resilient, Diametral Resilient and Complex (Dynamic) Moduli of Bituminous Mixes, Permanent Deformation Parameters and other Properties, Effects and Methods of Stabilisation and Use of Geo Synthetics; Marshall's and Hveem's Methods of Bituminous Concrete Mix Design, Field Implications of Stability and Flow Values, Introduction to Super Pave Mix Design, IRC Cement Concrete Mix Design.

UNIT-IV

Design of Flexible Pavements: Flexible Pavement Design Concepts, Asphalt Institute's Methods with HMA and other Base Combinations, AASHTO, Road Note No 29 & IRC Methods, Design of Runways & Taxiways, Design of Low Volume Rural Roads.

UNIT-V

Design Of Rigid Pavements: Calibrated Mechanistic Design Process, PCA, AASHTO & IRC Specifications, Introduction to Prestressed and Continuously Reinforced Cement Concrete Pavement Design, Rigid Pavement Design for Low Volume Rural Roads.

UNIT-VI

Design Of Shoulders, Overlays & Drainage: Shoulder Design Considerations, Traffic Prediction, Parking, Regular & Encroaching Traffic, Thickness Design Specifications for Flexible & Rigid Shoulders; Types & Design of Overlays: AI's Principal Component Analysis & IRC Methods of Overlay Design, Importance of Profile Correction Course; Pavement Drainage Concepts, Drainage Related Failures, Inflow-Outflow Concepts, Condition of Continuity, Surface and Sub Surface Drainage Design Specifications.

TEXT BOOKS:

1. 'Pavement Analysis and Design' by Yang H. Huang, Pearson Education, Second Edition.
2. 'Principles of Pavement Design' by Yoder.J. & Witczat Mathew, W. John Wiley & Sons Inc.
3. 'Pavement Design' by Srinivasa Kumar R, Universities Press, Hyderabad.

REFERENCES:

1. 'Design of Functional Pavements' by Nai C. Yang, McGraw Hill Publications.
2. 'Concrete Pavements' by AF Stock, Elsevier, Applied Science Publishers.
3. 'Pavement and Surfacings for Highway & Airports' by Micheal Sargious, Applied Science Publishers Limited.
4. 'Dynamics of Pavement Structures' by G. Martineek, Chapmen & Hall Inc.
5. 'Principles of Transportation Engineering' by Patha Chakroborty and Animesh Das, PHI Learning Private Limited, Delhi.

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CE803 (f) - GREEN BUILDINGS

(Elective-III)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

SYLLABUS:

UNIT-I

Green Buildings: Definition of Green Buildings, typical features of green buildings, benefits of Green Buildings- Sustainable site selection and planning of buildings to maximize comfort, day lighting, ventilation, planning for storm water drainage

UNIT- II

Environmentally friendly building materials and technologies: Natural Materials like bamboo, timber, rammed earth, stabilized mud blocks, hollow blocks, lime & lime-pozzolana cements, materials from agro and industrial waste, ferro-cement and ferro-concrete, alternative roofing systems, various paints reducing the heat gain of the building, etc.

UNIT - III

Energy and resource conservation: Need for energy conservation, various forms of energy used in buildings, embodied energy of materials, energy used in transportation and construction processes- water conservation systems in buildings-water harvesting in buildings – waste to energy management in residential complexes or gated communities.

UNIT- IV

Use of renewable energy resources: Wind and Solar Energy Harvesting, potential of solar energy in India and world, construction and operation of various solar appliances, success case studies of fully solar energy based buildings in India.

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UNIT- V

Climate Design: Local climatic conditions – temperature, humidity, wind speed and direction-impact of climate change on built environment - comforts: the desirable conditions – Principles of thermal design - means of thermal –light and lighting-building acoustics- energy efficient lighting, Ventilation and air quality requirement, various techniques for passive cooling, garden roofs, case studies for passive cooling and thermal comfort.

UNIT- VI

Green Building Rating Systems: Introduction to Leadership in Energy and Environment Design (LEED), Green Rating systems for Integrated Habitat Assessment - Modular wastewater treatment systems for built environment - Building automation and building management systems.

TEXT BOOKS:

1. 'Alternative building materials and technologies' by K.S. Jagadish, B.V. Venkatarama Reddy and K.S. Nanjunda Rao.
2. 'Non-Conventional Energy Resources' by G. D. Rai, Khanna Publishers.

REFERENCES:

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IV Year – II SEMESTER

	T	P	C
	3+1*	0	3

(Elective-IV)

CE804 (a) - SOIL DYNAMICS AND MACHINE FOUNDATIONS

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The basic course in soil mechanics/geotechnical engineering generally introduces the fundamental concepts, principles and applications of soil as engineering material with properties under static loading.

This course on 'Soil Dynamics' discusses

1. About the fundamentals of vibrations
2. about the behaviour and properties/response of soil as a material which is subjected to various types of dynamic or cyclic time-dependent loadings.
3. the design and analysis for machine foundations come along with this course to consider the dynamic properties of both soil and foundation as combined mass. Behaviour of various geotechnical structures such as shallow and deep foundations, retaining structures due to various types of time-dependent dynamic loading are discussed here along with the reference to design code provisions.
4. Phenomena like liquefaction and lateral spreading of soil are also discussed.
5. Discusses about the laboratory and filed tests to compute the dynamic soil properties of the soil mass.

Course Outcomes:

On successful completion of these course, the student able to

a. Use theory of vibrations to find the behavior of soil under dynamic loading.
b. Design machine foundations under different loads and soil conditions.
c. Understand the liquefaction phenomina.
d. Conduct various laboratory and filed tests to determine the dynamic soil prosperties and its interpretation.

e. Design vibration isolators under any vibratory machines.

SYLLABUS:

UNIT-I

Introduction: Types of motion- SHM- Fundamental definitions- SDOF systems- Free and forced vibration with and without damping - Constant force and rotating mass type excitation –Types of damping-Equivalent stiffness of springs in series and parallel. – Resonance and its effect - magnification-logarithmic decrement –Transmissibility.

UNIT-II

Theories of Vibration Analysis- EHS Theory and lumped parameter model- Different modes of vibration- Natural frequency of foundation soil system – Barkan and IS methods – Pressure bulb concept – Reisner Theory – Limitations of Reisner theory – Sung's solutions -- Pauw's Analogy – Heigh's Theory.

UNIT-III

Dynamic properties of soils, Determination of E, G and Poisons ratio from field and laboratory tests, recommendations of Indian codes- Stress waves in bounded elastic medium- Use of wave theory in the determination of elastic properties, Elastic coefficients of soils and their determination- damping factor from free and forced vibration tests.– Block vibration test – Determination of Damping factor.

UNIT-IV

Types of machine foundations – general requirements design – criteria for machine foundations, permissible amplitudes and bearing pressure
Design data, design criteria, IS code provisions for the design foundations of reciprocating machines.

UNIT-V

Design data, design criteria, IS code provisions for the design foundations of Impact type of machines.

UNIT-VI

Vibration Isolation: Transmissibility, Principles of isolation- Methods of isolation- Vibration isolators- Types and their characterizes
Special Topics: Liquefaction of soils, CSR, CRR, Factor of safety against liquefaction - Dynamic bearing capacity, Earth retaining structures under dynamic loads.

TEXT BOOK:

1. 'Vibrations of Soils and Foundations'by Richart Hall and Woods

REFERENCES:

1. 'Vibration Analysis and Foundation Dynamics'by NSV Kameswara Rao, Wheeler Publishing, New Delhi.
2. 'Foundations of Machines- Analysis and Design' by Prakash and Puri.
3. 'Analysis and design of Foundations for Vibrations' by P J Moore
4. 'Fundamentals of Soil Dynamics' by B M Das
5. 'Dynamics of bases and Foundations' by D D Barkar

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CE804 (b) - ENVIRONMENTAL AND INDUSTRIAL HYGIENE

(Elective-IV)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To provide with information regarding Occupational health, Hygiene, workplace safety.
2. To make aware of regulations, codes of practice in industrial hygiene.
3. To impart basic knowledge on industrial fatigue and ergonomics.
4. To know the basic right of an employee on safety aspects.

Course Learning Outcomes

Upon successful completion of this course, the students will be able to:

1. Identify aspects related to occupational health, Hygiene, workplace safety in an industry.
2. Know the regulations, codes of practice available with reference to industrial hygiene.
3. Enlist the common points related to ergonomics.
4. Know the safety equipment and the basic right of an employee on safety aspects.

SYLLABUS:

UNIT- I

Introduction: Need for developing Environment, Health and Safety systems in work places. Status and relationship of Acts, Regulations and Codes of Practice. Role of trade union safety representatives.

UNIT- II

Occupational Health and Hygiene: Definition of the term occupational health and hygiene. Categories of health hazards. Exposure pathways and human responses to hazardous and toxic substances. Advantages and limitations of environmental monitoring and occupational exposure limits. Hierarchy of control measures for occupational health risks. Control methods and reduction strategies for noise, radiation and excessive stress. OHSAS.

UNIT- III

Workplace Safety and Safety Systems: Features of the satisfactory design of work premises, ventilation. Safe installation and use of electrical supplies.

Fire safety and first aid provision. Significance of human factors in the establishment and effectiveness of safe systems. Safe systems of work for manual handling operations. Control methods to eliminate or reduce the risks arising from the use of work equipment. Requirements for the safe use of display screen equipment. Procedures and precautionary measures necessary when handling hazardous substances- Contingency arrangements for events of serious and imminent danger.

UNIT -IV

Techniques of Environmental Safety: Methods of effective implementation and review of health & safety policies. Functions and techniques of risk assessment, Investigation of accidents- Principles of quality management systems in health and safety management.

UNIT- V

Industrial Fatigue and Ergonomics:

Fatigue: Types of fatigue - circadian rhythms- sleep cycle-sleep debt-effects of fatigue-factors contributing to fatigue- mitigation of fatigue.

Ergonomics: definition-boundaries of ergonomics- objectives and principles of ergonomics-ergonomics relation with health and safety-ergonomics problems in work place-ergonomics improvements-identification of poor posture and risks.

UNIT- VI

Education and Training: Relationship between quality manuals, safety policies and written risk assessments. Records and other documentation required by an organisation for health and safety. Principles and methods of effective training- Feedback and evaluation mechanism.

TEXT BOOKS:

REFERENCES:

1. 'Environmental and Health and Safety Management' by Nicholas P. Cheremisinoff and Madelyn L.Graffia, William Andrew Inc. NY, 1995
2. 'The Facility Manager's Guide to Environmental Health and Safety' by Brian Gallant, GovernmentInst Publ., 2007.
3. 'Effective Environmental, Health, and Safety Management Using the Team Approach' by BillTaylor, Culinary and Hospitality Industry Publications Services 2005.

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CE804 (c) - REPAIR AND REHABILITATION OF STRUCTURES

(Elective-IV)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. Familiarize Students with deterioration of concrete in structures
2. Equip student with concepts of NDT and evaluation
3. Understand failures and causes for failures in structures
4. Familiarize different materials and techniques for repairs
5. Understand procedure to carryout Physical evaluation of buildings and prepare report.

Course Outcomes:

At the end of this course the student will be able to

a. Explain deterioration of concrete in structures
b. Carryout analysis using NDT and evaluate structures
c. Assess failures and causes of failures in structures
d. Carryout Physical evaluation and submit report on condition of the structure.

SYLLABUS:

UNIT - I

Deterioration of concrete in structures: Physical processes of deterioration like Freezing and Thawing, Wetting and Drying, Abrasion, Erosion, Pitting, Chemical processes like Carbonation, Chloride ingress, Corrosion, Alkali aggregate reaction, Sulphate attack Acid attack, temperature and their causes, Mechanism, Effect, preventive measures. - Cracks:Cracks in concrete, type, pattern, quantification, measurement & preventive measures.

UNIT- II

Non Destructive Testing- Non destructive test methods for concrete including Rebound hammer, Ultrasonic pulse velocity, Rebar locator, Corrosion meter, Penetration resistance and Pull out test, Core cutting-Corrosion: Methods for corrosion measurement and assessment including half-cell potential and resistivity, Mapping of data.

UNIT-III

Failure of buildings: Definition of building failure-types of failures- Causes of Failures- Faulty Design, Accidental over Loading, Poor quality of material and Poor Construction practices- Fire damage - Methodology for investigation of failures-diagnostic testing methods and equipments-repair of cracks in concrete

UNIT-IV

Materials for repair and rehabilitation -Admixtures- types of admixtures-purposes of using admixtures- chemical composition- Natural admixtures-Fibres- wraps- Glass and Carbon fibre wraps- Steel Plates-Concrete behavior under corrosion, disintegrated mechanisms- moisture effects and thermal effects – Visual investigation- Acoustical emission methods- Corrosion activity measurement- chloride content – Depth of carbonation- Impact echo methods- Ultrasound pulse velocity methods- Pull out tests.

UNIT: V

Repair Techniques: Grouting, Jacketing, Shotcreting, externally bonded plates, Nailing, Underpinning and under water repair; Materials, Equipments, Precautions and Processes.

UNIT: VI

Investigation of structures: Distress, observation and preliminary test methods. Case studies: related to rehabilitation of bridge piers, dams, canals, heritage structures, corrosion and erosion damaged structures.

TEXT BOOKS:

1. 'Maintenance & Repair of Civil Structures' by B.L. Gupta & Amit Gupta.
2. 'Rehabilitation of Concrete Structures' by B. Vidivelli, Standard Publishers.
3. 'Concrete Bridge Practice Construction, Maintenance & Rehabilitation' by V. K. Raina.

REFERENCES:

1. 'Concrete Structures- protection Repair and Rehabilitation' by R. Doodge Woodson, BH Publishers

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CE804 (d) - WATER RESOURCES SYSTEM PLANNING AND MANAGEMENT

(Elective-IV)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The course is designed to

1. introduce the concepts of system analysis in the planning, design, and operation of water resources.
2. appreciate mathematical optimization methods and models.
3. learn and apply basic economic analysis tools to water resources projects.
4. understand linear, nonlinear and dynamic programming techniques and apply them to various water resources systems planning and design problems.
5. appreciate simulation and management techniques in water resources systems.

Course Outcomes

At the end of the course the student will be able to

a. apply optimization methods to solve problems related to water resource systems.
b. perform basic economic analysis to evaluate the economic feasibility of water resources projects
c. formulate optimization models for decision making in water resources systems.
d. use simulation models for planning and design of Water Resources Systems.

SYLLABUS:

UNIT – I

Introduction: Concepts of systems analysis, definition, systems approach to water resources planning and management, role of optimization models, objective function and constraints, types of optimization techniques.

UNIT – II

Linear programming: Formulation of linear programming models, graphical method, simplex method, application of linear programming in water resources, revised simplex method, duality in linear programming, sensitivity analysis.

UNIT – III

Dynamic programming: Principles of optimality, forward and backward recursive dynamic programming, curse of dimensionality, application for resource allocation.

UNIT – VI

Non-linear optimization techniques: Classical optimization techniques, Lagrange methods, Kuhn-Tucker conditions, Search techniques, overview of Genetic Algorithm

UNIT – V

Water Resources Economics: Basics of engineering economics, economic analysis, conditions of project optimality, benefit and cost analysis

UNIT – VI

Simulation and management: Application of simulation techniques in water resources, planning of reservoir system, optimal operation of single reservoir system, allocation of water resources, optimal cropping pattern, conjunctive use of surface and sub-surface water resources.

TEXT BOOKS:

1. 'Water Resources System Analysis' by Vedula S and P P Mujumdar, McGraw Hill Company Ltd, 2005.
2. 'Water Resources Economics' by James D and R. Lee, Oxford Publishers, 2005.

REFERENCES:

1. 'Water Resources Systems Planning and Management - An Introduction to Methods, Models and Applications'by Loucks D P and E V Bee,UNESCO Publications, 2005 (http://ecommons.cornell.edu/bitstream/1813/2804/21/00_intro.pd)
2. 'Optimal design of water distribution networks' by Bhave, P. R, Narosa Publishing house, 2003.

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CE804 (e) - URBAN TRANSPORTATION PLANNING

(Elective-IV)

Lecture :	3 hrs/Week	Internal Assessment :	Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. To learn various procedures for travel demand estimation .
2. To various data collection techniques for OD data.
3. To know various models and techniques for trip generation, trip distribution, mode choice and traffic assignment.
4. To develop alternative urban transport network plans.

Course Outcomes:

At the end of course, Student can

a. Estimate travel demand for an urban area.
b. Plan the transportation network for a city.
c. Identify the corridor and plan for providing good transportation facilities.
d. Evaluate various alternative transportation proposals.

SYLLABUS:

UNIT -I

Urban Transportation Problems & Travel Demand: Urban Issues, Travel Characteristics, Evolution of Planning Process, Supply and Demand – Systems approach; Trends, Overall Planning process, Long term Vs Short term planning, Demand Function, Independent Variables, Travel Attributes, Assumptions in Demand Estimation, Sequential, and Simultaneous Approaches, Aggregate and Disaggregate Techniques.

UNIT -II

Data Collection And Inventories: Collection of data – Organisation of surveys and Analysis, Study Area, Zoning, Types and Sources of Data, Road Side Interviews, Home Interview Surveys, Commercial Vehicle Surveys, Sampling Techniques, Expansion Factors, Accuracy Checks, Use of Secondary Sources, Economic data – Income – Population – Employment – Vehicle Owner Ship.

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UNIT -III

Trip Generation & Distribution:UTPS Approach, Trip Generation Analysis: Zonal Models, Category Analysis, Household Models, Trip Attraction models, Commercial Trip Rates; Trip Distribution: Growth Factor Methods, Gravity Models, Opportunity Models, Time Function Iteration Models.

UNIT -IV

Mode Choice Analysis: Mode Choice Behaviour, Competing Modes, Mode Split Curves, Aggregate and Disaggregate Approaches; Discrete Choice Analysis, Choice sets, Maximum Utility, Probabilistic Models: Binary Logit, Multinomial Logit Model – IIA property; Aggregation

UNIT -V

Traffic Assignment: Diversion Curves; Basic Elements of Transport Networks, Coding, Route Properties, Path Building Criteria, Skimming Tree, All-or-Nothing Assignment, Capacity Restraint Techniques, Reallocation of Assigned Volumes, Equilibrium Assignment.

UNIT -VI

Corridor Identification, Plan Preparation & Evaluation: Master plans, Selection of Corridor, Corridor Identification, Corridor deficiency Analysis; Travel Forecasts to Evaluate Alternative Improvements, Impacts of New Development on Transportation Facilities. Pivot Point Analysis, Environmental and Energy Analysis; Case studies

TEXT BOOKS:

1. ‘Introduction to Urban System Planning’ by Hutchinson, B.G., McGraw Hill.
2. ‘Transportation Engineering - An Introduction’ by Khisty C.J., Prentice Hall.
3. ‘Fundamentals of Transportation Planning’ by Papacostas, Tata McGraw Hill.

REFERENCES:

1. ‘Urban Transportation Planning: A decision oriented Approach’ by Mayer M and Miller E, McGraw Hill.
2. ‘Introduction to Transportation Planning’ by Bruton M.J., Hutchinson of London.
3. ‘Metropolitan Transportation Planning’ by Dicky, J.W., Tata McGraw Hill.
4. ‘Traffic Engineering and Transportation Planning’ by Kadiyali.L.R., Khanna Publishers, New Delhi.

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CE804 (f) - SAFETY ENGINEERING

(Elective-IV)

Lecture :	3 hrs/Week	Internal Assessment :	30 Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	70 Marks
Practical :	--	Credits :	3

Course Learning Objectives:

1. To import concepts of safety w.r.t construction Industry
2. To understands various hazards in construction industry and preventive measures
3. To learn safety operation of construction machinery
4. To learn techniques to distinguish civil structures safety
5. To understand fire safety principles

Course Outcomes:

Students will have ability to

a. Develop management plans to prevent accidents in construction industry.
b. Prepare plans to safe guard workers in construction of high risk buildings.
c. Ensure safety while operating construction machinery
d. Outline safety plans for demolition of buildings
e. Prepare fire safety plans for a given building

SYLLABUS:

UNIT-I

Accidents Causes And Management Systems : Problems impeding safety in construction industry- causes of fatal accidents, types and causes of accidents related to various construction activities, human factors associated with these accident – construction regulations, contractual clauses – Pre contract activates, preconstruction meeting - design aids for safe construction – permits to work – quality assurance in construction - compensation – Recording of accidents and safety measures – Education and training.

UNIT-II

Hazards Of Construction And Prevention : Excavations, basement and wide excavation, trenches, shafts – scaffolding , types, causes of accidents, scaffold inspection checklist – false work – erection of structural frame work, dismantling – tunneling – blasting, pre blast and post blast inspection – confined spaces – working on contaminated sites – work over water - road works – power plant constructions – construction of high rise buildings.

UNIT-III

Working At Heights: Fall protection in construction OSHA 3146 – OSHA requirement for working at heights, Safe access and egress – safe use of ladders- Scaffoldings , requirement for safe work platforms, stairways, gangways and ramps – fall prevention and fall protection , safety belts, safety nets, fall arrestors, controlled access zones, safety monitoring systems – working on fragile roofs, work permit systems, height pass – accident case studies.

UNIT-IV

Construction Machinery : Selection, operation, inspection and testing of hoisting cranes, mobile cranes, tower cranes, crane inspection checklist - builder's hoist, winches, chain pulley blocks – use of conveyors - concrete mixers, concrete vibrators – safety in earth moving equipment, excavators, dozers, loaders, dumpers, motor grader, concrete pumps, welding machines, use of portable electrical tools, drills, grinding tools, manual handling scaffolding, hoisting cranes – use of conveyors and mobile cranes – manual handling.

UNIT-V

Safety In Demolition Work : Safety in demolition work, manual, mechanical, using explosive - keys to safe demolition, pre survey inspection, method statement, site supervision, safe clearance zone, health hazards from demolition - Indian standard - trusses, girders and beams – first aid – fire hazards and preventing methods – interesting experiences at the construction site against the fire accidents.

UNIT-VI

Fire Safety: Fire –fire load-control and institutional fire protection systems, Fire Hydrant and extinguishers, Electrical Hazards, protection and interlock-Discharge rod and earthling device, safety in the use of portable tools. Emergency planning and preparedness. Marking of Route Fire Exist.

TEXT BOOKS:

1. 'Safety in the Build Environment' by Jnathea D.Sime, London, 1988.
2. 'Reliability Maintenance and Safety Engineering, by Gupta A K, Laxmi Publications, New Delhi.

3. 'Safety Management' by John V. Grimoldi, AITBS Publishers and Distributors, New Delhi.

REFERENCES:

1. 'Construction hazard and Safety Hand book' by Hudson, R., Butter Worth's, 1985.
2. 'Construction Safety Hand Book'by V.J.Davies and K.Thomasin, Thomas Telford Ltd., London, 1990.
3. 'Handbook of OSHA Construction Safety and Health'by Charles D. Reese & James V. Edison.

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CE804 (g) - BRIDGE ENGINEERING

(Elective-IV)

Lecture :	3 hrs/Week	Internal Assessment :	30 Marks
Tutorial :	1 Hrs/Week	Semester End Examination :	70 Marks
Practical :	--	Credits :	3

Course Learning Objectives:

The objective of this course is:

1. Familiarize Students with different types of Bridges and IRC standards.
2. Equip student with concepts and design of Slab Bridges, T Beam Bridges, Box Culverts.
3. Understand concepts of design of Plate Girder Bridges
4. Familiarize with different methods of inspection of bridges and maintenance.

Course Outcomes:

At the end of this course the student will be able to

a. Explain different types of Bridges with diagrams and Loading standards
b. Carryout analysis and design of Slab bridges, T Beam bridges, Box culvers and suggest structural detailing
c. Carryout analysis and design of Plate girder bridges
d. Organize for attending inspections and maintenance of bridges and prepare reports.

SYLLABUS:

UNIT-I

Introduction- Bridges- Types- Slab bridges, T Beam, Arch bridges, Cable Stayed bridges, prestressed concrete bridges, Truss Bridges, Culverts, - Nomenclature- Selection of Bridge Site- Economical span- Abutments pier and end connections- types of foundations- Open, Pile, Well Foundations, Bearings – Types- Introduction to Loading standards- Railway and IRC Loading.

UNIT-II

Slab bridges- Wheel load on slab- effective width method- slabs supported on two edges- cantilever slabs- dispersion length- Design of interior panel of slab- Guyon's – Massonet Method –Hendry- Jaegar Methods- Courbon's theory- Pigeaud's method.

UNIT-III

T-Beam bridges- Analysis and design of various elements of bridge –Design of deck slab, Longitudinal girders, Secondary beams- Reinforcement detailing.

UNIT-IV

Plate Girder Bridges: Elements of plate girder and their design-web- flange- intermediate stiffener- vertical stiffeners- bearing stiffener- Splices, Design problem with detailing.

UNIT-V

Box Culverts: Loading –Analysis and Design- Reinforcement detailing.

UNIT-VI

Inspection and Maintenance of Bridges: Procedures and methods for inspection – Testing of bridges- Maintenance of Sub Structures and Superstructures- Maintenance of bearings- Maintenance Schedules.

TEXT BOOK

1. 'Essentials of Bridge Engineering' by Jhonson Victor D
2. 'Design of Bridge Structures' by T. R. Jagadeesh, M.A. Jayaram, PHI
3. 'Design of RC Structures' by B. C. Punmai, Jain & Jain, Lakshmi Publications.

REFERENCES:

1. 'Design of Concrete Bridges' by Aswini, Vazirani, Ratwani.
2. 'Design of Steel Structures' by B. C. Punmai, Jain & Jain, Lakshmi Publications.
3. 'Design of Bridges' by Krishna Raju.

INTERNAL EXAMINATION PATTERN:

The total internal marks (30) are distributed in three components as follows:

1. Descriptive (subjective type) examination : 25 marks
2. Assignment : 05 marks

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

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DEPARTMENT OF CIVIL ENGINEERING

COURSE STRUCTURE

I M.TECH I SEMESTER

S.NO	SUBJECT NAME	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Advanced Mathematics	4		-	40	60	100	3
2	Theory of Elasticity	4		-	40	60	100	3
3	Matrix Analysis of Structures	4		-	40	60	100	3
4	Structural Dynamics	4		-	40	60	100	3
5	Elective –I							
	Design of Tall Structures Masonry Structures Repair & Rehabilitation of Structures Pre Stressed concrete	4		-	40	60	100	3
6	Elective –II							
	Design of Industrial Structures Special concretes Soil Dynamics & Foundation Engineering Advanced Structural Analysis	4	-	-	40	60	100	3
7	Advanced Structural Engineering Laboratory	-	-	6	40	60	100	3
	TOTAL	24	-	6	280	420	700	21

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I M.TECH II SEMESTER

S.NO	SUBJECT NAME	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Finite Element Method	4		-	40	60	100	3
2	Earthquake Resistant Design	4		-	40	60	100	3
3	Stability of Structures	4		-	40	60	100	3
4	Theory of Plates & Shells	4		-	40	60	100	3
5	Elective –III							
	Design of concrete bridges Geotechnical Earthquake Engineering Advanced Rein forced concrete design Experimental Stress Analysis	4		-	40	60	100	3
6	Elective –IV							
	Plastic Analysis & Design Advanced Steel Design Mechanics of Composite Materials Alternative Building Materials	4	-		40	60	100	3
7	CAD Laboratory		-	6	40	60	100	3
	TOTAL	24		6	280	420	700	21

II M.TECH III & IV SEMESTER

S.NO	SUBJECT NAME	Total marks	Credits
1	Seminar	100	1
2	Comprehensive Viva-Voce	100	2
3	Project Work	-	35
	Total	200	38

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I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ADVANCED MATHEMATICS							

Course Objectives:

- To create awareness of the importance of various techniques in statistics, Numerical methods which are applicable for engineering problem.

Course Outcomes:

- Capable of applying Numerical techniques in engineering applications.
- Ability to ese linear & nonlinear homogenous ordinary and partial differential equations for engineering problems.

UNIT-I : Statistic: Elements of statistic, frequency distribution; Concept of mean, median, mode and different types of distribution; Standard deviation and variance; Curve fitting by least square method; Correlation and Regression, Testing of Hypothesis; Basic type of factorial design and Analysis of Variance.

UNIT-II: Partial differential equations: Finite differences, wave equation- one and two dimensions, heat equation- one dimension and two dimension.

UNIT-III: Numerical Solutions of Elliptic(5-point formula, diagonal formula), Parabolic equations(Bender Smith, Crank Nickalson's formula)

UNIT-IV: Numerical method: Interpolation by Polynomial, Error analysis, Solution of system of linear equation by Gauss Seidal iterative method, Newton Rapson method Numerical Integration by Gauss quadrature, Solution of ordinary differential equation by Rayligh-Ritz method.

UNIT-V: Ordinary Differential Equation: i) 2nd order homogeneous equation ii) Euler Cauchys equation iii) non homogeneous linear equation.

UNIT-VI: Calculations of variations: Introduction, Functionals, Euler's equation, Solutions of Euler's equations, Geodesics, Isoperimetric Problems, Several Dependent Variables, Functional involving higher order derivatives, weighted residual method, Galerkin's method, Hamilton's principle, Lagrange's equations.

TEXT BOOK :

1. Dr. B.S. Grewal "*Higher Engineering Mathematics*", 42nd Edition, Khanna Publishers, 2012.
2. Introductory Methods of Numerical Analysis by S. S. Sastry (PHI)

REFERENCE BOOKS:

1. Numerical Methods for Scientific and Engineering Computation by M. K. Jain, S. R. K. Iyengar, R. K. Jain (New Age)
2. An Outline of Statistical Theory, Vol. I, II by A. M. Goon, M. K. Gupta, B. Dasgupta (The World Press Pvt. Ltd.)
3. The Design of Experiments to Find Optimal Conditions by Yu. P. Adler, E. V. Markova, Ylu V. Granovsky (MIR, 1975, Moscow)
4. Advanced Engineering Mathematics by Erwin Kreyszig (John Wiley & Sons, Inc)
5. Advanced Engineering Mathematics by Stanley Grossman & William R. Derrick (Harper & Row Publisher.

I M.TECH-ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
THEORY OF ELASTICITY							

Course Objectives:
This subject is taught to impart knowledge on theory of elasticity.

Course Outcomes:
Upon completion of this course, the student will be able to

- Analyse the stresses and strains for two dimensional and three dimensional elements.
- Understand the equilibrium and compatibility conditions.
- Solve the problems on Torsion for different shaped bars.

UNIT-I
Definition And Notation: Stress, Stress at a Point, Equilibrium Equations, Principal Stresses, Mohr's Diagram, Maximum Shear Stress, Boundary Conditions.
Strain At A Point: Compatibility Equations, Principal Strains, Generalised Hooke's law, Methods of Solution of Elasticity Problems – Plane Stress-Plane Strain Problems.

UNIT-II
Two Dimensional Problems: Cartesian co-ordinates – Airy's stress functions –Investigation of Airy's Stress function for simple beam problems – Bending of a narrow cantilever beam of rectangular cross section under edge load – method of Fourier analysis – pin ended beam under uniform pressure.

UNIT-III
Three Dimensional Problems: Principal stresses in three dimensions, stress invariants, equilibrium equations, octahedral stresses, Mohr's stress circle, construction of Mohr Circle for three dimensional stress systems,

UNIT-IV
General Equations In Cylindrical Co-Ordinates: Thick cylinder under uniform internal and / or external pressure, shrink and force fit, stress concentration.

UNIT-V
Stresses In An Infinite Plate (with a circular hole) subjected to uniaxial and biaxial loads, stress concentration, stresses in rotating discs and cylinders.

UNIT-VI
Torsion Of Circular, Elliptical And Triangular bars: membrane analogy, torsion of thin open sections and thin tubes.

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TEXT BOOKS:

1. Advanced Mechanics of solids, L. S. Srinath, Tata Mc. Graw Hill, 2003
2. Theory of Elasticity: S. P. Timoshenko and J. N Gordier, Mc. Graw Hill International, 3rd edition, 1972

REFERENCE BOOKS

1. Theory of Elasticity: Dr. Sadhu Singh, Khanna Publications, 1988
2. Elasticity, Theory, Applications &Numericals: Martin H Sadd, Elsevier, 2005
3. Applied Elasticity, Seetharamu&Govindaraju, Interline Publishing
4. Applied Elasticity, C.T. WANG Sc. D. Mc. Graw Hill Book Co.

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I M.TECH-ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
MATRIX ANALYSIS OF STRUCTURES							

Course Objectives:

- The course is intended to teach the basic concepts of Matrix Methods of Structural Analysis.
- Different methods will be taught in the class and their use will be explained in the class.

Course Outcomes:

Upon completion of this course, the student will be able to

- Solve the different structures by using stiffness methods.
- Analyze the substructures, frames and trusses.
- Use the different structural analysis software.

UNIT-I

General Introduction. A Few Historical Remarks.Matrix Methods of Analysis of Skeletal Structures.Methods of Analysis. Displacement Method: Stiffness Relationships.

UNIT-II

The Matrix Displacement Approach.Introduction. Stiffness Matrix of a Bar Element subjected to Axial Force. Co-ordinate Transformations.Global Stiffness Matrix.Application to Pin-Jointed Frames.Stiffness Matrix of a Beam Element.Application to Continuous Beams.

UNIT-III

Matrix Displacement Analysis of Planar Rigid-Jointed Frames. Neglect of Axial Strain in the Analysis of Planar Rigid-Jointed Frames.InclinedSupports.Other Kinds of Loading & Other Kinds of Frames.

UNIT-IV

Matrix Displacement Analysis of Grillage or Grid.Co-ordinate Transformations.Element Stiffness Matrix & its Application.

UNIT-V

Matrix Displacement Analysis of Three-Dimensional Structures.Co-ordinate Transformations.Application to Space Trusses & Space Frames.

UNIT-VI

Computer Applications & Use of Computer Packages.

IQAC

TEXT BOOKS:

1.Matrix& Finite Element Displacement Analysis of Structures: D.J.Dawe.
2.Computer Analysis of Structural Systems: John F. Fleming.
3.Matrix Methods of Structural Analysis: C.K.Wang.
4.Matrix Analysis of Framed Structures: Gere & Weaver.
5.Introduction to Matrix Methods of Structural Analysis: Martin,H.C.

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I M.TECH-ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
STRUCTURAL DYNAMICS							

Course Objectives:

The objectives of this course are

- To make students to learn principles of Structural Dynamics,
- To implement these principles through different methods and to apply the same for free and forced vibration of structures.
- To evaluate the dynamic characteristics of the structures

Course Outcomes:

On completion of this course, students are able to

- Achieve Knowledge of design and development of problem solving skills.
- Understand the principles of Structural Dynamics
- Design and develop analytical skills.
- Summarize the Solution techniques for dynamics of Multi-degree freedom systems
- Understand the concepts of damping in structures.

UNIT-I

Introduction: Introduction to Dynamic problems in Civil Engineering, Concept of degrees of freedom, D'Alembert's principle, principle of virtual displacement and energy principles Dynamics of Single-degree-of-freedom systems: Mathematical models of Single-degree-of-freedom systems system, Free vibration response of damped and undamped systems. Methods of evaluation of damping.

UNIT-II

Response of Single-degree-of-freedom systems to harmonic loading (rotation unbalance, reciprocating unbalance) including support motion, vibration isolation, transmissibility, Numerical methods applied to Single-degree-of-freedom systems - Duhamel integral, principle of vibration-measuring instruments – seismometer and accelerometer.

UNIT-III

Dynamics of Multi-degree freedom systems: Mathematical models of multi-degree-of-freedom systems, Shear building concept, free vibration of undamped multi-degree-of-freedom systems - Natural frequencies and mode shapes – orthogonality property of modes.

UNIT-IV

Response of Shear buildings for harmonic loading without damping using normal mode approach. Response of Shear buildings for forced vibration for harmonic loading with damping using normal mode approach, condition of damping uncoupling.

UNIT-V

Approximate methods: Rayleigh's method Dunkarley's method, Stodola's method. Dynamics of Continuous systems: Free longitudinal vibration of bars, flexural vibration of beams with different end conditions,

UNIT-VI

Stiffness matrix, mass matrix (lumped and consistent); equations of motion for the discretised beam in matrix form.

REFERENCE BOOKS:

1. Dynamics of Structures – Theory and Application to Earthquake Engineering"- 2nd ed., Anil K. Chopra, Pearson Education.
2. Earthquake Resistant Design of Building Structures, Vinod Hosur, WILEY (india)
3. Vibrations, structural dynamics- M. Mukhopadhaya : Oxford IBH
4. Structural Dynamics- Mario Paz : CBS publishers.
5. Structural Dynamics- Clough &Penzien : TMH 6. Vibration Problems in Engineering Timoshenko, S, Van-Nostrand Co.

I M.TECH-ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
DESIGN OF TALL STRUCTURES							

Course Objectives:

The objectives of this course is

- To make students to learn principles of stability of tall buildings,
- To design the tall buildings for earthquake and wind resistance.
- To evaluate the performance of tall structures for strength and stability.

Course Outcomes:

On completion of this course, students are able to

- Achieve Knowledge of design and development of problem solving skills.
- Understand the principles of strength and stability
- Design and develop analytical skills.
- Summarize the behavior of various structural systems.
- Understand the concepts of P-Delta analysis.

UNIT-I

Design Criteria: Design philosophy, loading, sequential loading, and materials – high performance concrete, fiber reinforced concrete, lightweight concrete, design mixes. Loading and Movement: Gravity loading: Dead and live load, methods of live load reduction, Impact, Gravity loading, Construction loads

UNIT-II

Wind loading: static and dynamic approach, Analytical and wind tunnel experimentation method. Earthquake loading: Equivalent lateral force, modal analysis, combinations of loading, working stress design, Limit state design, Plastic design.

UNIT-III

Behavior of Various Structural Systems: Factors affecting growth, Height and structural form; High rise behavior, Rigid frames, braced frames, in-filled frames, shear walls, coupled shear walls, wall-frames, tubular, cores, Futigger – braced and hybrid mega system.

UNIT-IV

Analysis and Design: Modeling for approximate analysis, accurate analysis and reduction techniques, analysis of building as total structural system considering overall integrity and major subsystem interaction, analysis for member forces; drift and twist, computerized general three dimensional analyses.

UNIT-V

Stability of Tall Buildings: Overall buckling analysis of frames, wall frames, approximate methods, second order effects of gravity of loading,

UNIT-VI

P-Delta analysis, simultaneous first order and P-Delta analysis, Transnational, Torsional instability, out of plum effects, stiffness of member in stability, effect of foundation rotation. Structural elements: sectional shapes, properties and resisting capacities, design, deflection, cracking, pre-stressing, shear flow. Design for differential movement, creep and shrinkage effects, temperature effects and fire

REFERENCE BOOKS:

1. Taranath B.S, "Structural Analysis and Design of Tall Buildings"- McGraw Hill
2. Wilf gang Schuller, "High rise building structures"- John Wiley
3. Bryan Stafford Smith &Alexcoull, "Tall building structures Analysis and Design"- John Wiley
4. T.Y Lin &D.Stotes Burry, "Structural concepts and system for Architects and Engineers"- John Wiley
5. Lynn S.Beedle, "Advances in Tall Buildings"- CBS Publishers and Distributors.
6. Dr. Y.P. Gupta – Editor, "Proceedings National Seminar on High Rise Structures- Design and Construction practices for middle level cities"- New Age International Limited.

I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
MASONRY STRUCTURES							

Course Objectives:

- To make students to learn performance of masonry structures,
- To design the masonry structures for earthquake resistance.
- To evaluate the strength and stability of the masonry structures.

Course Outcomes:

On completion of this course, students are able to

- Achieve Knowledge of design and development of problem solving skills.
- Understand the principles of design and construction of masonry structures
- Design and develop analytical skills.
- Summarize the masonry Characteristics.
- Evaluate the strength and stability of the masonry structures.

UNIT-I

Introduction, Masonry units, materials and types: History of masonry Characteristics of Brick, stone, clay block, concrete block, stabilized mud block masonry units – strength, modulus of elasticity and water absorption. Masonry materials – Classification and properties of mortars, selection of mortars.

UNIT-II

Strength of Masonry in Compression: Behaviour of Masonry under compression, strength and elastic properties, influence of masonry unit and mortar characteristics, effect of masonry unit height on compressive strength, influence of masonry bonding patterns on strength, prediction of strength of masonry in Indian context, Failure theories of masonry under compression. Effects of slenderness and eccentricity, effect of rate of absorption, effect of curing, effect of ageing, workmanship on compressive strength.

UNIT-III

Flexural and shear bond, flexural strength and shear strength: Bond between masonry unit and mortar, tests for determining flexural and shear bond strengths, factors affecting bond strength, effect of bond strength on compressive strength, orthotropic strength properties of masonry in flexure, shear strength of masonry, test procedures for evaluating flexural and shear strength.

UNIT-IV

Design of load bearing masonry buildings: Permissible compressive stress, stress reduction and shape reduction factors, increase in permissible stresses for eccentric vertical and lateral loads, permissible tensile and shear stresses, Effective height of walls and columns,

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UNIT-V

Opening in walls, effective length, effective thickness, slenderness ratio, eccentricity, load dispersion, arching action, lintels; Wall carrying axial load, eccentric load with different eccentricity ratios, wall with openings, freestanding wall; Design of load bearing masonry for buildings up to 3 to 8 storeys using BIS codal provisions.

UNIT-VI

Earthquake resistant masonry buildings: Behaviour of masonry during earthquakes, concepts and design procedure for earthquake resistant masonry, BIS codalprovisions. Masonry arches, domes and vaults: Components and classification of masonry arches, domes and vaults, historical buildings, construction procedure.

REFERENCE BOOKS:

1. Hendry A.W., "Structural masonry"- Macmillan Education Ltd., 2nd edition
2. Sinha B.P & Davis S.R., "Design of Masonry structures"- E & FN Spon
3. Dayaratnam P, "Brick and Reinforced Brick Structures"- Oxford & IBH
4. Curtin, "Design of Reinforced and Prestressed Masonry"- Thomas Telford
5. Sven Sahlin, "Structural Masonry"-Prentice Hall
6. Jagadish K S, Venkatarama Reddy B V and Nanjunda Rao K S, "Alternative Building Materials and Technologies"- New Age International, New Delhi & Bangalore
7. IS 1905, BIS, New Delhi.
8. SP20(S&T),New Delhi

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	4	0	0	40	60	100	3
REPAIR AND REHABILITATION OF STRUCTURES							

Course Objectives:

The objectives of this course is

- To investigate the cause of deterioration of concrete structures,
- To strategise different repair and rehabilitation of structures.
- To evaluate the performance of the materials for repair.

Course Outcomes:

On completion of this course, students are able to

- Achieve Knowledge of design and development of problem solving skills.
- Understand the cause of deterioration of concrete structures.
- Design and develop analytical skills.
- Summarize the principles of repair and rehabilitation of structures
- Understands the concept of Serviceability and Durability.

UNIT-I

General: Introduction, Cause of deterioration of concrete structures, Diagnostic methods & analysis, preliminary investigations, experimental investigations using NDT, load testing, corrosion mapping, core drilling and other instrumental methods Quality assurance for concrete construction as built concrete properties strength, permeability, thermal properties and cracking.

UNIT-II

Influence on Serviceability and Durability: Effects due to climate, temperature, chemicals, wear and erosion, Design and construction errors, corrosion mechanism, Effects of cover thickness and cracking, methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings, cathodic protection.

UNIT-III

Maintenance and Repair Strategies: Definitions: Maintenance, repair and rehabilitation, Facets of Maintenance importance of Maintenance Preventive measures on various aspects. Inspection, Assessment procedure for evaluating a damaged structure causes of deterioration-testing techniques.

UNIT-IV

Materials for Repair: Special concretes and mortars, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fiber reinforced concrete.

UNIT-V

Techniques for Repair: Rust eliminators and polymers coating for rebar during repair foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shot Crete Epoxy injection, Mortar repair for cracks, shoring and underpinning.

UNIT-VI

Examples of Repair to Structures: Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering wear, fire, leakage, marine exposure, engineered demolition techniques for dilapidated structures - case studies

REFERENCE BOOKS:

1. Sidney, M. Johnson "Deterioration, Maintenance and Repair of Structures".
2. Denison Campbell, Allen & Harold Roper, "Concrete Structures – Materials, Maintenance and Repair"- Longman Scientific and Technical
3. R.T.Allen and S.C. Edwards, "Repair of Concrete Structures"-Blakie and Sons 4. Raiker R.N., "Learning for failure from Deficiencies in Design, Construction and Service"- R&D Center (SDCPL)

I M.TECH-ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
PRE-STRESSED CONCRETE							

Course Objectives:

- This subject is thought to give the concepts of pre stress
- To impart the knowledge about analysis and design of pre stressed concrete members.

Course Outcomes:

Upon completion of this course, the student will be able to

- Know the concepts, methods and materials of pre stressing systems.
- Design the pre stressed concrete members.
- Calculate the deflections in pre stressed concrete members.
- Design anchorage zones and composite pre stressed concrete members.

UNIT-I

General Principles of Prestressed Concrete : Pre–tensioning and post – tensioning – Prestressing by straight, concentric, eccentric, bent and parabolic tendons – Different methods and systems of prestressing like Hoyer system, Freyssinet system, MagnelBlaton system – Lee-Mc call system.

UNIT-II

Losses of Prestress : Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, relaxation of steel, slip in anchorage, bending of member and frictional loss – Analysis of sections for flexure.

UNIT-III

Design of Section for Flexure : Allowable stresses – Elastic design of simple beams having rectangular and I-section for flexure – kern lines – cable profile and cable layout. Design of Sections for Shear : Shear and Principal stresses – Improving shear resistance by different prestressing techniques – horizontal, sloping and vertical prestressing – Analysis of rectangular and I–beam – Design of shear reinforcement – Indian code provisions.

UNIT-IV

Deflections of Prestressed Concrete Beams : Short term deflections of uncracked members– Prediction of long-time deflections – load – deflection curve for a PSC beam – IS code requirements for max. deflections.

UNIT-V

Transfer of Prestress in Pretensioned Members : Transmission of prestressing force by bond – Transmission length – Flexural bond stresses – IS code provisions – Anchorage zone stresses in post tensioned members – stress distribution in End block – Analysis by approximate, Guyon and Magnel methods – Anchorage zone reinforcement.

IQAC

UNIT-VI

Statically Indeterminate Structures : Advantages & disadvantages of continuous PSC beams – Primary and secondary moments – P and C lines – Linear transformation concordant and nonconcordant cable profiles – Analysis of continuous beams and simple portal frames (single bay and single story)

REFERENCEBOOKS :

1. Prestressed concrete by Krishna Raju, Tata Mc Graw Hill Book -- Co ., New Delhi.
2. Design of prestress concrete structures by T.Y. Lin and Burn, John Wiley, New York.
3. Prestressed concrete by S. RamamruthamDhanpat Rai & Sons, Delhi.

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I M.TECH-ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
DESIGN OF INDUSTRIAL STRUCTURES							

Course Objectives:
The objectives of this course is

- To make students to learn principles of Design of industrial building ,
- To design different components of industrial structures and to detail the structures.
- To evaluate the performance of the Pre- engineered buildings.

Course Outcomes:
On completion of this course, students are able to

- Achieve Knowledge of design and development of problem solving skills.
- Understand the industrial building and the components.
- Design and develop analytical skills.
- Summarize the principles of Structural Design and detailing
- Understands the concept of Pre- engineered buildings.

UNIT-I
Analysis of industrial building for Gravity and Wind load. Analysis and design of framing components namely, girders,

UNIT-II
Analysis of industrial building for Gravity and Wind load. Analysis and design of framing components namely trusses, gable frames.

UNIT-III
Analysis and design of gantry column (stepped column / column with bracket), purlins, girts, bracings including all connections.

UNIT-IV
Analysis of transmission line towers for wind load and design of towers including all connections.

UNIT-V
Forms of light guage sections, Effective width computation of unstiffened, stiffened, multiple stiffened compression elements of cold formed light guage sections. Concept of local buckling of thin elements.Limiting width to thickness ratio. Post buckling strength.

UNIT-VI
Concept of Pre- engineered buildings, Design of compression and tension members of cold formed light guage sections, Design of flexural members (Laterally restrained / laterally unrestrained).

REFERENCE BOOKS:

1. Bureau of Indian Standards, IS800-2007, IS875-1987, IS-801-1975. Steel Tables, SP 6 (1) – 1984
2. N Subramanian- "Design of Steel Structure" oxford University Press
3. B.C. Punmia, A.K. Jain "Design of Steel Structures", Laxmi Publications, New Delhi.
4. .Ramchandra and VirendraGehlot" Design of Steel Structures " Vol 1 and Vol.2, Scientific Publishers, Jodhpur 5. Duggal "Limit State Design of Steel Structures" TMH

I M.TECH-ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
SPECIAL CONCRETES							

Course Objectives:

- To make students to learn principles of Concrete mix design.
- To differentiate between different types of concrete.
- To characterize the high Performance concrete.

Course Outcomes:

On completion of this course, students are able to

- Achieve Knowledge of design and development of problem solving skills.
- Understand the principles of Concrete mix design
- Design and develop analytical skills.
- Summerize the Light Weight concrete, Fibre reinforced concrete and High Performance concrete.
- Understand the concepts of high Performance concrete.

UNIT-I

Components of modern concrete and developments in the process and constituent materials : Role of constituents,

UNIT-II

Development in cements and cement replacement materials, pozzolona, fly ash, silica fume, rice husk ash, recycled aggregates, chemical admixtures. Mix proportioning of Concrete: Principles and methods.

UNIT-III

Light Weight concrete: Introduction, classification, properties, strength and durability, mix proportioning and problems. High density concrete: Radiation shielding ability of concrete, materials for high density concrete, mix proportioning, properties in fresh and hardened state, placement methods.

UNIT-IV

Ferro cement: Ferrocement materials, mechanical properties, cracking of ferrocement, strength and behaviour in tension, compression and flexure, Design of ferrocement in tension, ferrocement constructions, durability, and applications.

UNIT-V

Fibre reinforced concrete: Fibre materials, mix proportioning, distribution and orientation, interfacial bond, properties in fresh state, strength and behavior in tension, compression and flexure of steel fibre reinforced concrete, mechanical properties, crack arrest and toughening mechanism, applications.

IQAC

UNIT-VI

High Performance concrete: constituents, mix proportioning, properties in fresh and hardened states, applications and limitations. Ready Mixed Concrete, Self Compacting Concrete. Reactive powder concrete, bacterial concrete.

REFERENCE BOOKS:

1. Neville A.M, "Properties of Concrete" Pearson Education Asis, 2000
2. P. Kumar Mehta, Paul J.N.Monterio, CONCRETE, "Microstructure, Properties and Materials"- Tata McGraw Hill
3. A.R.Santhakumar, (2007) "Concrete Technology"-Oxford University Press, New Delhi, 2007
4. Gambhir "Concrete Technology" TMH.
5. Short A and Kinniburgh.W, "Light Weight Concrete"- Asia Publishing House, 1963
6. Aitcin P.C. "High performance concrete"-E and FN, Spon London 1998
7. Rixom.R. andMailvaganam.N., "Chemical admixtures in concrete"- E and FN, Spon London 1999
8. Rudnai.G., "Light Wiehgt concrete"- Akademiaikiado, Budapest, 1963

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	4	0	0	40	60	100	3
SOIL DYNAMICS & FOUNDATION ENGINEERING							

Course Objectives:
Student will be able to

- Use the techniques, skills, and modern engineering tools necessary for engineering practice.
- Understand the impact of engineering solutions in economic and environmental context.
- Design, analyze and interpret data related to the geotechnical engineering.

Course Outcomes:
On successful completion of this course, it is expected that students should be able to

- Accentuate the understanding of the basic principles and exposes the student to the latest developments, with a strong research orientation. ¬ Identify, formulate and solve foundation related problems.
- Understand the latest trends, modern standards and state-of-the-art techniques for geotechnical engineering.

UNIT-I
Types of machine foundations - general requirements design - criteria for machine foundations, permissible amplitudes and bearing pressure.

UNIT-II
Resonance and its effect - free and forced Vibrations with and without damping - constant force and rotating mass type excitation - magnification steady state vibrations - logarithmic decrement.

UNIT-III
Natural frequency of foundation - soil system - Barkan's and I.S. methods of determining natural frequency.

UNIT-IV
Elastic properties of soil for dynamical purpose and their experimental determination - Elastic waves and their characteristics -'Experimental determination of shear modulus from wave theory.

UNIT-V
Apparent soil mass - bulb of pressure concept - Pauw's analogy of foundation - soil systems (concept only) - Theory of elastic half space - lamb and the dynamic Boussinesq's problem - Relsner's solution and its limitations - Quinlan and Sung's modifications - Hsiegh's equations for vertical vibration.

UNIT-VI
Principles of design of foundations for reciprocating and impact type of machine - as per I.S. Codes. Vibration isolation - types and methods of isolation - isolating materials and their properties.

TEXT BOOKS:
1. Hand Book of Machine Foundations by S. Srinivasulu and Vaidganathan.
2. Soil Mechanics & Foundation Engineering by B.C.Punmia.
3. Analysis and Design of Foundation and retaining structures-Sham Sher Prakets, Etal.

REFERENCE BOOKS:
1. Vibration of Soils & Foundations - Richant Hall & Woods.

I M.TECH-ISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ADVANCED STRUCTURAL ANALYSIS							

UNIT-I
Unsymmetrical bending, flexural stresses due to bending in two planes, shear center, bending of unsymmetrical section.

UNIT-II
Bending of beams with large initial curvature. Application of analysis of hooks, bends and curved links, etc.

UNIT-III
Beams curved in plans loaded perpendicular to there plane, Fixed and continuous curved beams.

UNIT-IV
Theories of failure, Max stress theory, max shear stress theory, max strain theory, Von Mises &Trescas failure theories.

UNIT-V
Beams on Elastic foundation, Beams of unlimited length, Semi infinite lengths and finite lengths on elastic foundation.

UNIT-VI
Analysis deep beams, determination of stresses and deflection.

REFERENCE BOOKS:

1. Timoshenko S., "Strength of Materials Vol – I & II", CBS Publishers
2. Shames I. H., "Mechanics of Deformable Solids", Prentice Hall India
3. Boresi A. P., "Advanced Mechanics of Material", John Wiley & Sons.
4. Srinath L. S., " Advanced Mechanics of Solids", Tata McGraw Hill

I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	6	40	60	100	3
ADVANCED STRUCTURAL ENGINEERING LABORATORY							

1. Mix design of concrete of different grades & using admixtures.
2. Tensile and Flexural strength of concrete of different grades.
3. Tensile strength of different types of steel rebars, rolled steel sections.
4. Testing of simply supported RCC beams for flexural failure
5. Testing of simply supported RCC beams for shear failure
6. Testing of RCC column
7. Non-destructive testing of concrete including rebound hammer and ultrasonic pulse method.
8. Permeability of concrete
9. Vibration analysis of beams and plates
10. Buckling load of struts.

ESSENTIAL READING:

1. A.M. Neville & J.J. Brooks, Concrete Technology, Pearson Education, Delhi, 2004.
2. A.R. Santhakumar, Concrete Technology, Oxford University Press, 2007, New Delhi

SUPPLEMENTARY READING:

1. Structural Engineering laboratory manual.
2. Relevant BIS Codes of practice for mix design, rebar testing, concrete design etc.

I M.TECH-IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
FINITE ELEMENT METHOD							

Course objectives:

- To make students to learn principles of Analysis of Stress and Strain,
- To apply the Finite Element Method for the analysis of one and two dimensional problems
- To evaluate the stress and strain parameters and their inter relations of the continuum.

Course Outcomes:

On completion of this course, students are able to

- Achieve Knowledge of design and development of problem solving skills.
- Understand the principles of stress-strain behaviour of continuum
- Design and develop analytical skills.
- Describe the state of stress in a continuum
- Understand the concepts of elasticity and plasticity.

UNIT-I

Basic concepts of elasticity – Kinematic and Static variables for various types of structural problems – approximate method of structural analysis – Rayleigh – Ritz method – Finite difference method – Finite element method. Variation method and minimization of Energy approach of element formulation.

UNIT-II

Principles of finite element method – advantages & disadvantages – Finite element procedure. Finite elements used for one, two & three dimensional problems – Element aspect ratio – mesh refinement vs. higher order elements – Numbering of nodes to minimize band width.

UNIT-III

Nodal displacement parameters – Convergence criterion – Compatibility requirements – Geometric invariance – Shape function – Polynomial form of displacement function. Generalized and Natural coordinates – Lagrangian interpolation function – shape functions for one, two & three dimensional elements.

UNIT-IV

Isoparametric elements - Internal nodes and higher order elements – Serendipity and Lagrangian family of Finite Elements – Sub parametric and Super parametric elements – Condensation of internal nodes – Jacobian transformation Matrix. Development of strain – displacement matrix and stiffness matrix, consistent load vector, numerical integration.

IQAC

UNIT-V

Application of Finite Element Method for the analysis of one & two dimensional problems - Analysis of simple beams and plane trusses – Application to plane stress / strain axisymmetric problems using CST & Quadrilateral Elements.

UNIT-VI

Application to Plates & Shells- Choice of displacement function (C 0 , C 1 and C 2 type) – Techniques for Non – linear Analysis.

REFERENCE BOOKS:

1. Krishnamoorthy C S, "Finite Element Analysis"- Tata McGraw Hill
2. Desai C and Abel J F, "Introduction to the Finite Element Method"- East West Press Pvt. Ltd., 1972 3. Bathe K J, "Finite Element Procedures in Engineering Analysis"- Prentice Hall
4. Rajasekaran. S, "Finite Element Analysis in Engineering Design"-Wheeler Publishing
5. Cook R D, Malkan D S &Plesta M.E, "Concepts and Application of Finite Element Analysis" - 3 rd Edition, John Wiley and Sons Inc., 1989
6. Shames I H and Dym C J, "Energy and Finite Element Methods in Structural Mechanics"- McGraw Hill, New York, 1985

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	4	0	0	40	60	100	3
EARTHQUAKE RESISTANT DESIGN							

Course objectives:

- To make students to learn principles of engineering seismology,
- To design the reinforced concrete buildings for earthquake resistance.
- To evaluate the seismic response of the structures.

Course Outcomes:

On completion of this course, students are able to

- Achieve Knowledge of design and development of problem solving skills.
- Understand the principles of engineering seismology
- Design and develop analytical skills.
- Summarize the Seismic evaluation and retrofitting of structures.
- Understand the concepts of earthquake resistance of reinforced concrete buildings.

UNIT-I

Introduction to engineering seismology, Geological and tectonic features of India, Origin and propagation of seismic waves, characteristics of earthquake and its quantification –Magnitude and Intensity scales, seismic instruments.

UNIT-II

Earthquake Hazards in India, Earthquake Risk Evaluation and Mitigation. Structural behavior under gravity and seismic loads, Lateral load resisting structural systems, Requirements of efficient earthquake resistant structural system, damping devises, base isolation systems.

UNIT-III

The Response history and strong motion characteristics. Response Spectrum – elastic and inelastic response spectra, tripartite (D-V-A) response spectrum, use of response spectrum in earthquake resistant design.Computation of seismic forces in multi-storeyed buildings – using procedures (Equivalent lateral force and dynamic analysis) as per IS-1893.

UNIT-IV

Structural Configuration for earthquake resistant design, Concept of plan irregularities and vertical irregularities, Soft storey, Torsion in buildings. Design provisions for these in IS-1893. Effect of infill masonry walls on frames, modelling concepts of infill masonry walls. Behaviour of masonry buildings during earthquakes, failure patterns, strength of masonry in shear and flexure, Slenderness concept of masonry walls, concepts for earthquake resistant masonry buildings – codal provisions.

IQAC

UNIT-V

Design of Reinforced concrete buildings for earthquake resistance-Load combinations, Ductility and energy absorption in buildings.confinement of concrete for ductility, design of columns and beams for ductility, ductile detailing provisions as per IS-1893. Structural behaviour, design and ductile detailing of shear walls.

UNIT-VI

Seismic response control concepts – Seismic demand, seismic capacity, Overview of linear and nonlinear procedures of seismic analysis. Performance Based Seismic Engineering methodology, Seismic evaluation and retrofitting of structures.

REFERENCE BOOKS:

1. Dynamics of Structures – Theory and Application to Earthquake Engineering- 2nd ed. – Anil K. Chopra, Pearson Education.
2. Earthquake Resistant Design of Building Structures, Vinod Hosur, WILEY (India)
3. Earthquake Resistant Design of Structures, Duggal, Oxford University Press
4. Earthquake resistant design of structures - Pankaj Agarwal, Manish Shrikande - PHI India
5. IS – 1893 (Part I): 2002, IS – 13920: 1993, IS – 4326: 1993, IS-13828: 1993
6. Design of Earthquake Resistant Buildings, Minoru Wakabayashi, McGraw Hill Pub.
7. Seismic Design of Reinforced Concrete and Masonry Buildings, T Paulay and M J N Priestley, John Wiley and Sons

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I M.TECH-IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
STABILITY OF STRUCTURES							

Course objectives:

- To make students to learn principles of stability of structures,
- To analyse the structural elements for stability.
- To evaluate the use of strain energy in plate bending and stability.

Course Outcomes:

On completion of this course, students are able to

- Achieve Knowledge of design and development of problem solving skills.
- Understand the principles of strength and stability
- Design and develop analytical skills.
- Appraise the Stability analysis by finite element approach.
- Understand the concepts of Lateral buckling of beams.

UNIT-I

Beam – column – Differential equation. Beam column subjected to (i) lateral concentrated load, (ii) several concentrated loads, (iii) continuous lateral load. Application of trigonometric series, Euler's formulation using fourth order differential equation for pined – pined, fixed – fixed, fixed – free and fixed – pinned column.

UNIT-II

Buckling of frames and continuous beams.Elastica.Energy method – Approximate calculation of critical loads for a cantilever. Exact critical load for hinged – hinged column using energy approach.Buckling of bar on elastic foundation. Buckling of cantilever column under distributed loads. Determination of critical loads by successive approximation.Bars with varying cross section.Effect of shear force on critical load. Column subjected to non – conservative follower and pulsating forces.

UNIT-III

Stability analysis by finite element approach – deviation of shape function for a two nodded Bernoulli – Euler beam element (lateral and translation of) – element stiffness and element geometric stiffness matrices – assembled stiffness and geometric stiffness matrices for a discretised column with different boundary condition – calculation of critical loads for a discretised (two elements) column (both ends built in). Buckling of pin jointed frames (maximum of two active dof) – symmetrical single bay portal frame.

IQAC

UNIT-IV

Lateral buckling of beams – differential equation – pure bending – cantilever beam with tip load – simply supported beam of I section subjected to central concentrated load. Pure Torsion of thin – walled bars of open cross section. Non – uniform Torsion of thin – walled bars of open cross section.

UNIT-V

Expression for strain energy in plate bending with in plate forces (linear and non – linear). Buckling of simply supported rectangular plate – uniaxial load and biaxial load.

UNIT-VI

Buckling of uniformly compressed rectangular plate simply supported along two opposite sides perpendicular to the direction of compression and having various edge condition along the other two sides.

REFERENCE BOOKS:

1. Stephen P.Timoshenko, James M Gere, "Theory of Elastic Stability"-2nd Edition, McGraw – Hill, New Delhi.
2. Robert D Cook et.al, "Concepts and Applications of Finite Element Analysis"-3rd Edition, John Wiley and Sons, New York.
3. S.Rajashekar, "Computations and Structural Mechanics"-Prentice – Hall, India.
4. Ray W Clough and J Penzien, "Dynamics of Structures" - 2nd Edition, McGraw Hill, New Delhi
5. H.Zeiglar, "Principles of Structural Stability"-Blaisdall Publication

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I M.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
Theory of Plates and Shells							

Course objectives:

- The objectives of this course is to make students to learn different methods of analysis of plates and shells,
- To critically detail the plates and shells.
- To evaluate the performance of spatial structures.

Course Outcomes:

On completion of this course, students are able to

- Achieve Knowledge ofanalysis and development of problem solving skills.
- Understand the principles of Analysis and Design
- Analyse and develop analytical skills.
- Summarize the performance of shells
- Understand the concepts of energy principle..

UNIT-I

Introduction: Assumptions in the theory of thin plates – Pure bending ofPlates – Relations between bending moments and curvature - Particular cases of pure bending ofrectangular plates,

UNIT-II

Cylindrical bending - immovable simply supported edges – Synclastic bending and Anticlastic bending – Strain energy in pure bending of plates in Cartesian and polarco-ordinates – Limitations.

UNIT-III

Laterally Loaded Circular Plates:- Differential equation of equilibrium – Uniformly loaded circular plates with simply supported and fixed boundary conditions – Annular plate with uniform moment and shear force along the boundaries.Laterally Loaded Rectangular Plates: - Differential equation of plates – Boundary conditions

UNIT-IV

Navier solution for simply supported plates subjected to uniformly distributed load and point load – Levy's method of solution for plates having two opposite edges simply supported with various symmetrical boundary conditions along the other two edges loaded with u. d. l. – Simplysupported plates with moments distributed along the edges - Approximate Methods. Effect of transverse shear deformation - plates of variable thickness – Anisotropic plates-thickplates- orthotropic plates and grids - Large Deflection theory.

IQAC

UNIT-V

Deformation of Shells without Bending:- Definitions and notation, shells in the form of a surfaceof revolution, displacements, unsymmetrical loading, spherical shell supported at isolated points,membrane theory of cylindrical shells, the use of stress function in calculating membrane forcesof shells.

UNIT-VI

General Theory of Cylindrical Shells:- A circular cylindrical shell loaded symmetrically with respect to its axis, symmetrical deformation, pressure vessels, cylindrical tanks, thermal stresses,in extensional deformation, general case of deformation, cylindrical shells with supported edges,approximate investigation of the bending of cylindrical shells, the use of a strain and stressfunction, stress analysis of cylindrical roof shells.

Text Books:

1. S.P Timoshenko and S.W Krieger, Theory of Plates and Shells, McGraw Hill, 1989.

Reference Books:

1. R. Szilard, Theory and Analysis of Plates – Classical Numerical Methods', Prentice Hall inc, 1974.
2. P.L Gould, Analysis of Shells and Plates, Springer-Verlag, New York, 1988.

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	4	0	0	40	60	100	3
DESIGN OF CONCRETE BRIDGES							

Course Objectives:

The objectives of this course is

- To make students to learn principles of Structural Design,
- To design different types of structures and to detail the structures.
- To evaluate performance of the structures.

Course Outcomes:

On completion of this course, students are able to

- Achieve Knowledge of design and development of problem solving skills.
- Explain the Bridge substructures and superstructures
- Design and develop analytical skills.
- Summarize the principles of design and detailing of bridges
- Understands the different types of bridges.

UNIT-I

Introduction: Historical Developments, Site Selection for Bridges, Classification of Bridges Forces on Bridges. Bridge substructures: Abutments, piers and wing walls Balanced Cantilever Bridge: Introduction and proportioning of components, Design of simply supported portion and design of cantilever portion, design of articulation.

UNIT-II

Box Culvert: Different Loading Cases IRC Class AA Tracked, Wheeled and Class A Loading, working out the worst combination of loading, Moment Distribution, Calculation of BM & SF, Structural Design of Slab Culvert, with Reinforcement Details.

UNIT-III

T Beam Bridge Slab Design: Proportioning of Components Analysis of interior Slab & Cantilever Slab Using IRC Class AA Tracked, Wheeled Class A Loading, Structural Design of Slab, with Reinforcement Detail.

UNIT-IV

T Beam Bridge Cross Girder Design: Analysis of Cross Girder for Dead Load & Live Load Using IRC Class AA Tracked, Wheeled Class A Loading A Loads, Structural Design of Beam, with Reinforcement Detail.

UNIT-V

T Beam Bridge Main Girder Design: Analysis of Main Girder for Dead Load & Live Load Using IRC Class AA Tracked, Wheeled Class A Loading Using COURBON'S Method. Analysis of Main Girder Using HENDRY-JAEGER and MORICELITTLE Method for IRC Class AA Tracked vehicle only, BM & SF for different loads, Structural Design of Main Girder With Reinforcement Details.

UNIT-VI

PSC Bridges: Introduction to Pre and Post Tensioning, Proportioning of Components, Analysis and Structural Design of Slab, Analysis of Main Girder using COURBON's Method for IRC Class AA tracked vehicle, Calculation of pre-stressing force, cable profile and calculation of stresses, Design of End block and detailing of main girder.

REFERENCE BOOKS:

1. "Essentials of Bridge Engineering"- D Johnson Victor, Oxford & IBH Publishing Co New Delhi
2. "Design of Bridges"- N Krishna Raju, Oxford & IBH Publishing Co New Delhi
3. "Principles and Practice of Bridge Engineering"- S P BindraDhanpat Rai & Sons New Delh
4. IRC 6 – 1966 "Standard Specifications And Code Of Practice For Road Bridges"- Section II Loads and Stresses, The Indian Road Congress New Delhi
5. IRC 21 – 1966 "Standard Specifications And Code Of Practice For Road Bridges"- Section III Cement Concrete (Plain and reinforced) The Indian Road Congress New Delhi
6. IS 456 – 2000 "Indian Standard Plain and Reinforced Concrete Code of Practice"- (Fourth Revision) BIS New Delhi
7. IS 1343 – "Indian Standard Prestressed Concrete Code of Practice"- BIS New Delhi
8. Raina V.K., "Concrete Bridge Practice"- Tata McGraw Hill
9. Bakht B &Jaeggar, "Bridge Analysis Simplified"- McGraw Hill
10. Ponnuswamy .S, "Bridge Engineering"- Tata McGraw Hill.
11. Derrick Beckett, "An Introduction to Structural Design of Concrete Bridges"- Surrey University Press

I M.TECH-IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
GEOTECHNICAL EARTHQUAKE ENGINEERING							

Course outcomes:
On completion of the course, the students will be able to:

- demonstrate the principles of earthquake loading
- quantify earthquake intensity and ground motion
- estimate seismic soil design parameters
- analyse and design seismic resistant foundation for buildings
- prepare soil risk and micro-zonation maps

Course objectives:

- To explain the mechanism of earthquake and its related causes to build structures and in-situ soils
- To explain how ground motion is recorded and how do quantify the earthquake intensity and frequency related parameters
- To explain how seismic site investigation will be done and seismic soil design parameters are estimated
- To explain how seismic resistant design of foundation will be done and also explain the concept of liquefaction and related causes including codal recommendations
- To explain how to do hazard assessment and mitigation and explain how do prepare a risk and microzonation mapping

UNIT-I
Seismology and Earthquakes:Introduction, Seismic Hazards, seismic waves, internal structure of earth, Continental drift and plate tectonics, faults, elastics rebound theory, geometric notations, location of earthquakes, size of earthquakes.

UNIT-II
Strong Ground Motion:Strong ground motion measurement, ground motion parameters, estimation of ground motion parameters.

UNIT-III
Seismic Hazard Analysis:Identification and Evaluation of Earthquake Sources, deterministic seismic hazard analysis, probabilistic seismic hazard analysis.

UNIT-IV
Wave propagation:Waves in unbounded media, waves in a semi – infinite body, waves in a layered media, attenuation of stress waves.

IQAC

UNIT-V
Dynamic soil properties: Measurement of dynamic soil properties using field and laboratory tests (overview), stress strain behavior of cyclically loaded soils, strength of cyclically loaded soils.Ground Response AnalysisOne – Dimensional Ground response Analysis – Linear and Non-Linear Approaches. Local Site Effects: Effect of local site conditions on ground motion, design parameters, development of design parameters.

UNIT-VI
Liquefaction:Flow liquefaction, cyclic mobility, evaluation of liquefaction hazards, liquefaction susceptibility, initiation of liquefaction, effects of liquefaction.
Soil Improvement for Remediation of Seismic Hazards:Densification techniques, Reinforcement Techniques, Grouting and Mixing techniques, Drainage techniques.

TEXT BOOKS:

1. Geotechnical Earthquake Engineering by Steven L. Kramer, prentice Hall, 1st edition, 1996.

REFERENCE BOOKS:

1. Geotechnical Earthquake Engineering Handbook by Robert W. Day, McGraw-Hill. 2nd edition, 2010.

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I M.TECH-IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ADVANCED REINFORCED CONCRETE DESIGN							

Course Objectives:
The objectives of this course is
- To make students to learn principles of Structural Design,
- To design different types of structures and to detail the structures.
- To evaluate performance of the structures.

Course Outcomes:
On completion of this course, students are able to
- Achieve Knowledge of design and development of problem solving skills.
- Understand the principles of Structural Design
- Design and develop analytical skills.
- Summarize the principles of Structural Design and detailing
- Understands the structural performance.

UNIT-I
Yield line method of design of slabs. Design of flat slabs.

UNIT-II
Design of grid floors.

UNIT-III
Design of continuous beams with redistribution of moments.

UNIT-IV
Design of Chimneys,

UNIT-V
Design of silos and bunkers.

UNIT-VI
Art of detailing earthquake resistant structures. Expansion and contraction joints

REFERENCE BOOKS:

1. A Park and Paulay, "Reinforced Reinforced and Prestressed Concrete"
2. Lin TY and Burns N H, "Reinforced Concrete Design".
3. Kong KF and Evans T H "Design of Prestressed Concrete Structures
4. P.C.Varghese, "Advanced Reinforced Concrete Design", Prentice-Hall of India, New Delhi, 2005.
5. Dr.B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, "Comprehensive RCC Design"

I M.TECH-IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
EXPERIMENTAL STRESS ANALYSIS							

Course Objectives:
- This subject is taught to impart knowledge about the instruments and its applications.

Course Outcomes:
Upon completion of this course, the student will be able to
- Know the working principle of strain gauges.
- Do the model analysis using different theorems.
- Know the concepts of photo elasticity and its applications.
- Use the various Non-destructive testing methods.

UNIT-I
Basic equations and Plane Elasticity Theory: Introduction, Strain equations of Transformation, Compatibility, Stress-Strain Relations-Two dimensional State of Stress. The Plane-Elastic problem, The Plane-Strain Approach, Plane Stress, Airy's Stress function-Cartesian Co-ordinates

UNIT-II
Two dimensional problems in Polar Co-ordinates, Polar Components of Stress in terms of Airy's Stress function, Forms. Principles of Experimental Approach: Merit of Experimental Analysis introduction, uses of experimental stress analysis-Advantages of experimental stress analysis, Different methods, Simplification of problems.

UNIT-III
Strain Measurement using Strain Gauges: Definition of strain and its relation to Experimental Determinations, properties of strain-gauge systems, Types of strain gauges, Mechanical and Optical strain gauges. Electrical Strain Gauges - Introduction, LVDT - resistance strain gauge - various types - gauge factor, Materials for adhesion base, etc. Strain Rosettes: Introduction, The three element rectangular Rosette - The delta rosette - Corrections for Transverse strain effects.

UNIT-IV
Brittle Coating Method: Introduction, Coating stresses - Failure theories - Brittle coating Crack pattern - Crack detection - Types of Brittle coating - Test procedures for brittle coating analysis - Calibration procedures - Analysis of brittle coating data.

UNIT-V
Theory of Photo Elasticity: Introduction, Temporary double refraction - The stress optic law - Effects of stressed model in a Polaris cope for various arrangements - Fringe sharpening, Brewster stress optic law.

UNIT-VI

Two Dimensional Photo Elasticity: Introduction, Isochromatic Fringe patterns - Isoclinic fringe patterns, passage of light through plane Polaris cope and circular Polaris cope, Isoclinic fringe pattern - Compensation techniques - calibration methods, separation methods, scaling Model to Proto type stress- Materials for photo - elasticity, properties of photo elastic materials.

REFERENCEBOOKS :

1. Experimental Stress Analysis by J.W.Dally and W.F.Riley
2. Experimental Stress Analysis by Dr. Sadhu Singh
3. Experimental Stress Analysis by Dove and Adams

I M.TECH-IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
PLASTIC ANALYSIS & DESIGN							

Course Objectives:

- To familiarize on plastic behaviour , plastic moment & plastic mechanism of steel structures like simple beams & portal frames.
- To design simple beams continuous beams & portal frames
- Introduction to stability

Course Outcomes:

Upon completion of this course, the student will be able to

- Develop confidence levels in understanding the plastic analysis, plastic mechanism& apply to simple beams & frames
- Able to analyse minimum weight structures for stability

UNIT-I

Plastic behavior, review cures of structural steel, plastic moments, shape factors, load factors, plastic hinge, types of collapse, collapse mechanism, collapse load factor.

UNIT-II

Upper and lower bound, uniqueness theorems, principle of virtual work, statical method, minimum and maximum theorems, step by step method.

UNIT-III

Methods of release of restrains, load interacting diagrams, method of inequalities.

UNIT-IV

Plastic Moment Distribution applied to continuous beams & portal frames (Max. Two bays single storey)

Effect of Axial force & Shear force on plastic moment of resistance.

UNIT-V

Design of beams , continuous beams and portal frames up to two story-two bays.

UNIT-VI

Minimum weight analysis, introduction to stability.

References
- Baker, J.F., Horne, M.R. and Heyman, J., The Steel Skeleton, Volume II,
- Plastic Behaviour and Design, Cambridge University Press, 1956.
- Heyman, J.,Beams and Framed Structures, 2nd Edn., Pergamon Press, 1974.
- Heyman, J., Elements of the Theory of Structures, Cambridge University Press, 1996.
- Hodge, P.G., Plastic Analysis of Structures, McGraw-Hill, New York, 1959.
- McKenzie, W.M.C., Examples in Structural Analysis, Taylor and Francis, Abington, 2006.
- Neal, B.G., Structural Theorems and their Applications, Pergamon Press, 1964.
- Thompson, F., and Haywood, G.G., Structural Analysis Using Virtual Work, Chapman and b
Hall, 1986.
- Rees, D.W.A., Mechanics of Solids and Structures, Imperial College Press, London, 2000.

I M.TECH-IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ADVANCED STEEL DESIGN							

Course Objectives:
- Structural steel design is as important as concrete design.
- The speed of construction in the case of steel structure is quite fast compared with concrete.
- Hence for industrial buildings steel is preferred to RCC.

Course outcomes:
- General principle in the design of steel structures
- Various types of connections
- Analysis and design of industrial structures
- Analysis and design of truss grader bridges
- Analysis and design of bunkers & silos

UNIT-I
Simple Connections –Riveted, Bolted Pinned And Welded Connections: Riveted connections-Bolted Connections- Load Transfer Mechanism – Failure of Bolted Joints – Specifications for Bolted Joints – Bearing – Type Connections – Tensile Strength of Plate – Strength and Efficiency of the Joint – Combined Shear and Tension – Slip – Critical Connections – Praying Action – Combined Shear and Tension for Slip- Critical Connections.

UNIT-II
Design of Groove welds- Design of Fillet Welds- Design of Intermittent fillet welds- Failure of Welds.

UNIT-III
Eccentric And Moment Connections: Introduction – Beams – Column Connections-Connections Subjected to Eccentric Shear – Bolted Framed Connections- Bolted Seat Connections – Bolted Brackete Connections. Bolted Moment Connections – Welded Framed Connections – Welded Brackete Connections - Moment Resistant Connections.

UNIT-IV
Analysis and Design of Industrial Buildings : Dead loads, live loads and wind loads on roofs. Design wind speed and pressure, wind pressure on roofs; wind effect on cladding and louvers; Design of angular roof truss, tubular truss, truss for a railway platform. Design of purlins for roofs, design of built up purlins, design of knee braced trusses and stanchions. Design of bracings.

UNIT-V

DESIGN OF STEEL TRUSS GIRDER BRIDGES : Types of truss bridges, component parts of a truss bridge, economic proportions of trusses, self weight of truss girders, design of bridge compression members, tension members; wind load on truss girder bridges; wind effect on top lateral bracing; bottom lateral bracing; portal Bracing; sway bracing.

UNIT-VI

Design of Steel Bunkers and Silos Introduction – Janseen's Theory – Airy's Theory – Design of Parameters – Design Criteria – Analysis of Bins – Hopper Bottom –Design of Bins.

REFERENCES BOOKS:

1. Design of Steel Structures. P. Dayaratnam, Publisher : S. Chand, Edition 2011 – 12.
2. Design Steel Structures Volume – II, Dr. Ramachandra &VivendraGehlotScientitic Publishes Journals Department.
3. Limit State Design of Steel Structures S.K. Duggal Mc Graw Hill Education Private Ltd. New Delhi.
4. Design of Steel Structures Galyord& Gaylord, Publisher ; Tata Mc Graw Hill, Education. Edition 2012. 5. Indian Standard Code – IS – 800-2007

I M.TECH-IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
MECHANICS OF COMPOSITE MATERIALS							

Course Objectives:

- To study the behaviour of composite materials and to investigate the failure and fracture characteristics.

Course outcomes:

- On completion of this course students will have sufficient knowledge on behavior of variouscomposite materials and they have an idea of failure and fracture mechanisms.

UNIT-I

Introduction: Requirements of structural materials, influence of nature of materials in structural form, Nature of structural materials- Homogeneous materials, composite materials.

UNIT-II

Macro mechanical Properties of composite Laminae: Introduction. Assumptions and Idealizations, Stress Strain relationships for composite Laminae- Isotropic, Orthotropic laminae, Strength Characteristics- Basic concepts, Strength hypothesis for isotropic and Orthotropic laminae. Macro mechanical Analysis of composite Laminae: Introduction, Assumptions and Limitations, Stiffness characteristics of glass reinforced laminae- Stress-Strain relationships in continuous, discontinuous fibre laminae, Strength characteristics of glass reinforced laminae- Strengths in continuous, discontinuous fibre laminae.

UNIT-III

Behaviour of Glass Fibre-Reinforced laminates: Introduction, Stiffness characteristics of Laminated composites-Behaviour of Laminated beams and plates, Strength characteristics of Laminated composites- Strength analysis and failure criteria, Effect of inter laminar structures. Glass Reinforced Composites: Introduction, Continuously reinforced laminates-uni-directionally and multi directionally continuously reinforced laminates, Discontinuously reinforced laminates – Stiffness and Strength properties.

UNIT-IV

GRP properties relevant to structural Design: Introduction, Short-term strength and stiffness-Tensile, Compressive, Flexural and Shearing. Long term strength and stiffness properties, Temperature effects, Effect of fire, Structural joints- Adhesive, mechanical, Combinational, Transformed sections.

UNIT-V

Design of GRP Box Beams: Introduction, loading, span and cross-sectional shape, Selection of material, Beam manufacture, Beam stresses, Experimental Behaviour, Effect on Beam performanceModulus of Elasticity, Compressive Strength, I value, prevention of compression buckling failure, Behaviour under long term loading.

UNIT-VI

Design of Stressed skinned roof structure: Introduction, loading and material properties, preliminary design, and computer analysis.

REFERENCE BOOKS:

1. GRP in Structural Engineering M.Holmes and D.J.Just.
2. Mechanics of Composite materials and Structures by ManjunathMukhopadhyay; Universities Press

I M.TECH-IISEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ALTERNATIVE BUILDING MATERIALS							

Course Objectives:

- Introduce the students to the concept of low-energy and low-cost building, locally available materials and technologies

Course outcomes:

After a successful completion of the course, the student will be able to:

- The knowledge on use of different materials for walls,roofs and other building materials
- Their usage as alternative

UNIT-I

Introduction: Energy in building materials, Environmental issues concerned to building materials, Embodied energy and life-cycle energy, Global warming and construction industry, Environmental friendly and cost effective building technologies, Requirements for building of different climatic regions, Traditional building methods and vernacular architecture, Green building ratings – IGBC and LEED manuals – mandatory requirements.

UNIT-II

Alternative Masonry Units: Characteristics of building blocks for walls, Stones and Laterite blocks, Bricks and hollow clay blocks, Concrete blocks, Stabilized blocks: mud blocks, steam cured blocks, Fal-G Blocks, stone masonry block LIME-POZZOLANA CEMENTS

Raw materials, Manufacturing process, Properties and uses.

UNIT-III

Fibre Reinforced Concrete Matrix materials, Fibers: metal and synthetic, Properties and applications, Fibre reinforced plastics, Matrix materials, Fibers: organic and synthetic, Properties and applications building materials from Agro and industrial wastes, Types of agro wastes, Types of industrial and mine wastes, Properties and applications, Field quality control test methods.

UNIT-IV

FerrocementAndFerroconcreteProperties, Ferrocement and ferroconcrete building components, Materials and specifications, Properties, Construction methods, Applications Alternative Roofing Systems Concepts, Filler slabs, Composite beam panel roofs, Masonry vaults and domes.

UNIT-V

Structural Masonry Compressive strength of masonry elements, Factors affecting compressive strength, Strength of units, prisms / wallettes and walls, Effect of brick work bond on strength, Bond strength of masonry : Flexure and shear, Elastic properties of masonry materials and masonry, IS Code provisions, Design of masonry compression elements, Concepts in lateral load resistance.

UNIT-VI

Cost Effective Building Design Cost concepts in buildings, Cost saving techniques in planning, design and construction, Cost analysis: Case studies using alternatives.

Equipment For Production Of Alternative Materials Machines for manufacture of concrete, Equipments for production of stabilized blocks, Moulds and methods of production of precast elements

TEXT BOOKS:

"Alternative Building Materials and Technologies", KS Jagadish, BV Venkatarama Reddy and KS Nanjunda Rao, New Age International pub.

REFERENCE BOOKS:

1. "Structural Masonry", Arnold W. Hendry
2. "Building materials in Developing Countries", RJS Spence and DJ Cook, Wiley pub. 1983
3. LEED India, Green Building Rating System, IGBC pub.
4. IGBC Green Homes Rating System, CII pub.

I M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	6	40	60	100	3
CAD LABORATORY							

Development of Finite Element Programming for analysis of beams, trusses, frames. ;
Analysis of plates and shells using commercial softwares

I B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
ELECTRIC CIRCUIT ANALYSIS-I							

Course Objectives:

- To study the concepts of passive elements, types of sources and various network reduction techniques.
- To understand the behavior of RLC networks for sinusoidal excitations.
- To understand the concept of resonance.
- To understand the applications of network topology to electrical circuits.
- To understand the applications of network theorems for analysis of electrical networks.
- To study the concept of magnetic coupled circuit.

Course Outcomes:

Students are able to solve

- Various electrical networks in presence of active and passive elements.
- Any R, L, C network with sinusoidal excitation.
- Any R, L, C network at resonance condition.
- Electrical networks with network topology concepts.
- Electrical networks by using principles of network theorems.
- Any magnetic circuit with various dot conventions.

UNIT-I: Introduction to Electrical Circuits

Passive components and their V-I relations. Sources (dependent and independent) , Ohm's Law-Kirchhoff's laws, Network reduction techniques(series, parallel, series - parallel, star- to-delta and delta-to-star transformation). source transformation technique, nodal analysis ,mesh analysis, super node and super mesh analysis for D.C.excitatons.

UNIT-II: Single Phase A.C. Circuits

Periodic waveforms (determination of rms, average value and form factor). Concept of phase and phase difference. Complex and polar forms of representations, steady state analysis of R, L and C circuits with sinusoidal excitation, Power Factor and its significance, Real, Reactive power and apparent Power.

UNIT-III: Resonance

Resonance, series and parallel circuits, concept of band width and Quality factor.

UNIT-IV : Network Topology

Definitions of Graph and Tree. Basic cutset and tieset matrices for planar networks. Loop and nodal methods of analysis of networks with dependent and independent voltage and current sources. Duality and Dual networks.

UNIT-V: Network Theorems (DC & AC Excitations)

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem, Tellegen's theorem and compensation theorem.

UNIT-VI : Magnetic Circuits

Basic definition of MMF, flux and reluctance. Analogy between electrical and magnetic circuits.

Composite magnetic circuits. Faraday's laws of electromagnetic induction Concept of self and mutual inductance. Dot convention, coefficient of coupling. Analysis of series and parallel magnetic circuits.

Text Books:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley,Mc Graw Hill Company,6 th edition.
2. Network Analysis: Van Valkenburg; Prentice-Hall of India Private Ltd.

Reference Books:

1. Introduction to Circuit Analysis and Design by Tildon Glisson. Jr, Springer Publications.
2. Electric Circuit Analysis by K.S. Suresh Kumar, Pearson publications
3. Electric Circuits by David A. Bell, Oxford publications.
4. Introductory Circuit Analysis by Robert L Boylestad, Pearson Publications.
5. Circuit Theory(Analysis and Synthesis) by A.chakrabarthi,Dhanpat Rai&co.

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I B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3

PROGRAMMING WITH C
(Common to ECE,EEE,CIVIL and Mechanical)

Course Objectives:

- To gain experience about structured programming
- To help students to understand the implementation of C language
- To understand various features in C

Course Outcomes:

- Study and Understand basics of computer Hardware and Software.
- Study, Analyze and Understand logical structure of computer programming and different constructs to develop programs in C language.
- Understand and Analyze simple data structures and use of pointers and dynamic memory allocation technique.
- Create files and apply file I/O operations.

UNIT I:
INTRODUCTION: Computer systems, Hardware and Software Concepts,

Problem Solving: Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and high-level languages, Creating and Running Programs: Writing, Editing (vi/emacs editor), Compiling (gcc), Linking and Executing in under Linux.

BASICS OF C: Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arithmetic , relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

UNIT II:
SELECTION – MAKING DECISION: TWO WAY SELECTION: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples.

ITERATIVE: loops- while, do-while and for statements, break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.

ARRAYS: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix.

STRINGS: concepts, c strings.

UNIT III:
FUNCTIONS- MODULAR PROGRAMMING: functions, basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

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UNIT IV:
POINTERS: pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and multi-dimensional arrays, dynamic memory management functions, command line arguments

UNIT V:
ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields, program applications

UNIT VI:
FILE HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs

Text Books:
1. Programming in C, Reema Thareja, OXFORD.
2. The C programming Language by Dennis Richie and Brian Kernighan 2nd ed..

Reference Books:
1. Programming in ANSI C, Dr.E.Balaguruswamy, Tata McGraw-Hill Education.
2. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PEARSON.
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
4. Programming in C, Second Edition by Ashok N.Kamthane, Pearson.

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I B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	2
ELECTRICAL AND IT WORKSHOP LAB							

ELECTRICAL WORK SHOP LABORATORY

Course Objectives:

- Know various wiring connections.
- Know how to make circuit boards
- Practice Lamp Circuits.

Course Outcomes:

- Getting knowledge on wiring connections.
- Getting knowledge on various lamp circuit connections.
- Getting knowledge on soldering of devices.

LIST OF EXPERIMENTS

1. One lamp controlled by one switch.
2. Two lamps controlled by two independent switches.
3. One lamp controlled by one switch and provision of 2/3 plug socket with switch control.
4. Stair case wiring.
5. Godown wiring.
6. Soldering and de soldering of simple electrical devices.
7. Practicing of resistance measurement.
8. House wiring (wiring of energy meter, main switch board and one sub circuit).
9. Wiring of fluorescent lamp.
10. Two lamps controlled by one switch.
11. Wiring of mercury vapour lamp.
12. Series and parallel connection of lamps (DIM&BRIGHT).

IT WORKSHOP LAB

Course Objectives:

- Enabling the student to understand basic hardware and software tools through practical exposure.

Course Outcomes:

After completion of this course, the students gain

- Knowledge on computer system such as system unit, input devices, output devices connected to the computer.
- Knowledge to understand the booting process and loading of the operating system, and getting it ready for use.
- Knowledge to understand the working of the internet that includes the use of protocols, domains, IP addresses, URLs, web browsers, web servers, mail-servers, etc.
- Knowledge to familiarize with parts of Word window, Excel window and PowerPoint.

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SYLLABUS:

1. PC Hardware:
Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Troubleshooting Hardware and Software some tips and tricks.

2. Internet & World Wide Web:
Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums. Awareness of cyber hygiene (protecting the personal computer from getting infected with the viruses), worms and other cyber-attacks.

3. Productivity tools: Crafting professional word documents; excel spread sheets, power point presentations and personal websites using the Microsoft suite of office tools.
(Note: Student should be thoroughly exposed to minimum of 12 Tasks)

4. PC Hardware
Task a: Identification of the peripherals of a computer.
To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.
Task b: (Optional): A Practice on disassembling the components of a PC and assembling them to back to working condition.
Task c: Examples of Operating Systems- DOS, MS Windows, Installation of MS windows on a PC
Task d: Introduction to Memory and Storage Devices, I/O Port, Device Drivers, Assemblers, Compilers, Interpreters, Linkers, Loaders.

Task e:
Hardware Troubleshooting (Demonstration): Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).
Software Troubleshooting (Demonstration): Identification of problem and fixing the PC for any software issues.

5. Internet & Networking Infrastructure
Task: Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC, Bluetooth technology, Wireless Technology, Modem, DSL, and Dialup Connection.

6. Orientation & Connectivity Boot Camp and Web Browsing: Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

Task: Search Engines & Netiquette:
Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc).Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.
Task: Cyber Hygiene (Demonstration) : Awareness of various threats on the internet. Importance of Security patch updates and Anti-Virus solution Ethical Hacking, Firewalls, Multi-factors authentication techniques including Smart card Biometrics and also practiced.

7. Word
Task a: MS Word Orientation:

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Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting, Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving.

Task b : Creating Project : Abstract Features to be covered:-Formatting Styles, Inserting Table, Bullets and Numbering, Changing Text Direction, Cell alignment, footnote, Hyperlink, Symbols, Spell Check, Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

8. Excel

Task a: Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations.

Task b: Creating Scheduler - Features to be covered:-Gridlines, Format Cells, Summation, auto fill, Formatting Text.

Task c: LOOKUP/VLOOKUP

Task d: Performance Analysis: Features to be covered:-Split cells, freeze panes, group and outline, Sorting, Boolean and Logical operators, Conditional Formatting.

9. Power Point

Task a: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes:- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in PowerPoint.

Task b: Focusing on the power and potential of Microsoft power point Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes:- Master Layouts (slide, template and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background , textures, Design Templates, Hidden slides, OLE in PPT.

10. UNIX Commands

11. Algorithms

12. Flowcharts

Text Books:

1. Computer Fundamentals, Anita Goel, Pearson
2. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller QUE, Pearson, 2008
3. Information Technology Workshop, 3e, G Praveen Babu, M V Narayana BS Publications.
4. Comdex Information Technology, Vikas Gupta, dreamtech

Reference Books:

1. Essential Computer and IT Fundamentals for Engineering and Science Students, Dr.N.B.Venkateswarlu.
2. How to solve it by Computer, R.G. Dromey, PHI.

I B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	2

COMPUTER PROGRAMMING LAB
(Common to ECE,EEE,CIVIL and Mechanical)

Course Objective:

- The purpose of this course is to introduce to students to the field of language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

Course Outcomes:

After completion of this C Programming Lab, students should be able to:

- Study, analyse and understand logical structure of computer programming and different constructs to develop programs in C Language.
- Know how to write, compile and debug programs in C Language.
- Understand and analyse data types, typecasting and operator precedence.
- Analyse the use of conditional and looping statements to solve problems associated with conditions and repetitions.
- Explain and analyse simple data structures, use of pointers and dynamic memory allocation techniques.
- Summarize the role of functions involving the idea of modularity, know how to create files and apply file I/O operations.

Exercise 1

a) Write an Algorithm, Flowchart and Program to calculate the area of triangle using the formula Area = (s (s-a) (s-b) (s-c)) 1/2 where s= (a+b+c)/2.
b) Write an Algorithm, Flowchart and Program to find the largest of three numbers using ternary operator.
c) Write an Algorithm, Flowchart and Program to swap two numbers without using a temporary variable.

Exercise 2

a) Write a C program to find the roots of a quadratic equation.
b) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement).

Exercise 3

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.
b) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.
b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.
c) Write a C Program to check whether the given number is Armstrong number or not.

Exercise 5

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a) Write a C program to interchange the largest and smallest numbers in the array.
b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them.

Exercise 6

a) Write a C Program to find both the largest and smallest number of an array of integers
b) Write a C Program to find transpose of a matrix.

Exercise 7

Write C programs that use both recursive and non-recursive functions for the following
a) To find the factorial of a given integer.
b) To find the GCD (greatest common divisor) of two given integers.

Exercise 8

Write a C Program for the following.
a) To find Fibonacci sequence
b) Write C programs illustrating call by value and call by reference concepts.

Exercise 9

Write C Programs for the following string operations without using the built in functions - to concatenate two strings
a) To append a string to another string
b) To compare two strings

Exercise 10

Write C Programs for the following string operations without using the built in functions
a) To find the length of a string
b) To find whether a given string is palindrome or not

Exercise 11

Write a C program that uses functions to perform the following operations:
a) To insert a sub-string in to given main string from a given position.
b) To delete n Characters from a given position in a given string.
c) To replace a character of string either from beginning or ending or at a specified location

a) Write a C program to implement a linear search.
b) Write a C program to implement binary search
c) Write a C program to implement sorting of an array of elements

Exercise 13

a) Write C Program to reverse a string using pointers
b) Write a C Program to compare two arrays using pointers
c) Write a C program to swap two numbers using pointers

Exercise 14

Examples which explores the use of structures, union and other user defined variables

Exercise 15

a) Write a C program which copies one file to another.
b) Write a C program to count the number of characters and number of lines in a file.
c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

Text Books:

1. Programming in C, Reema Thareja, OXFORD
2. The C programming Language by Dennis Richie and Brian Kernighan 2nd ed.

Reference Books:

1. Programming in ANSI C, Dr.E.Balaguruswamy, Tata McGraw-Hill Education.
2. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PEARSON.
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
4. Programming in C, Second Edition by Ashok N.Kamthane, Pearson.

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II Year – I SEMESTER

	T	P	C
	3+1	0	3

ELECTRICAL CIRCUIT ANALYSIS-II

Preamble :

This course aims at study of three phase systems, transient analysis, network synthesis and fourier analysis for the future study and analysis of power systems.

Objectives:

i. To study the concepts of balanced three-phase circuits.
ii. To study the concepts of unbalanced three-phase circuits.
iii. To study the transient behaviour of electrical networks with DC, pulse and AC excitations.
iv. To study the performance of a network based on input and output excitation/response.
v. To understand the realization of electrical network function into electrical equivalent passive elements.
vi. To understand the application of fourier series and fourier transforms for analysis of electrical circuits.

UNIT-I Balanced Three phase circuits

Phase sequence- star and delta connection - relation between line and phase voltages and currents in balanced systems - analysis of balanced three phase circuits - measurement of active and reactive power in balanced three phase systems.

UNIT-II Unbalanced Three phase circuits

Analysis of three phase unbalanced circuits: Loop method – Star-Delta transformation technique, Two wattmeter methods for measurement of three phase power.

UNIT-III Transient Analysis in DC and AC circuits

Transient response of R-L, R-C, R-L-C circuits for DC and AC excitations, Solution using differential equations and Laplace transforms.

UNIT-IV Two Port Networks

Two port network parameters – Z, Y, ABCD and hybrid parameters and their relations, Cascaded networks - poles and zeros of network functions.

UNIT-V Network synthesis

Positive real function - basic synthesis procedure - LC immittance functions - RC impedance functions and RL admittance function - RL impedance function and RC admittance function - Foster and Cauer methods.

UNIT-VI Fourier analysis and Transforms

Fourier theorem- Trigonometric form and exponential form of Fourier series, Conditions of symmetry- line spectra and phase angle spectra, Analysis of electrical circuits to non sinusoidal periodic waveforms.

Fourier integrals and Fourier transforms – properties of Fourier transforms and application to electrical circuits.

Outcomes:

i. Students are able to solve three- phase circuits under balanced condition.

ii. Students are able to solve three- phase circuits under unbalanced condition.

iii. Students are able find out transient response of electrical networks with different types of excitations.

iv. Students are able to estimate the different types of two port network parameters.

v. Students are able to represent electrical equivalent network for a given network transfer function.

vi. Students are able to extract different harmonics components from the response of a electrical network.

Text Books:

1. Engineering Circuit Analysis by William Hayt and Jack E.Kemmerley, Mc Graw Hill Company, 6th edition.
2. Network synthesis: Van Valkenburg; Prentice-Hall of India Private Ltd.

Reference Books:

1. Introduction to circuit analysis and design by Tildon Glisson. Jr, Springer Publications.
2. Circuits by A.Bruce Carlson , Cengage Learning Publications.
3. Network Theory Analysis and Synthesis by Smarajit Ghosh, PHI publications.
4. Networks and Systems by D. Roy Choudhury, New Age International publishers.
5. Electric Circuits by David A. Bell, Oxford publications.
6. Circuit Theory (Analysis and Synthesis) by A.chakrabarthi, Dhanpat Rai&co.

	T	P	C
II Year – I SEMESTER	**3+1**	**0**	**3**

THERMAL AND HYDRO PRIME MOVERS

Part-A: Thermal prime movers

Course Objectives: To make the student understand the types of prime movers, which can be connected to generators for power production and should obtain the skills of performing the necessary calculations with respect to the functioning of the prime movers.

UNIT I:

Objectives: To make the student learn about the constructional features, operational details of various types of internal combustion engines through the details of several engine systems and the basic air standard cycles, that govern the engines. Further, the student shall be able to calculate the performance of different types of internal combustion engines.

I.C Engines: Classification, working principles – valve and port timing diagrams – air standard cycles – Engine systems line fuel injection, carburetion, ignition, cooling and lubrication – Engine performance evaluation.

UNIT II:

Objectives: To train the student in the aspects of steam formation and its utilities through the standard steam data tables and charts. To make the student correlate between the air standard cycles and the actual cycles that govern the steam turbines. To train the student to calculate the performance of steam turbines using velocity diagrams.

Properties of Steam and use of Steam Tables- T-S and H-S Diagrams. Analysis of Various Thermodynamic Processes under gone by Steam.

Vapor Power Cycles: Carnot Cycle-Rankine Cycle- Thermodynamic Variables Effecting Efficiency and output of Rankine Cycle-. Analysis of simple Rankine Cycle and Re-heat cycle.

Steam Turbines: Schematic layout of steam power plant Classification of Steam Turbines- Impulse Turbine and Reaction Turbine- Compounding in Turbines- Velocity Diagrams for simple Impulse and Reaction Turbines- Work done & efficiency.

UNIT III:

Objectives: To impart the knowledge of gas turbine fundamentals, the governing cycles and the methods to improve the efficiency of gas turbines.

Gas Turbines: Simple gas turbine plant-ideal cycle, closed cycle -open cycle-. Efficiency, Work ratio and optimum pressure ratio for simple gas turbine cycle. Actual cycle, analysis of simple cycles & cycles with inter cooling, reheating and Regeneration.

Part-B: Hydro prime movers

UNIT IV:

Objectives: To teach the student about the fundamental of fluid dynamic equations and its applications fluid jets. To impart the knowledge of various types of pumps, their constructional features, working and performance.

IMPACT OF JETS AND PUMPS: Impulse momentum equation, Impact of Jet on stationary and moving vanes (flat and curved). Pumps: Types of pumps, Centrifugal pumps: Main components, Working principle, Multi stage pumps, Performance and characteristic curves.

UNIT V:

Objectives: To make the student learn about the constructional features, operational details of various types of hydraulic turbines. Further, the student shall be able to calculate the performance of hydraulic turbines.

HYDRAULIC TURBINES: Classification of turbines; Working principle, Efficiency calculation and Design principles for Pelton Wheel, Francis and for Kaplan turbines; Governing of turbines; Performance and characteristic curves.

UNIT VI:

Objectives: To train the student in the areas of types of hydro electric power plants, estimation and calculation of different loads by considering various factors.

HYDRO POWER: Components of Hydro electric power plant: pumped storage systems, Estimation of water power potential; Estimation of load on turbines: load curve, load factor, capacity factor, utilization factor, diversity factor, load – duration curve, firm power, secondary power, prediction of load.

Text Books:

1. Thermal Engineering by Rajput, Lakshmi publications
2. Thermal engineering by M.L.Mathur and F.S.Mehta, Jain Brothers.
3. "Hydraulics & Fluid Mechanics", P.N. Modi and S.M. Seth, TEXT BOOKS House, Delhi
4. "Fluid Mechanics & Hydraulic Machinery" A.K.Jain, , Khanna Publishers, Delhi.

Reference Books:

1. "Fluid Mechanics" by Victor. L. Streeter.
2. "Introduction to Fluid Mechanics" Edward .J. Shaughnessy Jr.
3. "Fluid Mechanics & Its Applications", Vijay Gupta, Santhosh. K.Gupta.
4. "Fluid Mechanics & Fluid power Engineering, Dr D.S. Kumar.
5. "Water Power Engineering" M.M Desumukh.

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II Year – I SEMESTER

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3+1	0	3

BASIC ELECTRONICS AND DEVICES

Preamble: This course introduces the concepts of semi-conductor physics and operation of various semi-conductor devices. Realization of rectifiers, amplifiers and oscillators using semi-conductor devices and their analysis is also introduced in this course.

Unit-I:

Objective: To learn the basics of semiconductor physics.

Review of Semi Conductor Physics: Insulators, Semi conductors, and Metals classification using Energy Band Diagrams, Mobility and Conductivity, Electrons and holes in Intrinsic Semi conductors, Extrinsic Semi Conductor, (P and N Type semiconductor) Hall effect, Generation and Recombination of Charges, Diffusion, Continuity Equation, Injected Minority Carriers, Law of Junction, Introduction to fermi level in Intrinsic, Extrinsic semi conductors with necessary mathematics.

Outcome:
Students are able to understand the basic concepts of semiconductor physics, which are useful to understand the operation of diodes and transistors.

Unit-II:

Objective:
To study the construction details, operation and characteristics of various semiconductor diodes.

Junction Diode Characteristics
Operation and characteristics of p-n junction diode. Current components in p-n diode, diode equation. Temperature dependence on V–I characteristic, diffusion capacitance and diode resistance (static and dynamic), energy band diagram of p-n diode.

Special Diodes: Avalanche and Zener break down, Zener characteristics, tunnel diode, characteristics with the help of energy band diagrams, Varactor diode, LED, PIN diode, Photo diode.

Outcome:
Students are able to explain the operation and characteristics of PN junction diode and special diodes.

Unit-III:

Objective:

To understand the operation and analysis of rectifiers with and without filters. Further study the operation of series and shunt regulators using zener diodes.

Rectifiers and Regulators

Half wave rectifier, ripple factor, full wave rectifier (with and without transformer), harmonic components in a rectifier circuit, inductor filter, capacitor filter, L-section filter, Π- section filter, and comparison of various filter circuits in terms of ripple factors. Simple circuit of a regulator using Zener diode. Types of regulators-series and shunt voltage regulators, over load voltage protection.

Outcome:

Ability to understand operation and design aspects of rectifiers and regulators.

Unit-IV:

Objective:

To study the characteristics of different bipolar junction transistors and their biasing stabilization and compensation techniques. To analyze transistor amplifiers using h-parameters.

Transistors

Junction transistor, transistor current components, transistor as an amplifier and switch. Characteristics of transistor (CE, CB and CC configurations). Transistor biasing and thermal stabilization (to fixed bias, collector to base bias, self bias). Compensation against variation in base emitter voltage and collector current. Thermal runaway. Hybrid model of transistor. Analysis of transistor amplifier using h-parameters

Outcome:

Students are able to understand the characteristics of various transistor configurations. They become familiar with different biasing, stabilization and compensation techniques used in transistor circuits.

Unit- V:

Objective:

To understand the basics of FET,Thyristors, Power IGBTs and Power MOSFETs.

Power semiconductor devices

Principle of operation and characteristics of Thyristors, Silicon control rectifiers, power IGBT and power MOSFET their ratings. Comparison of power devices.

FET: JFET Characteristics (Qualitative explanation), MOFET Characteristics–static and Transfer (enhancement and depletion mode), low frequency model of FET, FET as an amplifier.

Outcome:
Students are able to understand the operation and characteristics of FET, Thyristors, Power IGBTs and Power MOSFETs.

Unit VI :

Objective:
To understand the concepts of positive and negative feedbacks and their role in amplifiers and oscillators.

Amplifiers and oscillators

Feedback Amplifiers -classification, feedback concept, transfer gain and general characteristics of negative feedback amplifiers, effect of feedback on input and output resistances. Methods of analysis of feedback amplifiers.

Power Amplifiers – Classification, push-pull amplifiers, Introduction to harmonics (distortion factor.

Oscillators – Condition for oscillation, RC-phase shift oscillator. Wein bridge oscillator, Crystal oscillator. Frequency and amplitude stability of oscillators.

Outcome:
Students are able to understand the merits and demerits of positive and negative feedback and the role of feedback in oscillators and amplifiers.

TEXT BOOKS:

1. Electronic Devices and Circuits – J. Millman, C.C. Halkias, Tata Mc-Graw Hill.
2. Electronics devices and circuits by Atul P. Godse, Uday, Bakshi, Technical Publication.

REFERENCE BOOKS:

1. Electronic Devices and Circuits by David A. Bell, Oxford University Press.
2. Electronic Devices and Circuits – Salivahanan, Kumar, Vallavaraj, TATA Mc Graw Hill, Second Edition.
3. Electronic Devices and Circuits – R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition, 2006.

II Year – I SEMESTER	T	P	C
	3+1	0	3

COMPLEX VARIABLE AND STATISTICAL METHODS

UNIT-I Functions of a complex variable:

Introduction – Continuity – Differentiability – Analyticity – Properties – Cauchy-Riemann equations in Cartesian and polar coordinates. Harmonic and conjugate harmonic functions – Milne – Thompson method.

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

UNIT-II Integration and Series Expansions

Complex integration: Line integral – Cauchy's integral theorem , Cauchy's integral formula, Generalized integral formula (all without proofs)-

Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series.

Subject Category

ABET Learning Objectives a e k

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

UNIT III Integration using Residues:

Types of Singularities: Isolated, pole of order m, essential - Residues – Residue theorem(without proof) - Evaluation of real integrals of type (a) (b) (c)

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

UNIT IV Conformal Mapping:

Transformation by exp z, lnz, z^2, z^n(n positive integer), Sin z, cos z, z + a/z- Translation, rotation, inversion and bilinear transformation – fixed point – cross ratio – properties – invariance of circles.

Subject Category

ABET Learning Objectives a e k

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

UNIT V Sampling Distributions:

Review of Normal distribution - Population and samples - Sampling distribution of mean (with known and unknown variance), proportion, variances - Sampling distribution of sums and differences -Point and interval estimators for means, variances, proportions.

Subject Category

ABET Learning Objectives a e k

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

UNIT VI Tests of Hypothesis

Type I and Type II errors -Maximum error- One tail, two-tail tests - Tests concerning one mean and proportion, two means- Proportions and their differences using Z-test, Student's t-test - F-test and Chi -square test.

Subject Category

ABET Learning Objectives a b d e h k

ABET internal assessments 1 2 6 7 10

JNTUK External Evaluation A B E F D

Books:

1. Advanced Engineering Mathematics: Erwin Kreyszig, Wiley India Edition.
2. Advanced Engineering Mathematics: Michael Greenberg, Pearson.
3. Advanced Engineering Mathematics: BS Grewal , Khanna Publishers (42nd Ed).
4. Probability and Statistics for Engineers: Miller and John E. Freund, Prentice Hall of India.
5. Probability and Statistics for Engineers and Scientists: Ronald E. Walpole, Sharon L. Mayers and Keying Ye: Pearson.

Subject Category	ABET Learning Objectives	ABET Internal Assessments	JNTUK External Evaluation	Rem a-rks
Theory Design Analysis Algorithms Drawing Others	a) Apply knowledge of math, science, & engineering b) Design & conduct experiments, analyze & interpret data c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints d) Function on multidisciplinary teams e) Identify, formulate, & solve engineering problems f) Understand professional & ethical responsibilities g) Communicate effectively h) Understand impact of engineering solutions in global, economic, environmental, & societal context i) Recognize need for & be able to engage in lifelong learning j) Know contemporary issues k) Use techniques, skills, modern tools for engineering practices	1. Objective tests 2. Essay questions tests 3. Peer tutoring based 4. Simulation based 5. Design oriented 6. Problem based 7. Experiential (project based) based 8. Lab work or field work based 9. Presentation based 10. Case Studies based 11. Role-play based 12. Portfolio based	A. Questions should have: B. Definitions, Principle of operation or philosophy of concept. C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference. D. Design oriented problems E. Trouble shooting type of questions F. Applications related questions G. Brain storming questions	

II Year – I SEMESTER

	T	P	C
	3+1	0	3

ELECTROMAGNETIC FIELDS

Electromagnetic fields is the foremost pre-requisite course for most of the subjects in Electrical Engineering. Either in the enunciation of basics of electrical elements R, L and C that are the building blocks of any electrical device or in the illustration of Energy transfer from mechanical to electrical and vice versa its role is crucial. This course also includes the famous works of Coulomb, Ampere, Faraday, Maxwell etc. to the field of Electrical Engineering.

UNIT – I Electrostatics:

Objective:

To study the production of electric field and potentials due to different configurations of static charges.

Electrostatic Fields – Coulomb's Law – Electric Field Intensity (EFI) – EFI due to a line and a surface charge – Work done in moving a point charge in an electrostatic field – Electric Potential – Properties of potential function – Potential gradient – Guass's law — Maxwell's first law, div (D)=ρv Laplace's and Poison's equations and Solution of Laplace's equation in one variable.

Outcome: Ability to calculate electric field and potentials using guass's law or solving Laplace's or Possion's equations.

UNIT – II Conductors – Dielectrics and Capacitance:

Objective :

To study the properties of conductors and dielectrics, calculate the capacitance of different configu-various and understand the concept of conduction and convection current densities.

Electric dipole – Dipole moment – potential and EFI due to an electric dipole – Torque on an Electric dipole in an electric field – Behaviour of conductors in an electric field – Conductors and Insulators

Polarization – Boundary conditions between conduction to Dielectric and dielectric to dielectrics capacitance – capacitance of parallel plates, spherical and coaxial cables with composite dielectrics –Energy stored and energy density in a static electric field – Current density – conduction and Convection current densities – Ohm's law in point form – Equation of continuity.

Outcome: Learn how to calculate capacitance, energy stored in dielectrics and get's the concept of conduction and convection currents.

UNIT – III Magneto statics and Ampere's Law:

Objective:

To study the magnetic fields produced by currents in different configurations, application of ampere's law and the Maxwell's second and third equations.

Static magnetic fields – Biot-Savart's law – Oesterd's experiment - Magnetic field intensity (MFI) – MFI due to a straight current carrying filament – MFI due to circular, square and solenoid current – Carrying wire – Relation between magnetic flux, magnetic flux density and MFI – Maxwell's second Equation, div(B)=0 –Ampere's circuital law and its applications viz. MFI due to an infinite sheet of current and a long filament carrying conductor – Point form of Ampere's circuital law –Field due to a circular loop, rectangular and square loops, Maxwell's third equation, Curl (H)=J.

Outcome:

Ability to find magnetic field intensity due to current, the application of ampere's law and the Maxwell's second and third equations.

UNIT – IV Force in Magnetic fields:

Objective :

To study the magnetic force and torque through Lorentz force equation in magnetic field environment like conductors and other current loops.

Magnetic force - Moving charges in a Magnetic field – Lorentz force equation – force on a current element in a magnetic field – Force on a straight and a long current carrying conductor in a magnetic field – Force between two straight long and parallel current carrying conductors – Magnetic dipole and dipole moment – a differential current loop as a magnetic dipole – Torque on a current loop placed in a magnetic field.

Outcome:

Students can calculate the magnetic forces and torque produced by currents in magnetic field.

UNIT – V Self and Mutual inductance:

Objective :

To develop the concept of self and mutual inductances and the energy stored.

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(AUTONOMOUS)
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Guntur (Dist.), A.P.

Self and Mutual inductance – determination of self-inductance of a solenoid and toroid and mutual inductance between a straight long wire and a square loop wire in the same plane – energy stored and density in a magnetic field.

Outcome:
Will the able to calculate self and mutual inductances and the energy stored in the magnetic field.

UNIT – VI Time Varying Fields:

Objective :
To study time varying and Maxwell's equations in different forms and Maxwell's fourth equation for the induced Emf.

Time varying fields – Faraday's laws of electromagnetic induction – Its integral and point forms – Maxwell's fourth equation, Curl (E)=-∂B/∂t – Statically and Dynamically induced EMFs – Simple problems -Modification of Maxwell's equations for time varying fields – Displacement current – Poynting Theorem and Poynting vector.

Outcome:
Students will gain knowledge on time varying fields and get ability to calculate induced Emf. Concepts of displacement current and Poynting vector and associated problems are solved.

TEXT BOOKS:

1. "Engineering Electromagnetics" by William H. Hayt & John. A. Buck Mc. Graw-Hill Companies, 7th Editon. 2006.

REFERENCE BOOKS

1. "Principles of Electro Magnetics" by Sadiku, Oxford Publications,4th edition.
2. "Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt. Ltd., 2nd edition.
3. "Electromagnetic Field Theory" by Yaduvir Singh, Pearson.
4. Fundamentals of Engineering Electromagnetics by Sunil Bhooshan, Oxford higher education.
5. Electro magnetism : Problems with solutions by Ashutosh Pramanik, PHI Publications.

II Year – I SEMESTER

T	P	C
3+1	0	3

ELECTRICAL MACHINES – I

Preamble:

This is a basic course on rotating electrical machines. This course covers the topics related to principles, performance, applications and design considerations of dc machines.

Learning objectives:

i. Appreciate the principles of electromagnetic energy conversion and understand the construction details of DC machine.
ii. Understand the principle of operation and performance of DC generators.
iii. Learn the characteristics and performance of DC generators.
iv. Learn the characteristics and performance of DC motors.
v. Learn the speed control and testing methods of DC motors.
vi. Learn the basic ideas of design of DC machines.

UNIT–I:

Electromechanical Energy Conversion

Introduction to S.I Units - principles of electromechanical energy conversion – forces and torque in magnetic field systems – energy balance- singly excited machine- magnetic force - co-energy – multi excited magnetic field system-construction features of conventional and modern DC machines.

UNIT–II:

D.C. Generators – I

Principle of operation – E.M.F equation- armature windings – lap and wave windings – armature reaction –cross magnetizing and de-magnetizing AT/pole –commutation process – methods of improving commutation – compensating windings – Interpoles.

UNIT–III:

D.C. Generators – II

Methods of excitation- self excited and separately excited-types of generators build-up of emf - open circuit characteristics-critical field resistance-critical speed-causes for failure to self excitation-remedial measures – Internal and external characteristics of separately excited, shunt, series, compound generators-applications, losses and efficiency.

UNIT–IV:

D.C. Motors

Principle of operation – back E.M.F - torque equation –characteristics of shunt, series and compound motors – armature reaction and commutation - losses and efficiency- speed torque characteristics-applications of dc motors. Starting by 3 point and 4 point starters – protective devices.

UNIT-V:

Speed Control and Testing of D.C. Machines

Speed control by armature voltage and field flux control – testing of DC machines - brake test, Swinburne's method – principle of regenerative or Hopkinson's method - retardation test -- separation of losses – methods of electrical braking: plugging, dynamic and regenerative.

UNIT–VI:

Design of D.C. Machines

Design concept - output equation - choice of specific electric and magnetic loadings – separation of D and L - estimation of number of conductors/ turns - coils - armature slots – conductor dimension – slot dimension - choice of number of poles – length of air gap.

Learning outcomes:

i. Able to explain the concepts of electromagnetic energy conversion.
ii. Able to explain the operation of dc generator, armature reaction and commutation.
iii. Able to analyze the characteristics and performance of dc generators.
iv. Able to explain the torque developed and performance of dc motors.
v. Able to analyze the speed control and testing methods of dc motors.
vi. Able to propose design aspects of a dc machine.

TEXT BOOKS:

1 Electrical Machines – P.S. Bhimbra, Khanna Publishers
2. Electric Machinery by A.E.Fitzgerald,Charles kingsley,Stephen D.Umans, TMH

REFERENCE BOOKS:

1. Theory & Performance of Electrical Machines by J.B.Guptha. S.K.Kataria & Sons.
2. Electrical Machines by R.K. Rajput, Lakshmi publications, 5th edition.
3. The Performance and Design of DC machines - Albert E. Clayton.
4. Electrical Machine Design by A.K. Sawhney, Dhanpat Rai & Sons publications.
5. Electric Machines by Mulukutla S.Sarma&Mukesh K.Pathak, CENGAGE Learning.

II Year – II SEMESTER

	T	P	C
	3+1	0	3

SWITCHING THEORY AND LOGIC DESIGN

UNIT – I

REVIEW OF NUMBER OF SYSTEMS & CODES:

i) Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members, problem solving.

ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9's compliment code etc.,

iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR realizations.

UNIT – II

MINIMIZATION TECHNIQUES:

Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 6 variables, tabular minimization, problem solving (code-converters using K-Map etc..).

UNIT – III

COMBINATIONAL LOGIC CIRCUITS DESIGN :

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

UNIT – IV

INTRODUCTION OF PLD's :

PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, programming tables of PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

UNIT – V

SEQUENTIAL CIRCUITS I:

Classification of sequential circuits (synchronous and asynchronous); basic flip-flops, truth tables and excitation tables (nand RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Conversion from one flip-flop to flip-flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

UNIT – VI

SEQUENTIAL CIRCUITS II :

Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Meelay to Moore conversion and vice-versa.

TEXT BOOKS:

1. Switching Theory and Logic Design by Hill and Peterson Mc-Graw Hill TMH edition.
2. Switching Theory and Logic Design by A. Anand Kumar.
3. Digital Design by Mano PHI.

REFERENCE BOOKS:

1. Modern Digital Electronics by RP Jain, TMH.
2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers.
3. Micro electronics by Milliman MH edition.

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II Year – II SEMESTER	**3+1**	**0**	**3**

PULSE & DIGITAL CIRCUITS

UNIT-I

Linear Wave Shaping: High pass, low pass RC circuits-response to sinusoidal, step, pulse,square and ramp inputs. RC circuit as differentiator and integrator.

Attenuators: Basic attenuator circuit and compensated attenuator circuit.

Switching characteristics of devices: Diode as a switch, transistor as a switch-transistor at cutoff, the reverse collector saturation current I_{CBO} , Its variation with the junction temperature. The transistor switch in saturation. Design of transistor switch.

UNIT-II

Non linear wave shaping: Diode clippers, Transistor clipper, clippers at two independent levels-transfer characteristics of clippers-emitter coupled clipper, clamping operation, diode clamping circuits with source resistance and diode resistance -transient and steady state response for a square wave input, clamping circuit theorem-practical clamping circuit.

UNIT-III

Multi vibrators:

Bistable multi vibrators:

A basic binary circtuit-explanation. Fixed-bias transistor binary,self-biased transistor binary, binary with commutating capacitors-analysis.Non saturated binary–symmetrical triggering, schmitttrigger circuit-emmitter coupled binary circuit.

Monostable multi vibrator:

Basic circuit-collector coupled monostable multivibrator- emitter coupled monostable multivibrator-triggering of monostable multivibrator.

Astable multi vibrator:

The Astable collector coupled multivibrator, the Astable emitter coupled multivibrator.

UNIT-IV

Digital logic circuits: Introduction, positive and negative logic, Diode OR gate, Diode AND gate, An inverter circuit with transistor, DTL, TTL, ECL, AOI logic, NMOS logic, PMOS logic, CMOS logic-analysis and problem solving.

NIT-V

Time base generators:

Voltage time base generators-Introduction, definitions of sweep speed error, displacement error, transmission error, various methods of generating time- base waveforms, UJT time base generator, transistor constant current sweep.

Miller time base generators: General considerations, The miller sweep-general considerations of bootstrap time base generator-basic principles, transistor bootstrap time base generator.

UNIT-VI

Synchronization and frequency division:

Pulse synchronization of relaxation devices, frequency division of the sweep circuit-synchronization of Astable multi, Monostable multivibrator, synchronization of sweep circuit with symmetrical signals-sine wave frequency division with a sweep circuit.

Sampling Gates: Basic operating principle, Unidirectional diode gate circuits, bi-directional gates using transistors. A bidirectional diode gate, Four- diode gate.

Text books:

1. "Pulse, Digital and switching wave forms" by Milliman and Taub Mc Graw Hill.
2. Micro electronics by MilliMan –Mc Graw Hill .

References:

1. MS PrakashRao "Pulse and Digital Circuits" Tata McGraw Hill.
2. David J.Comer, "Digital Logical State Machine Design", Oxford university press, 2008, third edition.
3. Venkatrao, K.Ramasudha, K.Manmadharao. G, "Pulse and Digital Circuits", pearson education, 2010.
4. Pulse and digital circuitsby Anandkumar, PHI.

II Year – II SEMESTER

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POWER SYSTEMS-I

Preamble :

Electrical Power plays significant role in day to day life of entire mankind. The aim of this course is to allow the students to understand the concepts of the generation and distribution of power along with economic aspects.

Learning objectives :

i. To study the principle of operation and function of different components of a thermal power station.
ii. To study the principle of operation and function of different components of a Nuclear power station.
iii. To study the concepts of DC and AC distribution systems along with voltage drop calculations.
iv. To study the constructional details, principle of operation and function of different components of an Air and Gas Insulated substations.
v. To study the constructional details and classification of cables with necessary numerical calculations.
vi. To study the concepts of different types of load curves and types of tariffs applicable to consumers.

UNIT-I Thermal Power Stations

Selection of site, general layout of a thermal power plant showing paths of coal, steam, water, air, ash and flue gasses, ash handling system, Brief description of components: Boilers, Super heaters, Economizers, electrostatic precipitators steam Turbines : Impulse and reaction turbines, Condensers, feed water circuit, Cooling towers and Chimney.

UNIT-II Nuclear Power Stations

Location of nuclear power plant, Working principle, Nuclear fission, Nuclear fuels, Nuclear chain reaction, nuclear reactor Components : Moderators, Control rods, Reflectors and Coolants.Types of Nuclear reactors and brief description of PWR, BWR and FBR. Radiation: Radiation hazards and Shielding, nuclear waste disposal.

UNIT-III Distribution Systems

Classification of distribution systems, design features of distribution systems, radial distribution, ring main distribution, voltage drop calculations: DC distributors for following cases - radial DC distributor fed at one end and at both ends (equal / unequal voltages), ring main distributor, stepped distributor and AC distribution, comparison of DC and AC distribution.

UNIT-IV Substations

Classification of substations: **Air Insulated Substations -** Indoor & Outdoor substations, Substations layouts of 33/11 kV showing the location of all the substation equipment.

Bus bar arrangements in the Sub-Stations: Simple arrangements like single bus bar, sectionalized single bus bar, double bus bar with one and two circuit breakers, main and transfer bus bar system with relevant diagrams.

Gas Insulated Substations (GIS) – Advantages of Gas insulated substations, different types of gas insulated substations, single line diagram of gas insulated substations, constructional aspects of GIS, Installation and maintenance of GIS, Comparison of Air insulated substations and Gas insulated substations.

UNIT-V Underground Cables

Types of Cables, Construction, Types of insulating materials, Calculation of insulation resistance, stress in insulation and power factor of cable, Numerical Problems.

Capacitance of single and 3-Core belted Cables, Numerical Problems. Grading of Cables-Capacitance grading and Intersheath grading, Numerical Problems.

UNIT-VI Economic Aspects of Power Generation & Tariff

Economic Aspects - Load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, power capacity factor and plant use factor, Base and peak load plants, Numerical problems.

Tariff Methods - Costs of Generation and their division into Fixed, Semi-fixed and Running Costs, Desirable Characteristics of a Tariff Method, Tariff Methods: Simple rate, Flat Rate, Block-Rate, two-part, three–part, and power factor tariff methods, Numerical problems.

Learning Outcomes:

i. Students are able to identify the different components of thermal power plants.

ii. Students are able to identify the different components of nuclear Power plants.

iii. Students are able to distinguish between AC & DC distribution systems and also estimate voltage drops in both types of distribution systems.

iv. Students are able to locate the different components of an air and gas insulated substations.

v. Students are able to identify single core and multi core cables with different insulating materials.

vi. Students are able to analyse the effect of load factor, demand factor and diversity factor on the cost of generation of electrical power and also able to identify the types of tariff applicable to consumers based on their load demand.

TEXT BOOKS:

1. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar and A. Chakrabarti, Dhanpat Rai & Co. Pvt. Ltd.
2. Generation, Distribution and Utilization of Electric Energy by C.L.Wadhawa New age International (P) Limited, Publishers.

REFERENCE BOOKS:

1. Electrical Power Distribution Systems by - V. Kamaraju, Tata Mc Graw Hill, New Delhi.
2. Elements of Electrical Power Station Design by – M V Deshpande, PHI, New Delhi.

II Year – II SEMESTER

T	P	C
3+1	0	3

ELECTRICAL MACHINES – II

Preamble:

This course covers the topics on single-phase transformers, three-phase transformers and 3-phase induction motor which have wide application in power systems. The main aim of the course is to provide detail concepts, operation and performance of transformers and 3-phase induction motors. A complete design procedure for the design of transformers and 3-phase induction motors can be developed based on basic concepts discussed in unit-VI.

Learning objectives:

i. Appreciate the concept of operation and performance of single-phase transformers.
ii. Understand the methods of testing of single-phase transformer.
iii. Distinguish between single-phase and three-phase transformers.
iv. Understand the concept of operation and performance of 3-phase induction motor.
v. Appreciate the relation between torque and slip, performance of induction motor and induction generator.
vi. Understand the basic concepts of design of transformers and 3-phase induction motors.

UNIT-I

Single-phase Transformers

Types and constructional details - principle of operation - emf equation - operation on no load and on load – lagging, leading and unity power factors loads - phasor diagrams of transformers – equivalent circuit – regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – All day efficiency.

UNIT-II

Single-phase Transformers Testing

Tests on single phase transformers – open circuit and short circuit tests – Sumpner's test – separation of losses – parallel operation with equal voltage ratios – auto transformer - equivalent circuit – comparison with two winding transformers.

UNIT-III

3-Phase Transformers

Polyphase connections - Y/Y, Y/Δ, Δ/Y, Δ/Δ and open Δ -- Third harmonics in phase voltages - three winding transformers: determination of Zp, Zs and Zt -- transients in switching - off load and on load tap changers -- Scott connection.

UNIT-IV

3-phase Induction Motors

construction details of cage and wound rotor machines - production of a rotating magnetic field - principle of operation - rotor emf and rotor frequency - rotor current and pf at standstill and during running conditions - rotor power input, rotor copper loss and mechanical power developed and their inter relationship – equivalent circuit – phasor diagram.

UNIT-V

Characteristics, starting and testing methods of Induction Motors

Torque equation - expressions for maximum torque and starting torque - torque slip characteristic - double cage and deep bar rotors - crawling and cogging - no load and blocked rotor tests - circle diagram for predetermination of performance - methods of starting – starting current and torque calculations – induction generator operation.

UNIT-VI

Design of transformer and 3-phase induction motor

Transformer: Design concept – output equation – choice of windings – calculation of number of turns – length of mean turn of winding - calculation of resistance and leakage reactance.

Three phase induction motor: Design concept – choice of specific electric and magnetic loadings – output equation – stator design – number of slots – conductor dimensions – type of winding – number of rotor slots – conductor dimensions.

Learning outcomes:

i. Able to explain the operation and performance of single phase transformer.

ii. Able to explain the regulation losses and efficiency of single phase transformer.

iii. Able to explain types of three phase transformer connection, tap changing methods and 3-phase to 2-phase transformation.

iv. Able to explain the operation and performance of three phase induction motor.

v. Able to analyze the torque-speed relation, performance of induction motor and induction generator.

vi. Able to explain design procedure for transformers and three phase induction motors.

TEXT BOOKS:

1. The performance and design of alternating current machines – M.G. Say, CBS publishers & distributors, New Delhi.
2. Electrical Machines – P.S. Bimbra, Khanna Publishers.

REFERENCE BOOKS:

1. Electrical Machines by J.B.Guptha, S.K.Kataria & Sons.
2. Electrical Machines by D. P.Kothari, I. J. Nagarth, Mc Graw Hill Publications, 4th edition.
3. Electrical Machines by R.K.Rajput, Lakshmi publications,Fifth edition.
4. Electrical Machine Design by Sawhney, Dhanpath Rai Publications.
5. Electrical Machines by Smarajit Ghosh, Pearson Publications.

II Year – II SEMESTER

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CONTROL SYSTEMS

Preamble :

This course introduces the elements of linear control systems and their analysis. Classical methods of design using frequency response are included. The state space approach for modeling and analysis is the added feature of this course.

UNIT – I:

Learning Objective:

To learn the mathematical modeling of physical systems and to use block diagram algebra and signal flow graph to determine overall transfer function.

MATHEMATICAL MODELING OF CONTROL SYSTEMS

Open Loop and closed loop control systems and their differences, Classification of control systems, Feed-Back Characteristics, transfer function of linear system, Differential equations of electrical networks, Translational and Rotational mechanical systems, Transfer Function of DC Servo motor - AC Servo motor- Synchro-transmitter and Receiver, Block diagram algebra – Representation by Signal flow graph - Reduction using Mason's gain formula.

Outcome:

Ability to derive the transfer function of physical systems and determination of overall transfer function using block diagram algebra and signal flow graphs.

UNIT-II:

Learning Objective:

To analyze the time response of first and second order systems and improvement of performance by proportional plus derivative and proportional plus integral controllers.

TIME RESPONSE ANALYSIS

Standard test signals - Time response of first order systems –Time response of second order systems - Time domain specifications - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

Outcome:

Capability to determine time response specifications of second order systems and to determine error constants.

UNIT – III:

Learning Objective :

To investigate the stability of closed loop systems using Routh's stability criterion and the analysis by root locus method.

STABILITY AND ROOTLOCUS TECHNIQUE

The concept of stability – Routh's stability criterion –limitations of Routh's stability – The root locus concept - construction of root loci (Simple problems).

Outcome:

Acquires the skill to analyze absolute and relative stability of LTI systems using Routh's stability criterion and the root locus method.

UNIT–IV:

Learning Objective :

To present the Frequency Response approaches for the analysis of linear time invariant (LTI) systems using Bode plots, polar plots and Nyquist stability criterion.

FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications-Bode diagrams- transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots, Polar Plots, Nyquist Stability criterion.

Outcome:

Capable to analyze the stability of LTI systems using frequency response methods.

UNIT–V:

Learning Objective :

To discuss basic aspects of design and compensation of linear control systems using Bode plots.

CLASSICAL CONTROL DESIGN TECHNIQUES

Lag, Lead, Lag-Lead compensators, design of compensators – using Bode plots.

Outcome:

Able to design Lag, Lead, Lag-Lead compensators to improve system performance from Bode diagrams.

UNIT–VI:

Learning Objective:

Ability to formulate state models and analyze the systems. To present the concepts of Controllability and Observability.

STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, state space representation of transfer function, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability.

Outcome:

Ability to represent physical systems as state models and determine the response. Understanding the concepts of controllability and observability.

TEXT BOOKS:

1. Modern Control Engineering, Kotsuhiko Ogata, Prentice Hall of India.
2. Automatic control systems, Benjamin C.Kuo, Prentice Hall of India, 2nd Edition

REFERENCE BOOKS:

1. Control Systems, Manik Dhanesh N, Cengage publications .
2. Control Systems principles and design, M.Gopal, Tata Mc Graw Hill education Pvt Ltd., 4th Edition.
3. Control Systems Engineering, S.Palani, Tata Mc Graw Hill Publications.

III Year – I SEMESTER

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	3+1	0	3

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Unit – I:

(*The Learning objective of this Unit is to understand the concept and nature of Managerial Economic s and its relationship with other disciplines, Concept of Demand and Demand forecasting)

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics and Scope-Managerial Economics and its relation with other subjects-Concepts of Demand-Types-Determents-Law of Demand its Exception-Elasticity of Demand-Types and Measurement-Demand forecasting and its Methods.

(**The Learner is equipped with the knowledge of estimating the Demand for a product and the relationship between Price and Demand)

Unit – II:

(*The Learning objective of this Unit is to understand the concept of Production function, Input Output relationship, different Cost Concepts and Concept of Cost-Volume-Profit Analysis)

Production and Cost Analyses:

Production function-Isoquants and Isocosts-Law of Variable proportions-Cobb-Douglas Production function-Economics of Sale-Cost Concepts-Opportunity Cost-Fixed vs Variable Costs-Explicit Costs vs Implicit Costs-Out of Pocket Costs vs Imputed Costs-Cost Volume Profit analysis-Determination of Break-Even Point (Simple Problem).

(**One should understand the Cost Concepts for decision making and to estimate the least cost combination of inputs).

Unit – III:

(*The Learning Objective of this Unit is t understand the Nature of Competition, Characteristics of Pricing in the different market structure and significance of various pricing methods)

Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly and Monopolistic and Oligopoly – Features – Price, Output Determination – Managerial Theories of firm: Maris and Williamson's models – Methods of Pricing: Limit Pricing, Market Skimming Pricing, Internet Pricing: Flat Rate Pricing, Usage sensitive, Transaction based pricing, Priority Pricing.

(** One has to understand the nature of different markets and Price Output determination under various market conditions)

Unit – IV:

(*The Learning objective of this Unit is to know the different forms of Business organization and their Merits and Demerits both public & private Enterprises and the concepts of Business Cycles)

Types of Business Organization and Business Cycles:

Features and Evaluation of Sole Trader – Partnership – Joint Stock Company – State/Public Enterprises and their forms – Business Cycles – Meaning and Features – Phases of Business Cycle.

(**One should equipped with the knowledge of different Business Units)

Unit – V:

(*The Learning objective of this Unit is to understand the different Accounting Systems preparation of Financial Statements and uses of different tools for performance evaluation)

Introduction to Accounting & Financing Analysis:

Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow cash flow statements (Simple Problems)

(**The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis)

Unit – VI:

(*The Learning objective of this Unit is to understand the concept of Capital, Capitalization, Capital Budgeting and to know the techniques used to evaluate Capital Budgeting proposals by using different methods)

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Need for Capital Budgeting-Techniques of Capital Budgeting-Traditional and Modern Methods.

(**The Learner is able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making)

Note: *Learning Objective

** Learning Assessment

TEXT BOOKS

1. Dr. N. Appa Rao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011.

2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011.

3. Prof. J.V.Prabhakara Rao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

REFERENCES:

1. V. Maheswari : Managerial Economics, Sultan Chand.
2. Suma Damodaran : Managerial Economics, Oxford 2011.
3. Dr. B. Kuberudu and Dr. T. V. Ramana : Managerial Economics & Financial Analysis, Himalaya Publishing House 2011.
4. Vanitha Agarwal : Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja : Financial Accounting for Managers, Pearson.
6. Maheswari : Financial Accounting, Vikas Publications.
7. S. A. Siddiqui & A. S. Siddiqui : Managerial Economics and Financial Analysis, New Age International Publishers, 2012.

III Year – I SEMESTER

	T	P	C
	3+1	0	3

ELECTRICAL MEASUREMENTS

Preamble:

This course introduces principle of operation of basic analog and digital measuring instruments for measurement of current, voltage, power, energy etc. Measurement of resistance, inductance and capacitance by using bridge circuits will be discussed in detail. It is expected that student will be thorough with various measuring techniques that are required for an electrical engineer.

Learning Objectives:

- To study the principle of operation and working of different types of instruments. Measurement of voltage and current.
- To study the working principle of operation of different types of instruments for measurement of power and energy.
- To understand the principle of operation and working of dc and ac potentiometers.
- To understand the principle of operation and working of various types of bridges for measurement of parameters –resistance, inductance, capacitance and frequency.
- To study the principle of operation and working of various types of magnetic measuring instruments.
- To study the applications of CRO for measurement of frequency, phase difference and hysteresis loop using Lissajous patterns.

UNIT–I:

Measuring Instruments

Classification – Deflecting, control and damping torques – Ammeters and Voltmeters – PMMC, moving iron type, dynamometer and electrostatic instruments – Expression for the deflecting torque and control torque – Errors and compensations– Extension of range using shunts and series resistance – CT and PT: Ratio and phase angle errors – Design considerations.

UNIT –II:

Measurement of Power and Energy

Single phase and three phase dynamometer wattmeter – LPF and UPF – Expression for deflecting and control torques – Extension of range of wattmeter using instrument transformers – Measurement of active and reactive powers in balanced and unbalanced systems – Type of P.F. Meters – Single phase and three phase dynamometer and moving iron type Single phase induction type energy meter – Driving and braking.

torques – errors and compensations –Testing by phantom loading using R.S.S. meter– Three phase energy meter – Tri vector meter – Maximum demand meters– Electrical resonance type frequency meter and Weston type synchroscope.

UNIT – III:

Potentiometers

Principle and operation of D.C. Crompton's potentiometer – Standardization – Measurement of unknown resistance – Current – Voltage – AC Potentiometers: polar and coordinate types –Standardization – Applications.

UNIT – IV:

Measurements of Parameters

Method of measuring low, medium and high resistance – Sensitivity of Wheat stone's bridge – Carey Foster's bridge– Kelvin's double bridge for measuring low resistance– Loss of charge method for measurement of high resistance – Megger– Measurement of earth resistance – Measurement of inductance – Quality Factor – Maxwell's bridge–Hay's bridge – Anderson's bridge–Measurement of capacitance and loss angle – Desautybridge – Schering Bridge–Wagner's earthing device–Wien's bridge.

UNIT – V:

Magnetic Measurements

Ballistic galvanometer – Equation of motion – Flux meter – Constructional details–Determination of B–H Loop methods of reversals six point method – AC testing – Iron loss of bar samples– Core loss measurements by bridges and potentiometers.

UNIT – VI:

Digital Meters

Digital Voltmeter–Successive approximation – Measurement of phase difference – Frequency – Hysteresis loop using lissajious patterns in CRO –

Ramp and integrating type–Digital frequency meter–Digital multimeter–Digital Tachometer.

Learning Outcomes:

- Able to choose right type of instrument for measurement of voltage and current for ac and dc.
- Able to choose right type of instrument for measurement of power and energy – able to calibrate energy meter by suitable method
- Able to calibrate ammeter and potentiometer.
- Able to select suitable bridge for measurement of electrical parameters
- Able to use the ballistic galvanometer and flux meter for magnetic measuring instruments
- Able to measure frequency and phase difference between signals using CRO. Able to use digital instruments in electrical measurements.

Text Books:

1. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C.Widdis, fifth Edition, Wheeler Publishing.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.
3. Electrical and Electronic Measurements and instrumentation by R.K.Rajput, S.Chand

Reference Books:

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications.
2. Electrical Measurements – by Buckingham and Price, Prentice – Hall
3. Electrical Measurements by Forest K. Harris. John Wiley and Sons
4. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U, New Age International (P) Limited, Publishers.
5. Electrical and Electronic Measurements –by G.K.Banerjee, PHI Learning Private Ltd., New Delhi–2012.

III Year – I SEMESTER

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POWER SYSTEMS–II

Preamble:

This course is an extension of power systems–I course. It deals with basic theory of transmission lines modeling and their performance analysis. Transient in power system, improvement of power factor and voltage control are discussed in detail. It is important for the student to understand the mechanical design aspects of transmission lines, cables, insulators. These aspects are also covered in detail in this course.

Learning Objectives:

- To compute inductance and capacitance of transmission lines and to understand the concepts of GMD, GMR.
- To study short and medium length transmission lines, their models and performance computation.
- To study the performance and modeling of long transmission lines.
- To study the transient on transmission lines.
- To study the factors affecting the performance of transmission lines and power factor improvement methods.
- To discuss sag and tension computation of transmission lines as well as to study the over head insulators.

UNIT–I:

Transmission Line Parameters

Types of conductors – Calculation of resistance for solid conductors – Calculation of inductance for single phase and three phase– Single and double circuit lines– Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition–Numerical Problems–Calculation of capacitance for 2 wire and 3 wire systems – Effect of ground on capacitance – Capacitance calculations for symmetrical and asymmetrical single and three phase–Single and double circuit lines–Numerical Problems.

UNIT–II:

Performance of Short and Medium Length Transmission Lines

Classification of Transmission Lines – Short, medium, long line and their model representations –Nominal-T–Nominal-Pie and A, B, C, D Constants for symmetrical and Asymmetrical Networks– Numerical Problems– Mathematical Solutions to estimate regulation and efficiency of all types of lines – Numerical Problems.

UNIT–III:

Performance of Long Transmission Lines

Long Transmission Line–Rigorous Solution – Evaluation of A,B,C,D Constants–Interpretation of the Long Line Equations – Incident, Reflected and Refracted Waves –Surge Impedance and SIL of Long Lines–Wave Length and Velocity of Propagation of Waves – Representation of Long Lines – Equivalent-T and Equivalent Pie network models (Numerical Problems).

UNIT – IV:

Power System Transients

Types of System Transients – Travelling or Propagation of Surges – Attenuation–Distortion – Reflection and Refraction Coefficients – Termination of lines with different types of conditions – Open Circuited Line–Short Circuited Line – T-Junction– Lumped Reactive Junctions (Numerical Problems).

UNIT–V:

Various Factors Governing the Performance of Transmission line

Skin and Proximity effects – Description and effect on Resistance of Solid Conductors –Ferranti effect – Charging Current – Effect on Regulation of the Transmission Line–Shunt Compensation –Corona – Description of the phenomenon–Factors affecting corona–Critical voltages and power loss – Radio Interference –Power factor improvement methods.

UNIT–VI:

Sag and Tension Calculations and Overhead Line Insulators

Sag and Tension calculations with equal and unequal heights of towers– Effect of Wind and Ice on weight of Conductor–Numerical Problems – Stringing chart and sag template and its applications–Types of Insulators – String efficiency and Methods for improvement–Numerical Problems – Voltage distribution–Calculation of string efficiency–Capacitance grading and Static Shielding.

Learning Outcomes:

- Able to understand parameters of various types of transmission lines for using calculation and behavior during different operating conditions.

- Able to understand the insight into specific transmission lines short and medium type which would have application in medium and high voltage power transmission systems.
- Student will be able to understand the surge propagation, reflection and refraction in transmission lines. such output will be useful in protecting transmission line insulators and designing level of insulation coordination at various high voltages.
- Will be able to utilize it for understanding the surge behaivour of transmission line for protection of connects equipments,viz.power transformer and system connected shunt reactors.
- Will be able to understand various phenomenon related to charged line transmitting different level of power.
- Will be able to understand physical and geometrical parameters of transmission line for safe and efficient performance during operating condition of voltage and power.

Text Books:

1. Electrical power systems – by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1998.
2. Modern Power System Analysis by I.J. Nagarath and D.P.Kothari, Tata Mc Graw Hill, 2^{nd} Edition.
3. Electrical Power Systems by P.S.R. Murthy, B.S. Publications.

Reference Books:

1. Power system Analysis–by John J Grainger William D Stevenson, TMC Companies, 4^{th} edition
2. Power System Analysis and Design by B.R. Gupta, Wheeler Publishing.
3. A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S. Bhatnagar A .Chakrabarthy, DhanpatRai& Co Pvt. Ltd.

III Year – I SEMESTER

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ELECTRICAL MACHINES – III

Preamble:

This course essentially covers ac machines. It covers topics related to principle of operation, constructional features and starting of single phase induction motors and three phase synchronous motors. In addition, it also covers voltage regulation and parallel operation of synchronous generators.

Learning Objectives:

- To study the application of "Double revolving field" theory for single – phase induction motor and appreciate the function and application of a.c series motor.
- To discuss e.m.f generation principle of synchronous generator and armature reaction effect.
- To study the effect of load at different power factors, methods of predetermination of regulation for non– salient and salient pole generators.
- To study the parallel operation and the concepts of transfer of real and reactive powers.
- To understand the operation and performance of synchronous motor.
- To study the power circle diagrams and methods of starting of synchronous motor.

UNIT – I:

Single Phase Motors

Single phase induction motors – Constructional features and the problem of starting–Double revolving field theory–AC Series motor–Compensation.

UNIT–II:

Synchronous generator construction and operation

Constructional features of non–salient and salient pole type – Armature windings –Distributed and concentrated windings – Distribution– Pitch and winding factors –E.M.F equation–Improvements of waveform and armature reaction– Numerical problems.

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UNIT – III:

Voltage regulation of synchronous generator

Voltage regulation by synchronous impedance method– MMFmethod and Potier triangle method–Phasor diagrams– Two reaction analysis of salient pole machines and phasor diagram– Numerical problems.

UNIT –IV:

Parallel operation of synchronous generators

Parallel operation with infinite bus and other alternators – Synchronizing power – Load sharing –Transfer of real and reactive power– Numerical problems.

UNIT–V:

Synchronous motor – operation

Synchronous Motor principle and theory of operation– Phasor diagram – Starting torque–Variation of current and power factor with excitation – Synchronous condenser – Mathematical analysis for power developed– Numerical problems.

UNIT – VI:

Synchronous motor performance and starting

Excitation and power circles – Hunting and its suppression – Methods of starting – Synchronous induction motor.

Learning outcomes:

At the end of the course the student should be able to

- Analyze the performance of single phase induction and ac series motors.
- Explain the structure of synchronous machines and design the windings.
- Develop solutions for regulation of both non salient pole and salient pole synchronous generators.
- Explain the role of synchronous generators operation when connected to an infinite bus or when operating in parallel.
- Analyze the performance of synchronous motor for development of torque and power factor correction.
- Explain hunting phenomenon and methods of starting of synchronous motor.

Text Books:

1. Electrical Machines – by P.S. Bhimbra, Khanna Publishers.
2. The Performance and Design of AC Machines – by M.G.Say, ELBS and Ptiman & Sons.

Reference Books:

1. Electric Machinery – by A.E. Fitzgerald, C. Kingsley and S.Umans-by Mc Graw–Hill Companies, 5th edition, 1990.
2. Theory of Alternating Current Machinery by Langsdorf, Tata Mc Graw–Hill, 2nd edition.
3. Analysis of Electric Machinery and Drive systems – by Paul C. Krause, Oleg Wasynczuk and Scott D.Sudhoff, wiley publications, 2nd edition Publishers.

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III Year – I SEMESTER

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POWER ELECTRONICS

Preamble:

The usage of power electronics in day to day life has increased in recent years. It is important for student to understand the fundamental principles behind all these converters. This course covers characteristics of semi conductor devices, ac/dc, dc/dc, ac/ac and dc/ac converters. The importance of using pulse width modulated techniques to obtain high quality power supply (dc/ac converter) is also discussed in detail in this course.

Learning Objectives:

- To study the characteristics of various power semiconductor derive and analyze the operation of diode bridge rectifier.
- To design firing circuits for SCR. Analyze the operation of AC voltage controller and half–wave phase controlled rectifiers.
- To understand the operation of single phase full–wave converters and analyze harmonics in the input current.
- To study the operation of three phase full–wave converters and dual converter.
- To analyze the operation of single phase cyclo converters and high frequency dc–dc converters.
- To understand the working of inverters and application of PWM techniques for voltage control and harmonic mitigation.

UNIT–I:

Power Semi Conductor Devices

Thyristors–Silicon controlled rectifiers (SCR's) –Characteristics of power MOSFET and power IGBT– Basic theory of operation of SCR–Static characteristics– Turn on and turn off methods–Dynamic characteristics of SCR– Snubber circuit design–Numerical problems–Diode bridge rectifier with R–load and capacitive filter–Output voltage and input current waveforms.

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UNIT–II:

Phase Controlled Converters – Single Phase

Firing circuits for SCR– Line commutation principle– Single phase AC voltage controller with R and RL load–Half wave converters with R,RL and RLE loads– Derivation of average load voltage and current–Effect of freewheeling diode for RL load.

UNIT–III:

Single Phase Bridge Converter and Harmonic Analysis Fully controlled converters

Operation with R, RL and RLE loads–Derivation of average voltage and current – Effect of source Inductance.

Semi Converters (Half Controlled):

Operation with R, RL and RLE loads – Harmonic analysis for input current waveform in a system with a large load inductance –Calculation of input power factor.

UNIT–IV:

Three Phase AC–DC Bridge Converters

Full converter with R and RL loads–Semi converter (Half Controlled) with R and RL loads– Derivation of load voltage–Line commutated Inverter operation–Dual converters with non–circulating and circulating currents.

UNIT – V:

AC–AC and DC–DC Converters

Single phase Bridge type cyclo converter with R and RL load (Principle of operation) –High frequency DC–DC converters: Buck Converter operation–Time ratio control and current limit control strategies–Voltage and current waveforms–Derivation of output voltage–Boost converter operation–Voltage and current waveforms–Derivation of output voltage – Buck-Boost converter operation –Voltage and current waveforms.

UNIT – VI:

DC–AC Inverters

Inverters

Single phase inverters–Unipolar and bipolar switching–Three phase Inverters (120^0 and 180^0 modes of operation) –PWM techniques– Sine triangular PWM technique– amplitude and frequency modulation Indices –Harmonic analysis.

Learning Outcomes:

Student should be able to

- Explain the characteristics of various power semiconductor derive and analyze the operation of diode bridge rectifier.
- Design firing circuits for SCR. Analyze the operation of AC voltage controller and half–wave phase controlled rectifiers.
- Explain the operation of single phase full–wave converters and analyze harmonics in the input current.
- Explain the operation of three phase full–wave converters and dual converter.
- Analyze the operation of single phase cyclo converters and high frequency dc–dc converters.
- Explain the working of inverters and application of PWM techniques for voltage control and harmonic mitigation.

Text Books:

1. Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998
2. Power Electronics: converters, applications & design -by Nedmohan, Tore M. Undeland, Robbins by Wiley India Pvt. Ltd.
3. Power Converter Circuits -by William Shepherd, Li zhang, CRC Taylor & Francis Group.

Reference Books:

1. Elements of Power Electronics–Philip T.Krein.oxford.
2. Power Electronics – by P.S.Bhimbra, Khanna Publishers.
3. Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K.Sinha, New Age International (P) Limited Publishers, 1996.
4. Power Electronics handbook by Muhammad H. Rashid, Elsevier.

III Year – I SEMESTER

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LINEAR & Digital IC APPLICATIONS

Preamble:

All Electronic devices developed in circuit Concepts. Thus all analog circuits developed on circuit Concept basis. But the advancement of Technology in Fabrication Field gain prominence and all discrete components are fabricated using I.C Technology. On a Single chip millions of transistors are fabricated using Very Large Scale IC. In This context Operational Amplifies which is an analog device plays an important role for Analog IC Design.

Operational Amplifies performs Algebraic operations, Logarithmic Operations, Trigonometric Operations etc. Therefore these Operational Amplifiers design goes into System design instead of circuit design. So Linear IC applications plays vital role in the electronic field Starting from home appliances to Super computers.

Learning Objectives:

After completion of this course, the reader should be able to

- Draw a block diagram representing a typical op-amp with various definitions.
- Draw and explain the open-loop configuration and feedback configuration and can determine Voltage gain, the input resistance, the output resistance.
- Differentiate between Ideal and Non-Ideal Op-Amp, Determination of closed loop voltage gain, the input resistance, the output resistance for Non-Ideal Op-Amp Circuits.
- Perform various mathematical Operations, Trigonometric & Logarithmic Operations, and Instrumentation Amplifier with relevant Circuits.
- Design waveform generators (Astable, Monostable, Schmitt Trigger) using Single Op-Amp.
- Study of 555 timer & its applications using Astable and Monostable Operations.
- Can design various types of Active Filters such as LPF, HPF, BPF, BRF, NBPF, Notch Filter, ALL pass filters.
- Study the operation & applications of PLA.
- Explain the operation of A/D and D/A Converters.

UNIT–I:

Introduction To Operational Amplifier

Block diagram of Typical Op–Amp With Various Stages– BJT Differential Amplifier With R_E DC Analysis– AC Analysis –BJT differential amplifier with constant current source – Analysis Different input/output configurations dual input balanced output–Dual input unbalanced output–Signal input balanced output–Signal input unbalanced output–AC analysis with r–parameters –Current repeater circuits–Current mirror circuits–Analysis–Level translator – Cascade differential amplifier– FET differential amplifier.

UNIT–II:

OP–AMP Parameter

Input offset voltage – Input off–set current–Input bias current–Differential input resistance–Common mode rejection ratio–Slew ratio–PSRR–Large signal voltage gain–Output voltage swing transients response–definitions and explanations. Measurement of bias current–Measurement of offset currents–Measurement of offset voltage –Measurement of slew rate – Output offset voltage balancing circuits–Bias current compensations circuit–Dual power suppliers with shunt capacitance filter–Fix voltages Regulators 78XX–79XX sering and as currents sources– Dual power supply using 78XX and 79XX sering.

UNIT–III

Ideal Operational Amplifier Theory and Basic Circuits

Ideal operational amplifier properties–Ideal assumptions–Basic circuits such as non inverting type comparator–Inverting type comparator–Voltage follower– Inverting amplifier–Non–inverting amplifier–Summing amplifier–Non–inverting summing amplifier–sub-tractor– Differentiator–Integrator–Scale changer–Instrumentation amplifier– V to I and I to V convertors–Log and Anti–log amplifiers–Zero crossing detector–Schmitt-trigger peak detector– Half-wave and full-wave rectifiers– Precision diode– Non-ideal operational amplifier non–inverting amplifier– inverting amplifier– closed-loop gain–Input and output resistance equivalent circuits.

UNIT–IV:

Wave form generator in angular waveform generator using op–amps and PLL Design of Astable multivibrator –Monostable multivibrator using signal op-amp–Trigring waveform generator 555 timer:Introduction–Pindiagram–Functional diagram for 8pin DIP–Design of Astable and monostable multi– Astable applicatio–Monostable applications– PLL: Introduction,basic blockdiagram– Furctions of each block–566 VC0– 565 PLL block diagram –Function of each block–Applications of PLL–Frequency

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multiplier role of each pin frequency transalation– AM–FM and FSK demodulators.

UNIT–V:

Active filters

Introduction– Merits and demerits of active filters–Over passive filters– First order low pass Butter–Worth filter –Design and frequency response–Second order LPF design and frequency response – First order HPF design and frequency response– Second order HPF design and frequency response– Higher-order filters– BPF wide band–pass and narrow band–pass filter–Wide band reject filter–Notch filter–All-pass filter.

UNIT–VI:

D to A and A to D Convertors

Digital to Analog Convertors(D to A) – Introduction–Specifications–Basic DAC techniques– Weighted resistor DAC– R–2R ladder DAC–Invested R–2R –Output expression for each type.

Analog to Digital Convertors

Introduction–Specifications–Parallel comparator type–Counter type–Dual slope–Successive approximation type ADCs– Merits and demerits of each type, Comparison of different types.

Learning Outcomes:

- After completion of this course student can able to differentiate "Analog Circuits & Digital Circuits".
- The course content gives an insight in to the fundamentals so that one can design the "Linear Circuits" with their own innovative skills.
- Those who are taken this course can specialize in this subject in their Post Graduation. It is a challenging task for the individual to exhibit his logical skills & Analytical ability.
- They can design their own circuits which may be useful for current industry needs.

Text Books:

1. OP–AMPS and liner integrator circuits by Ramakanth A Gayakwad (PHI).
2. Linear Integrated Circuits by D.Roy chowdary, New age international.

3. Op–amp and linear integrated circuits by sanjay sharma, S.K.Kataria & son's New Delhi.

Reference Books:

1. Micro Electronics– Mcllimian Mc Graw Hill.
2. Analog Electronics– L.K.Maheswari, PHI.
3. Linear Integrated circuits by S.Salivahan, TMH.

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III Year – I SEMESTER

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INTELLECTUAL PROPERTY RIGHTS AND PATENTS

UNIT I

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement - Regulatory – Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues.

UNIT II

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of performers – Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law-Semiconductor Chip Protection Act.

UNIT III

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

UNIT IV

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law.

UNIT V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement –

Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law.

UNIT VI

Introduction to Cyber Law – Information Technology Act - Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy - International aspects of Computer and Online Crime.

REFERENCE BOOKS:

1. Deborah E.Bouchoux: "Intellectual Property". Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections
4. Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi
5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
6. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights", Excel Books. New Delhi.
7. M. Ashok Kumar and Mohd. Iqbal Ali: "Intellectual Property Right" Serials Pub.

III Year – II SEMESTER	T	P	C
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SWITCHGEAR AND PROTECTION

Preamble:

In order to supply power from generating end to receiving end several equipments are connected in to the system. In order to protect the equipments and components against various operating conditions and over voltages protective devices are required to be installed in the system. Topics specified in this subject deal with various types of protective equipments and their working principle including limitations etc.

Learning objectives:

- To provide the basic principles of arc interruption, circuit breaking principles, operation of various types of circuit breakers.
- To study the classification, operation, construction and application of different types of electromagnetic protective relays.
- To explain various types of faults in generators and transformers and different types of protective schemes.
- To impart knowledge of various protective schemes used for feeders and bus bars.
- To explain the principles and operations of different types of static relays.
- To study different types of over voltages in a power system and principles of different protective schemes for insulation co-ordination.

UNIT–I:

Circuit Breakers

Miniature Circuit Breaker(MCB)– Elementary principles of arc interruption– Restrike Voltage and Recovery voltages– Restrike phenomenon– Average and Max. RRRV– Current chopping and Resistance switching– Introduction to oil circuit breakers– Description and operation of Air Blast– Vacuum and SF6 circuit breakers– CB ratings and specifications– Auto reclosing.

UNIT–II:

Electromagnetic Protection

Principle of operation and construction of attracted armature– Balanced beam– induction disc and induction cup relays– Relays classification– Instantaneous– DMT and IDMT types– Applications of relays: Over current/under voltage relays– Directional relays– Differential relays and percentage differential relays– Universal torque equation– Distance relays: Impedance– Reactance– Mho and offset mho relays– Characteristics of distance relays and comparison.

UNIT–III:

Generator Protection

Protection of generators against stator faults– Rotor faults and abnormal conditions– restricted earth fault and inter turn fault protection– Numerical examples.

Transformer Protection

Protection of transformers: Percentage differential protection– Design of CT's ratio– Buchholz relay protection–Numerical examples.

UNIT–IV:

Feeder and Bus bar Protection

Protection of lines: Over current– Carrier current and three zone distance relay using impedance relays–Translay relay–Protection of bus bars– Differential protection.

UNIT–V:

Static and Digital Relays

Static relays: Static relay components– Static over current relay– Static distance relay– Micro processor based digital relays.

UNIT–VI:

Protection against over voltage and grounding

Generation of over voltages in power systems– Protection against lightning over voltages– Valve type and zinc–Oxide lighting arresters– Insulation coordination– BIL– impulse ratio– Standard impulse test wave– volt~time characteristics– Grounded and ungrounded neutral systems–Effects of ungrounded neutral on system performance– Methods of neutral grounding: Solid–resistance–Reactance–Arcing grounds and grounding Practices.

Learning Outcomes:

- To be able to understand the principles of arc interruption for application to high voltage circuit breakers of air, oil, vacuum, SF_6 gas type.
- Ability to understand the working principle and constructional features of different types of electromagnetic protective relays.
- Students acquire in depth knowledge of faults that is observed to occur in high power generator and transformers and protective schemes used for all protections.
- Improves the ability to understand various types of protective schemes used for feeders and bus bar protection.
- Generates understanding of different types of static relays with a view to application in the system.
- To be able to understand the different types of over voltages appearing in the system, including existing protective schemes required for insulation co-ordination.

Text Books:

1. Protection and SwitchGear by BhaveshBhalja, R.P. Maheshwari, NileshG. Chothani, Oxford University Press, 2013
2. Power system protection- Static Relays with microprocessor applications. by T.S. Madhava Rao, TMH
3. Electrical Power System Protection by C. CHRISTOPOULOS and A. Wright, Springer publications

Reference Books:

1. Power System Protection and Switchgear by Badari Ram, D.N Viswakarma, TMH Publications.
2. Fundamentals of Power System Protection by Paithankar and S.R. Bhide, PHI, 2003.
3. Art & Science of Protective Relaying – by C R Mason, Wiley Eastern Ltd.

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III Year – II SEMESTER

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MICROPROCESSORS AND MICROCONTROLLERS

Preamble:

Microprocessor and microcontroller have become important building blocks in digital electronics design. It is important for student to understand the architecture of a microprocessor and its interfacing with various modules. 8086 microprocessor architecture, programming, and interfacing is dealt in detail in this course. Interfacing, assembly language programming and interfacing of 8051 microcontroller and its application in industry are also covered in this course.

Learning objectives:

- To understand the organization and architecture of Micro Processor
- To understand addressing modes to access memory
- To understand 8051 micro controller architecture
- To understand the programming principles for 8086 and 8051
- To understand the interfacing of MP with IO as well as other devices.
- To understand how to develop cyber physical systems

UNIT–I:

Introduction to Microprocessor Architecture

Introduction and evolution of Microprocessors– Architecture of 8086– Register Organization of 8086–Memory organization of 8086– General bus operation of 8086–Introduction to 80286–80386 and 80486 and Pentium.

UNIT–II:

Minimum and Maximum Mode Operations

Instruction set, Addressing modes– Minimum and Maximum mode operations of 8086–8086 Control signal interfacing–Read and write cycle timing diagrams.

UNIT–III:

Assembly Language Programming

Assembly Directives–Macro's– Algorithms for Implementation of FOR Loop–WHILE–REPEAT and IF-THEN-ELSE Features–Addressing modes and Instruction set of 8051–Assembly language programming of 8051–Development systems and tools.

UNIT–IV:

I/O Interface

8255 PPI– Architecture of 8255–Modes of operation– Interfacing I/O devices to 8086 using 8255–Interfacing A to D converters– Interfacing D to A converters– Stepper motor interfacing– Static memory interfacing with 8086–DMA controller (8257)–Architecture–Interfacing 8257 DMA controller–Programmable Interrupt Controller (8259)–Command words and operating modes of 8259– Interfacing of 8259–Keyboard/display controller (8279)–Architecture–Modes of operation–Command words of 8279– Interfacing of 8279.

UNIT–V:

Introduction to 8051 Micro Controller

Overview of 8051 Micro Controller– Architecture– Register set–I/O ports and Memory Organization– Interrupts–Timers and Counters–Serial Communication.

UNIT– VI:

Cyber physical systems and industrial applications of 8051

Applications of Micro Controllers– Interfacing 8051 to LED's–Push button–Relay's and Latch Connections– Keyboard Interfacing– Interfacing Seven Segment Display–ADC and DAC Interfacing.

Learning Outcomes:

- To be able to understand the microprocessor capability in general and explore the evalution of microprocessors.
- To be able to understand the addressing modes of microprocessors
- To be able to understand the micro controller capability

- To be able to program mp and mc
- To be able to interface mp and mc with other electronic devices
- To be able to develop cyber physical systems

Text Books:

1. Microprocessors and Interfacing, Douglas V Hall, Mc-Graw Hill, 2nd Edition.
2. Kenneth J Ayala, "The 8051 Micro Controller Architecture, Programming and

   Applications", Thomson Publishers, 2nd Edition.
3. Ray and Burchandi, "Advanced Micro Processors and Interfacing", Tata McGraw-Hill.

Reference Books:

1. R.S. Kaler, " A Text book of Microprocessors and Micro Controllers", I.K. International Publishing House Pvt. Ltd.
2. Ajay V. Deshmukh, "Microcontrollers – Theory and Applications", Tata McGraw-Hill Companies –2005.
3. Ajit Pal, "Microcontrollers – Principles and Applications", PHI Learning Pvt Ltd, 2011.

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III Year – II SEMESTER

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UTILIZATION OF ELECTRICAL ENERGY

Preamble:

This course primarily deals with utilization of electrical energy generated from various sources. It is important to understand the technical reasons behind selection of motors for electric drives based on the characteristics of loads. Electric heating, welding and illumination are some important loads in the industry in addition to motor/drives. Another major share of loads is taken by Electric Traction. Utilization of electrical energy in all the above loads is discussed in detail in this course. Demand side management concepts are also introduced as a part of this course.

Learning objectives:

- To understand the operating principles and characteristics of traction motors with respect to speed, temperature ,loading conditions.
- To acquaint with the different types of heating and welding techniques.
- To study the basic principles of illumination and its measurement.
- To understand different types of lightning system including design.
- To understand the basic principle of electric traction including speed–time curves of different traction services.
- To understand the method of calculation of various traction system for braking, acceleration and other related parameters, including demand side management of energy.

UNIT – I:

Selection of Motors

Choice of motor, type of electric drives, starting and running characteristics–Speed control–Temperature rise–Applications of electric drives–Types of industrial loads–continuous–Intermittent and variable loads–Load equalization.

UNIT – II:

Electric Heating

Advantages and methods of electric heating–Resistance heating induction heating and dielectric heating.

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Electric Welding

Electric welding–Resistance and arc welding–Electric welding equipment–Comparison between AC and DC Welding

UNIT – III:

Illumination fundamentals

Introduction, terms used in illumination–Laws of illumination–Polar curves–Integrating sphere–Lux meter–Sources of light

UNIT – IV:

Various Illumination Methods

Discharge lamps, MV and SV lamps – Comparison between tungsten filament lamps and fluorescent tubes–Basic principles of light control– Types and design of lighting and flood lighting–LED lighting.

UNIT – V:

Electric Traction – I

System of electric traction and track electrification– Review of existing electric traction systems in India– Special features of traction motor–Mechanics of train movement–Speed–time curves for different services – Trapezoidal and quadrilateral speed time curves.

UNIT – VI:

Electric Traction – II

Calculations of tractive effort– power –Specific energy consumption for given run–Effect of varying acceleration and braking retardation–Adhesive weight and braking retardation adhesive weight and coefficient of adhesion–Principles of energy efficient motors.

Learning Outcomes:

- Able to identify a suitable motor for electric drives and industrial applications
- Able to identify most appropriate heating or welding techniques for suitable applications.
- Able to understand various level of illuminosity produced by different illuminating sources.
- Able to estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.

- Able to determine the speed/time characteristics of different types of traction motors.
- Able to estimate energy consumption levels at various modes of operation.

Text Books:

1. Utilization of Electric Energy – by E. Openshaw Taylor, Orient Longman.
2. Art & Science of Utilization of electrical Energy – by Partab, DhanpatRai & Sons.

Reference Books:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Generation, Distribution and Utilization of electrical Energy – by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1997.

III Year – II SEMESTER

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POWER SYSTEM ANALYSIS

Preamble:

The course is designed to give students the required knowledge for the design and analysis of electrical power grids. Calculation of power flow in a power system network using various techniques, formation of Z_{bus} and its importance are covered in this course. It also deals with short circuit analysis and analysis of power system for steady state and transient stability.

Learning Objectives:

- To study the development of impedance diagram (p.u) and formation of Y_{bus}
- To study the Gauss Seidel, Newton raphson, decoupled and fast decoupled load flow methods.
- To study the concept of the Z_{bus}building algorithm.
- To study short circuit calculation for symmetrical $faults_s$
- To study the effect of unsymmetrical faults.
- To study the rotor angle stability analysis of power systems.

UNIT –I:

Per Unit Representation & Topology

Per Unit Quantities–Single line diagram– Impedance diagram of a power system – Graph theory definition – Formation of element node incidence and bus incidence matrices – Primitive network representation – Formation of Y–bus matrix by singular transformation and direct inspection methods.

UNIT –II:

Power Flow Studies

Necessity of power flow studies – Derivation of static power flow equations – Power flow solution using Gauss-Seidel Method – Newton Raphson Method (Rectangular and polar coordinates form) –Decoupled and Fast Decoupled methods (Algorithmic approach) – Problems on 3–bus system only.

UNIT –III:

Z–Bus formulation

Formation of Z–Bus: Partial network– Algorithm for the Modification of Z_{bus} Matrix for addition element for the following cases: Addition of element from a new bus to reference– Addition of element from a new bus to an old bus– Addition of element between an old bus to reference and Addition of element between two old busses (Derivations and Numerical Problems).– Modification of Z–Bus for the changes in network (Problems).

UNIT – IV:

Symmetrical Fault Analysis

3–Phase short circuit currents and reactances of synchronous machine–Short circuit MVA calculations.

UNIT –V:

Symmetrical Components & Fault analysis

Synthesis of unsymmetrical phasor from their symmetrical components– Symmetrical components of unsymmetrical phasor–Phase - shift of symmetrical components in Y–Δ–Power in terms of symmetrical components – Sequence networks – Positive, negative and zero sequence networks– Various types of faults LG– LL– LLG and LLL on unloaded alternator– unsymmetrical faults on power system.

UNIT – VI:

Power System Stability Analysis

Elementary concepts of Steady state– Dynamic and Transient Stabilities– Description of Steady State Stability Power Limit–Transfer Reactance– Synchronizing Power Coefficient –Power Angle Curve and Determination of Steady State Stability –Derivation of Swing Equation–Determination of Transient Stability by Equal Area Criterion–Application of Equal Area Criterion–Methods to improve steady state and transient stability.

- Able to draw an impedance diagram for a power system network.
- Able to form a Y_{bus} matrix for a power system network with or without mutual couplings.
- Able to find out the load flow solution of a power system network using different types of load flow methods.
- Able to formulate the Z_{bus} for a power system network.
- Able to find out the fault currents for all types faults with a view to provide data for the design of protective devices.

- Able to find out the sequence components of currents for any unbalanced power system network.
- Able to analyze the steady state, transient and dynamic stability concepts of a power system.

Text Books:

1. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
2. Electrical Power Systems by P.S.R.Murthy, B.S.Publications
3. Modern Power system Analysis – by I.J.Nagrath&D.P.Kothari: Tata Mc Graw–Hill Publishing Company, 2nd edition.
4. Power System Analysis and Design by J.Duncan Glover, M.S.Sarma, T.J. Overbye – CengageLearning publications.

Reference Books:

1. Power System Analysis – by A.R.Bergen, Prentice Hall, Inc.
2. Power System Analysis by HadiSaadat – TMH Edition.
3. Power System Analysis by B.R.Gupta, Wheeler Publications.

III Year – II SEMESTER	T	P	C
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POWER SEMICONDUCTOR DRIVES

Preamble:

This course is an extension of power electronics applications to electric drives. This course covers in detail the basic and advanced speed control techniques using power electronic converters that are used in industry. It is equally important to understand the four quadrant operation of electric drives and slip power recovery schemes in induction motors.

Learning Objectives:

- To learn the fundamentals of electric drive and different electric braking methods.
- To analyze the operation of three phase converter controlled dc motors and four quadrant operation of dc motors using dual converters.
- To discuss the converter control of dc motors in various quadrants.
- To understand the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.
- To learn the principles of static rotor resistance control and various slip power recovery schemes.
- To understand the speed control mechanism of synchronous motors

UNIT–I:

Fundamentals of Electric Drives

Electric drive – Fundamental torque equation – Load torque components – Nature and classification of load torques – Steady state stability – Load equalization– Four quadrant operation of drive (hoist control) – Braking methods: Dynamic – Plugging – Regenerative methods.

UNIT–II:

Three phase converter controlled DC motors

Revision of speed control techniques – Separately excited and series motors controlled by full converters – Output voltage and current waveforms – Speed-torque expressions – Speed-torque characteristics – Numerical problems – Four quadrant operation using dual converters.

UNIT–III:

Control of DC motors by DC–DC converters (Type C & Type D)

Single quadrant – Two quadrant and four quadrant chopper fed separately excited and series excited motors – Continuous current operation– Output voltage and current waveforms – Speed–torque expressions – Speed–torque characteristics –Four quadrant operations – Closed loop operation (Block diagrams only).

UNIT–IV:

Induction motor control – Stator side

Variable voltage characteristics–Control of Induction Motor by AC Voltage Controllers – Waveforms –Speed torque characteristics– Variable Voltage Variable Frequency control of induction motor by voltage source inverter – PWM control – Closed loop operation of induction motor drives (Block Diagram Only).

UNIT–V:

Control of Induction motor – Rotor side

Static rotor resistance control – Slip power recovery schemes – Static Scherbius drive – Static Kramer drive – Performance and speed torque characteristics – Advantages –Applications.

UNIT–VI:

Control of Synchronous Motors

Separate control &self control of synchronous motors – Operation of self controlled synchronous motors by VSI– Closed Loop control operation of synchronous motor drives (Block Diagram Only) –Variable frequency control–Pulse width modulation.

Learning Outcomes:

Student should be able to

- Explain the fundamentals of electric drive and different electric braking methods.
- Analyze the operation of three phase converter controlled dc motors and four quadrant operation of dc motors using dual converters.
- Explain the converter control of dc motors in various quadrants.
- Explain the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters.
- Explain the principles of static rotor resistance control and various slip power recovery schemes.

- Explain the speed control mechanism of synchronous motors

Text Books:

1. Fundamentals of Electric Drives – by G K Dubey Narosa Publications
2. Power Semiconductor Drives, by S.B. Dewan, G.R.Slemon, A.Straughen, Wiley-India Edition.

Reference Books:

1. Electric Motors and Drives Fundamentals, Types and Apllications, by Austin Hughes and Bill Drury, Newnes.
2. Thyristor Control of Electric drives – Vedam Subramanyam Tata McGraw Hill Publications.
3. Power Electronic Circuits, Devices and applications by M.H. Rashid, PHI.
4. Power Electronics handbook by Muhammad H.Rashid, Elsevier.

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III Year – II SEMESTER

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	3+1	0	3

MANAGEMENT SCIENCE

UNIT I

Introduction to Management: Concept –nature and importance of Management – Functions of Management – Evaluation of Management thought- Theories of Motivation – Decision making process-Designing organization structure- Principles of organization - Types of organization structure.

UNIT II

Operations Management: Principles and Types of Management – Work study- Statistical Quality Control- Control charts (P-chart, R-chart, and Cchart).

Simple problems- Material Management: Need for Inventory control- EOQ, ABC analysis (simple problems) and Types of ABC analysis (HML, SDE, VED, and FSN analysis).

UNIT III

Functional Management: Concept of HRM, HRD and PMIR- Functions of HR Manager- Wage payment plans(Simple Problems) – Job Evaluation and Merit Rating - Marketing Management- Functions of Marketing – Marketing strategies based on product Life Cycle, Channels of distributions.

UNIT IV

Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM Identifying Critical Path- Probability- Project Crashing (Simple Problems).

UNIT V

Strategic Management: Vision, Mission, Goals, Strategy – Elements of Corporate Planning Process – Environmental Scanning – SWOT analysis- Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

UNIT VI

Contemporary Management Practice: Basic concepts of MIS, MRP, Justin- Time (JIT) system, Total Quality Management (TQM), Six sigma and Capability Maturity Model (CMM) Levies, Supply Chain Management, Enterprise Resource Planning (ERP), Business Process outsourcing (BPO), Business process Re-engineering and Bench Marking, Balanced Score Card.

Text Books

1. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, '*Management Science*' Cengage, Delhi, 2012.
2. Dr. A. R. Aryasri, *Management Science*' TMH 2011.

References

1. Koontz & Weihrich: 'Essentials *of management*' TMH 2011.
2. Seth & Rastogi: Global Management Systems, Cengage learning, Delhi, 2011.
3. Robbins: Organizational Behaviour, Pearson publications, 2011.
4. Kanishka Bedi: Production & Operations Management, Oxford Publications, 2011.
5. Philip Kotler & Armstrong: Principles of Marketing, Pearson publications.
6. Biswajit Patnaik: Human Resource Management, PHI, 2011.
7. Hitt and Vijaya Kumar: Starategic Management, Cengage learning.

Objective:

To familiarize with the process of management and to provide basic insights into select contemporary management practices.

Codes/ Tables:

Normal Distribution Function Tables need to be permitted into the examination Halls.

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IV Year – I SEMESTER

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RENEWABLE ENERGY SOURCES AND SYSTEMS

Preamble:

This course gives a flavor of renewable sources and systems to the students. It introduces solar energy its radiation, collection, storage and its applications. This covers generation, design, efficiency and characteristics of various renewable energy sources including solar, wind, hydro, biomass, fuel cells and geothermal systems.

Learning Objectives:

- To study the solar radiation data, extra terrestrial radiation, radiation on earth's surface.
- To study solar thermal collections.
- To study solar photo voltaic systems.
- To study maximum power point techniques in solar pv and wind.
- To study wind energy conversion systems, Betz coefficient, tip speed ratio.
- To study basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

UNIT–I:

Fundamentals of Energy Systems

Energy conservation principle – Energy scenario (world and India) – Solar radiation: Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT–II:

Solar Thermal Systems

Liquid flat plate collections: Performance analysis – Transmissivity – Absorptivity product collector efficiency factor – Collector heat removal factor – Numerical problems. Introduction to solar air heaters – Concentrating collectors and solar pond.

UNIT–III:

Solar Photovoltaic Systems

Balance of systems – IV characteristics – System design: storage sizing – PV system sizing – Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique.

UNIT–IV:

Wind Energy

Wind patterns – Types of turbines – Kinetic energy of wind – Betz coefficient – Tip–speed ratio – Efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking.

UNIT–V:

Hydro and Tidal power systems

Basic working principle – Classification of hydro systems: Large, small, micro – measurement of head and flow – Energy equation – Types of turbines – Numerical problems.

Tidal power – Basics – Kinetic energy equation – Numerical problems – Wave power – Basics – Kinetic energy equation.

UNIT–VI:

Biomass, fuel cells and geothermal systems

Biomass Energy: Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing.

Fuel cell: Classification – Efficiency – VI characteristics.

Geothermal: Classification – Dry rock and acquifer – Energy analysis.

Learning Outcomes:

Student should be able to

- Analyze solar radiation data, extraterrestrial radiation, radiation on earth's surface.
- Design solar thermal collections.
- Design solar photo voltaic systems.
- Develop maximum power point techniques in solar PV and wind.
- Explain wind energy conversion systems, Betz coefficient, tip speed ratio.
- Explain basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

Text Books:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis -second edition, 2013.
3. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford.

Reference Books:

1. Renewable Energy- Edited by Godfrey Boyle-oxford university, press, 3rd edition, 2013.
2. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal, World scientific, Singapore.
3. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
4. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI.
5. Non conventional energy source –B.H. Khan- TMH-2nd edition.

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IV Year – I SEMESTER

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	3+1	0	3

HVAC & DC TRANSMISSION

Preamble:

With the increasing power generation in the country and long distance power transmission, it is necessary that power should be transmitted at extra and ultra high voltage. The topics dealt in this subject relate to phenomena associated with transmission line at higher voltages, equipments generating high voltage and power control strategy.

Learning Objectives:

- To understand the phenomena associated with transmission line, operating at extra high voltages. The unit gives detail analysis of several phenomena viz. electrostatic field, charges, voltage gradient and conductor configuration.
- The objective is to discuss phenomena of corona, losses, audible noise, radio interference and measurement of these quantities.
- To understand the phenomena of HVDC, HVDC equipment comparison with AC and the latest state of art in HVDC transmission.
- To understand method of conversion of AC to DC, performance of various level of pulse conversion and control characteristics of conversion. It also provides knowledge of effect of source inductance as well as method of power control.
- To understand the requirements of reactive power control and filtering technique in HVDC system.
- To understand the harmonics in AC side of power line in a HVDC system and design of filters for various levels of pulse conversion.

UNIT – I:

Introduction of EHV AC transmission

Necessity of EHV AC transmission – Advantages and problems – Power handling capacity and line losses – Mechanical considerations – Resistance of conductors –Electrostatics – Field of sphere gap – Field of line charges and properties – Charge ~ potential relations for multi–conductors – Surface voltage gradient on conductors – Bundle spacing and bundle radius –

Examples – Distribution of voltage gradient on sub conductors of bundle – Examples.

UNIT – II:

Corona effects

Power loss and audible noise (AN) – Corona loss formulae – Charge voltage diagram – Generation – Characteristics – Limits and measurements of AN – Relation between 1–phase and 3–phase AN levels – Examples – Radio interference (RI) – Corona pulses generation – Properties and limits – Frequency spectrum – Modes of propagation – Excitation function – Measurement of RI, RIV and excitation functions – Examples.

UNIT – III:

Basic Concepts of DC Transmission

Economics & Terminal equipment of HVDC transmission systems: Types of HVDC Links – Apparatus required for HVDC Systems – Comparison of AC &DC transmission – Application of DC Transmission System – Planning & Modern trends in DC transmission.

UNIT – IV:

Analysis of HVDC Converters and System Control

Choice of Converter configuration – Analysis of Graetz – Characteristics of 6 Pulse & 12 Pulse converters – Cases of two 3 phase converters in star – Star mode and their performance – Principal of DC Link Control – Converters Control Characteristics – Firing angle control – Current and extinction angle control – Effect of source inductance on the system – Starting and stopping of DC link – Power Control.

UNIT–V:

Reactive Power Control in HVDC

Reactive Power Requirements in steady state – Conventional control strategies –Alternate control strategies sources of reactive power – AC Filters – Shunt capacitors – Synchronous condensers.

UNIT – VI:

Harmonics and Filters

Generation of Harmonics – Characteristics harmonics – Calculation of AC Harmonics – Non–Characteristics harmonics – Adverse effects of harmonics – Calculation of voltage & current harmonics – Effect of Pulse number on harmonics. Types of AC filters, Design of Single tuned filters – Design of High pass filters.

Learning Outcomes:

- To be able to acquaint with HV transmission system with regard to power handling capacity, losses, conductor resistance and electrostatic field associate with HV. Further knowledge is gained in area of bundle conductor system to improve electrical and mechanical performance.
- To develop ability for determining corona, radio interference, audible noise generation and frequency spectrum for single and three phase transmission lines.
- To be able to acquire knowledge in transmission of HVDC power with regard to terminal equipments, type of HVDC connectivity and planning of HVDC system.
- To be able to develop knowledge with regard to choice of pulse conversion, control characteristic, firing angle control and effect of source impedance.
- To develop knowledge of reactive power requirements of conventional control, filters and reactive power compensation in AC. side of HVDC system.
- Able to calculate voltage and current harmonics, and design of filters for six and twelve pulse conversion.

Text Books:

1. HVDC Power Transmission Systems: Technology and system Interactions – by K.R.Padiyar, New Age International (P) Limited, and Publishers.
2. Direct Current Transmission – by E.W.Kimbark, John Wiley & Sons.
3. EHVAC Transmission Engineering by R. D. Begamudre, New Age International (P) Ltd.

Reference Books:

1. EHVAC and HVDC Transmission Engineering and Practice – S.Rao.
2. Power Transmission by Direct Current – by E.Uhlmann, B.S.Publications
3. HVDC Transmission – J. Arrillaga.

IV Year – I SEMESTER

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POWER SYSTEM OPERATION AND CONTROL

Preamble:

This subject deals with Economic operation of Power Systems, Hydrothermal scheduling and modeling of turbines, generators and automatic controllers. It emphasizes on single area and two area load frequency control and reactive power control.

Learning Objectives:

- To understand optimal dispatch of generation with and without losses.
- To study the optimal scheduling of hydro thermal systems.
- To study the optimal unit commitment problem.
- To study the load frequency control for single area system
- To study the PID controllers for single area system and two area system.
- To understand the reactive power control and compensation of transmission lines.

UNIT–I:

Economic Operation of Power Systems

Optimal operation of Generators in Thermal power stations, – Heat rate curve – Cost Curve – Incremental fuel and Production costs – Input–output characteristics – Optimum generation allocation with line losses neglected – Optimum generation allocation including the effect of transmission line losses – Loss Coefficients – General transmission line loss formula.

UNIT–II:

Hydrothermal Scheduling

Optimal scheduling of Hydrothermal System: Hydroelectric power plant models – Scheduling problems – Short term Hydrothermal scheduling problem.

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UNIT–III:

Unit Commitment

Optimal unit commitment problem – Need for unit commitment – Constraints in unit commitment – Cost function formulation – Solution methods – Priority ordering – Dynamic programming.

UNIT–IV:

Load Frequency Control

Modeling of steam turbine – Generator – Mathematical modeling of speed governing system – Transfer function – Modeling of Hydro turbine – Necessity of keeping frequency constant – Definitions of Control area – Single area control – Block diagram representation of an isolated power system – Steady state analysis – Dynamic response – Uncontrolled case – Load frequency control of two area system – Uncontrolled case and controlled case – Tie–line bias control.

UNIT–V:

Load Frequency Controllers

Proportional plus Integral control of single area and its block diagram representation – Steady state response – Load Frequency Control and Economic dispatch control.

UNIT–VI:

Reactive Power Control

Overview of Reactive Power control – Reactive Power compensation in transmission systems – Advantages and disadvantages of different types of compensating equipment for transmission systems – Load compensation – Specifications of load compensator – Uncompensated and compensated transmission lines: Shunt and series compensation – Need for FACTS controllers.

Learning Outcomes:

- Able to compute optimal scheduling of Generators.
- Able to understand hydrothermal scheduling.
- Understand the unit commitment problem.
- Able to understand importance of the frequency.
- Understand importance of PID controllers in single area and two area systems.
- Will understand reactive power control and line power compensation.

Text Books:

1. Electric Energy systems Theory – by O.I.Elgerd, Tata McGraw–hill Publishing Company Ltd., Second edition.
2. Power System stability & control, Prabha Kundur,TMH
3. Modern Power System Analysis – by I.J.Nagrath & D.P.Kothari Tata Mc Graw – Hill Publishing Company Ltd, 2nd edition.

Reference Books:

1. Power System Analysis and Design by J.Duncan Glover and M.S.Sarma, THOMPSON, 3rd Edition.
2. Power System Analysis by Grainger and Stevenson, Tata McGraw Hill.
3. Power System Analysis by Hadi Saadat – TMH Edition.

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IV Year – I SEMESTER

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Open Elective

ENERGY AUDIT, CONSERVATION & MANAGEMENT

Preamble:

This is an open elective course developed to cater current needs of the industry. This course covers topics such as energy conservation act and energy conservation. It also covers energy efficient lighting design, student will learn power factor improvement techniques, energy efficiency in HVAC systems. In addition, economic aspects such as payback period calculations, life cycle costing analysis is covered in this course.

Learning Objectives:

- To understand energy efficiency, scope, conservation and technologies.
- To design energy efficient lighting systems.
- To estimate/calculate power factor of systems and propose suitable compensation techniques.
- To understand energy conservation in HVAC systems.
- To calculate life cycle costing analysis and return on investment on energy efficient technologies.

Unit–I:

Basic Principles of Energy Audit and management

Energy audit – Definitions – Concept – Types of audit – Energy index – Cost index – Pie charts – Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language – Questionnaire – Check list for top management.

Unit–II:

Lighting

Modification of existing systems – Replacement of existing systems – Priorities: Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam

– Luminance or brightness – Types of lamps – Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures.

Unit–III:

Power Factor and energy instruments

Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

Unit–IV:

Space Heating and Ventilation

Ventilation – Air–Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning – Insulation–Cooling load – Electric water heating systems – Energy conservation methods.

Unit–V

Economic Aspects and Analysis

Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts).

Unit–VI:

Computation of Economic Aspects

Calculation of simple payback method – Net present worth method – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment.

Learning Outcomes:

Student will be able to

- Explain energy efficiency, conservation and various technologies.
- Design energy efficient lighting systems.
- Calculate power factor of systems and propose suitable compensation techniques.
- Explain energy conservation in HVAC systems.
- Calculate life cycle costing analysis and return on investment on energy efficient technologies.

Text Books:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2nd edition, 1995

Reference Books:

1. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
2. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.
3. Energy management hand book by W.C.Turner, John wiley and sons.
4. Energy management and conservation –k v Sharma and pvenkata seshaiah-I K International Publishing House pvt.ltd,2011.
5. http://www.energymanagertraining.com/download/Gazette_of_IndiaPartIISecI-37_25-08-2010.pdf

Note : This Elective can be offered to Students of All Branches including EEE.

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INSTRUMENTATION
(Open Elective)

Preamble:

Electrical and Electronic Instrumentation plays a key role in the industry. With the advancement of technology day to day manual maintenance is replaced by simply monitoring using various instruments. Thus this course plays very important role in overall maintenance of the industry.

Learning Objectives:

- To study various types of signals and their representation.
- To study various types of transducers: Electrical, Mechanical, Electromechanical, Optical etc.
- To study and measure the various types of Non–electrical quantities.
- To study various types of digital voltmeters
- To study the working principles of various types of oscilloscopes and their applications.
- To study various types of signal analyzers.

UNIT–I:

Signals and their representation

Measuring Systems, Performance Characteristics, – Static characteristics – Dynamic Characteristics – Errors in Measurement – Gross Errors – Systematic Errors – Statistical analysis of random errors – Signal and their representation – Standard test, periodic, aperiodic, modulated signal – Sampled data pulse modulation and pulse code modulation.

UNIT–II:

Transducers

Definition of transducers – Classification of transducers – Advantages of Electrical transducers – Characteristics and choice of transducers – Principle operation of resistor, inductor, LVDT and capacitor transducers – LVDT Applications – Strain gauge and its principle of operation – Guage factor – Thermistors – Thermocouples – Synchros – Piezo electric transducers – Photo diodes.

UNIT–III:

Measurement of Non–Electrical Quantities

Measurement of strain – Gauge Sensitivity – Displacement – Velocity – Angular Velocity – Acceleration – Force – Torque – Measurement of Temperature, Pressure, Vacuum, Flow, Liquid level.

UNIT–IV:

Digital Voltmeters

Digital voltmeters – Successive approximation, ramp, dual–Slope integration continuous balance type – Micro processor based ramp type – DVM digital frequency meter – Digital phase angle meter.

UNIT–V:

Oscilloscope

Cathode ray oscilloscope – Time base generator – Horizantal and vertical amplifiers – Measurement of phase and frequency – Lissajous patterns – Sampling oscilloscope – Analog and digital type data loger – Transient recorder.

UNIT–VI:

Signal Analyzers

Wave Analyzers – Frequency selective analyzers – Heterodyne – Application of Wave analyzers – Harmonic Analyzers – Total Harmonic distortion – Spectrum analyzers – Basic spectrum analyzers – Spectral displays – Vector impedance meter – Q meter – Peak reading and RMS voltmeters.

Learning Outcomes:

- Able to represent various types of signals .
- Acquire proper knowledge to use various types of Transducers.
- Able to monitor and measure various parameters such as strain, velocity, temperature, pressure etc.
- Acquire proper knowledge and working principle of various types of digital voltmeters.
- Able to measure various parameter like phase and frequency of a signal with the help of CRO.
- Acquire proper knowledge and able to handle various types of signal analyzers.

Text Books:

1. Electronic Instrumentation–by H.S.Kalsi Tata MCGraw–Hill Edition, 1995.
2. A course in Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpatrai& Co.

Reference Books:

1. Measurement and Instrumentation theory and application, Alan S.Morris and Reza Langari, Elsevier
2. Measurements Systems, Applications and Design – by D O Doeblin
3. Principles of Measurement and Instrumentation – by A.S Morris, Pearson / Prentice Hall ofIndia
4. Modern Electronic Instrumentation and Measurement techniques – by A.D Helfrickand W.D. Cooper, Pearson/Prentice Hall of India.

4\. Transducers and Instrumentation by D.V.S Murthy, Prentice Hall of India.

Note : This Elective can be offered to Students of All Branches including EEE.

NON–CONVENTIONAL SOURCES OF ENERGY

(Open Elective)

Preamble:

This course gives a flavor of non–conventional sources of energy to the students. It introduces solar energy its radiation, collection, storage and its applications. This covers generation, design, efficiency and characteristics of various non–conventional energy sources including solar, wind, hydro, biomass, fuel cells and geothermal systems.

Learning Objectives

- To study the solar radiation data, extraterrestrial radiation, radiation on earth's surface.
- To study solar thermal collections.
- To study solar photo voltaic systems.
- To study maximum power point techniques in solar pv and wind.
- To study wind energy conversion systems, Betz coefficient , tip speed ratio.
- To study basic principle and working of hydro, tidal, biomass, fuel cell and geothermal systems.

UNIT–I:

Fundamentals of Energy Systems

Energy conservation principle – Energy scenario (world and India) – Solar radiation: Outside earth's atmosphere – Earth surface – Analysis of solar radiation data – Geometry – Radiation on tilted surfaces – Numerical problems.

UNIT–II:

Solar Thermal Systems

Liquid flat plate collections: Performance analysis – Transmissivity – Absorptivity – Product collector efficiency factor – Collector heat removal factor – Numerical problems – Introduction to solar air heaters – Concentrating collectors and solar pond.

UNIT–III:

Solar Photovoltaic Systems

Balance of systems – IV characteristics – System design: Storage sizing, PV system sizing, Maximum power point techniques: Perturb and observe (P&O) technique – Hill climbing technique.

UNIT–IV:

Wind Energy

Wind patterns – Types of turbines – Kinetic energy of wind – Betz coefficient – Tip–speed ratio – efficiency – Power output of wind turbine – Selection of generator(synchronous, induction) – Maximum power point tracking.

UNIT–V:

Hydro and Tidal power systems

Basic working principle – Classification of hydro systems: large, small, micro – Measurement of head and flow – Energy equation – Types of turbines – Numerical problems.

Tidal power – Basics – Kinetic energy equation – Numerical problems – Wave power – Basics – Kinetic energy equation.

UNIT–VI:

Biomass, fuel cells and geothermal systems

Biomass Energy: Fuel classification – Pyrolysis – Direct combustion of heat – Different digesters and sizing.

Fuel cell: classification – Efficiency – VI characteristics.

Geothermal: classification – Dry rock and acquifer – Energy analysis.

Learning Outcomes:

Student should be able to

- Analyze solar radiation data, extraterrestrial radiation, radiation on earth's surface.
- Design solar thermal collections.
- Design solar photo voltaic systems.
- Develop maximum power point techniques in solar PV and wind.
- Explain wind energy conversion systems, Betz coefficient , tip speed ratio.
- Explain basic principle and working of hydro, tidal, biomass ,fuel cell and geothermal systems.

Text Books:

1. Solar Energy: Principles of Thermal Collection and Storage, S. P. Sukhatme and J. K. Nayak, TMH, New Delhi, 3rd Edition.
2. Renewable Energy Resources, John Twidell and Tony Weir, Taylor and Francis.

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3. Energy Science: Principles, Technologies and Impacts, John Andrews and Nick Jelly, Oxford.

Reference Books:

1. Handbook of renewable technology Ahmed and Zobaa, Ramesh C Bansal,World scientific, Singapore.
2. Renewable Energy Technologies /Ramesh & Kumar /Narosa.
3. Renewable energy technologies – A practical guide for beginners – Chetong Singh Solanki, PHI.

Note : This Elective can be offered to Students of All Branches including EEE.

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OPTIMIZATION TECHNIQUES

(Open Elective)

Preamble:

Optimization techniques have gained importance to solve many engineering design problems by developing linear and nonlinear mathematical models. The aim of this course is to educate the student to develop a mathematical model by defining an objective function and constraints in terms of design variables and then apply a particular mathematical programming technique. This course covers classical optimization techniques, linear programming, nonlinear programming and dynamic programming techniques.

Learning Objectives:

1. To define an objective function and constraint functions in terms of design variables, and then state the optimization problem.
2. To state single variable and multi variable optimization problems, without and with constraints.
3. To explain linear programming technique to an optimization problem, define slack and surplus variables, by using Simplex method.
4. To state transportation and assignment problem as a linear programming problem to determine optimality conditions by using Simplex method.
5. To study and explain nonlinear programming techniques, unconstrained or constrained, and define exterior and interior penalty functions for optimization problems.
6. To explain Dynamic programming technique as a powerful tool for making a sequence of interrelated decisions.

UNIT – I:

Introduction and Classical Optimization Techniques:

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

UNIT – II:

Classical Optimization Techniques

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of

Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT – III:

Linear Programming

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm - Duality in Linear Programming – Dual Simplex method.

UNIT – IV:

Transportation Problem

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems – Special cases in transportation problem.

UNIT – V:

Nonlinear Programming:

Unconstrained cases - One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method - Univariate method, Powell's method and steepest descent method.

Constrained cases - Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

UNIT – VI:

Dynamic Programming:

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

Learning Outcomes:

The student should be able to:

1. State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.

2. Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.
3. Formulate a mathematical model and apply linear programming technique by using Simplex method. Also extend the concept of dual Simplex method for optimal solutions.
4. Solve transportation and assignment problem by using Linear programming Simplex method.
5. Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions.
6. Formulate and apply Dynamic programming technique to inventory control, production planning, engineering design problems etc. to reach a final optimal solution from the current optimal solution.

Text Books:

1. "Engineering optimization: Theory and practice"-by S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. "Introductory Operations Research" by H.S. Kasene & K.D. Kumar, Springer (India), Pvt. LTd.

Reference Books:

1. "Optimization Methods in Operations Research and systems Analysis" – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research – by Dr. S.D.Sharma, Kedarnath, Ramnath & Co
3. "Operations Research: An Introduction" – by H.A.Taha, PHI Pvt. Ltd., 6th edition
4. Linear Programming–by G.Hadley.

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Note : This Elective can be offered to Students of All Branches except EEE.

IV Year – I SEMESTER

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Elective – I

VLSI DESIGN

Preamble:

In the recent times fabrication technology is revolutionized and especially LSI has become so dense that on a single IC tens and thousands of transistors are placed. Thus integrated circuits have become integrated systems and the development of fabrication technology VLSI plays very important role.

Learning Objectives:

- To provide the basic fundamentals of fabrication technology, generations of IC and speed, power consumptions of various fabrication technologies.
- To understand the knowledge of electrical properties of MOS circuits.
- To learn the design concepts of stick diagrams, layouts for various MOS technologies.
- To understand the concepts of design rules, scaling, subsystem design semiconductor IC design.
- To understand the synthesis, simulation design verification tools, CMOS testing.

UNIT –I

Introduction

Introduction to IC technology – The IC era – MOS and related VLSI technology – Basic MOS transistors – Enhancement and depletion modes of transistor action – IC production process – MOS and CMOS fabrication process – BiCMOS technology – Comparison b/w CMOS and bipolar technologies.

UNIT – II

Basic electrical properties of MOS and BiCMOS circuits

I_{ds}–V_{ds} relationships – Aspects of MOS transistor threshold voltage – MOS Trans-conductance and output conductance – MOS Transistor – Figure of merit – The pMOS transistor – The nMOS inverter – Determination of pull–up to pull–down ratio for nMOS inverter driven by another nMOS inverter for an nMOS inverter driven through one or more pass Transistors – Alternative forms of pull up – The CMOS Inverter MOS transistor Circuit model – Bi–CMOS Inverters.

UNIT – III

MOS and BiCOMS circuit design processes

MOS layers – Stick diagrams – Design rules and layout – General observation on the design rules, 2μm double metal, double poly – CMOS/BiCMOS rules, 1.2μm Double metal, Double poly CMOS rules – Layout diagrams of NAND and NOR gates and CMOS inverter – Symbolic Diagrams – Translation to Mask Form.

UNIT – IV

Basic circuit concepts

Sheet resistance – Sheet resistance concept applied to MOS transistor and inverters – Area capacitance of layers – Standard unit of capacitance – Some area capacitance calculations – The delay unit – Inverter delays – Driving large capacitive loads – Propagations Delays – Wiring Capacitance – Fan–in and Fan–out characteristics – Choice of layers – Transistor switches – Realization of gates using nMOS, pMOS and CMOS technologies.

UNIT – V

Scaling of MOS circuit

Scaling models and scaling factors – Scaling factors for device parameters – Limitations of scaling – Limits due to sub threshold currents – Limits on logic level and supply voltage due to noise – Limits due to current density – Some architectural Issues – Introduction to switch logic and gate logic.

UNIT – VI

Digital design using HDL

Digital system design process – VLSI Circuit Design Process – Hardware simulation – Hardware Synthesis – History of VHDL – VHDL requirements – Levels of abstraction – Elements of VHDL – Packages – Libraries and bindings – Objects and classes – Variable assignments – Sequential statements – Usage of subprograms – Comparison of VHDL and verilog HDL.

VHDL MODELLING

Simulation – Logic Synthesis – Inside a logic synthesizer – Constraints – Technology libraries – VHDL and logic synthesis – Functional gate – Level verification – Place and route – Post layout timing simulation – Static timing

– Major net list formats for design representation – VHDL synthesis – Programming approach.

Learning Outcomes

- Ability to demonstrate the fundamentals of IC technology such as various MOS fabrication technologies.
- Ability to calculate electrical properties of MOS circuits such as Ids – Vds relationship, Vt, gm, gds, figure of merit, sheet resistance, area capacitance.
- Ability to demonstrate semi conductor IC design such as PLA's, PAL, FPGA, CPLS's design.
- Ability to demonstrate VHDL synthesis, simulation, design capture tools design verification tools, CMOS testing.

Text Books:

1. Essentials of VLSI Circuits and Systems–Kamran Eshraghian, Douglas and A.Pucknell and Sholeh Eshraghian, Prentice–Hall of India Private Limited, 2005 Edition.
2. VLSI Design–K. Lal Kishor and V.S.V.Prabhakar, I.K. International Publishing House Private Limited, 2009 First Edition.
3. VLSI Design–A.Shanthi and A.Kavitha, New Age International Private Limited, 2006 First Edition.

References Books:

1. VLSI Design By Debaprasad Das, Oxford University Press,2010.
2. VLSI Design By A.Albert Raj & T. Latha, PHI Learning Private Limited, 2010.

ELECTRICAL DISTRIBUTION SYSTEMS
(ELECTIVE–I)

Preamble:

This subject deals with the general concept of distribution system, substations and feeders as well as discusses distribution system analysis, protection and coordination, voltage control and power factor improvement.

Learning Objectives

- To study different factors of Distribution system.
- To study and design the substations and distribution systems.
- To study the determination of voltage drop and power loss.
- To study the distribution system protection and its coordination.
- To study the effect of compensation on p.f improvement.
- To study the effect of voltage control on distribution system.

UNIT – I:

General Concepts

Introduction to distribution systems, Load modeling and characteristics – Coincidence factor – Contribution factor loss factor – Relationship between the load factor and loss factor – Classification of loads (Residential, commercial, Agricultural and Industrial) and their characteristics.

UNIT – II:

Substations

Location of substations: Rating of distribution substation – Service area within primary feeders – Benefits derived through optimal location of substations.

Distribution Feeders

Design Considerations of distribution feeders: Radial and loop types of primary feeders – Voltage levels – Feeder loading – Basic design practice of the secondary distribution system.

UNIT – III:

System Analysis

Voltage drop and power–loss calculations: Derivation for voltage drop and power loss in lines – Manual methods of solution for radial networks – Three phase balanced primary lines.

UNIT – IV:

Protection

Objectives of distribution system protection – Types of common faults and procedure for fault calculations – Protective devices: Principle of operation of fuses – Circuit reclosures – Line sectionalizes and circuit breakers.

Coordination

Coordination of protective devices: General coordination procedure – Residual current circuit breaker RCCB (Wikipedia).

UNIT – V:

Compensation for Power Factor Improvement

Capacitive compensation for power–factor control – Different types of power capacitors – shunt and series capacitors – Effect of shunt capacitors (Fixed and switched) – Power factor correction – Capacitor allocation – Economic justification – Procedure to determine the best capacitor location.

UNIT – VI:

Voltage Control

Voltage Control: Equipment for voltage control – Effect of series capacitors – Effect of AVB/AVR –Line drop compensation.

Learning Outcomes:

- Able to understand the various factors of distribution system.
- Able to design the substation and feeders.
- Able to determine the voltage drop and power loss
- Able to understand the protection and its coordination.
- Able to understand the effect of compensation on p.f improvement.
- Able to understand the effect of voltage, current distribution system performance.

Text Book:

1. "Electric Power Distribution system, Engineering" – by TuranGonen, McGraw–hill Book Company.

Reference Books:

1. Electrical Distribution Systems by Dale R.Patrick and Stephen W.Fardo, CRC press
2. Electric Power Distribution – by A.S. Pabla, Tata McGraw–hill Publishing company, 4th edition, 1997.
3. Electrical Power Distribution Systems by V.Kamaraju, Right Publishers.

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OPTIMIZATION TECHNIQUES
(Elective-I)

Preamble:

Optimization techniques have gained importance to solve many engineering design problems by developing linear and nonlinear mathematical models. The aim of this course is to educate the student to develop a mathematical model by defining an objective function and constraints in terms of design variables and then apply a particular mathematical programming technique. This course covers classical optimization techniques, linear programming, nonlinear programming and dynamic programming techniques.

Learning Objectives:

1. To define an objective function and constraint functions in terms of design variables, and then state the optimization problem.
2. To state single variable and multi variable optimization problems, without and with constraints.
3. To explain linear programming technique to an optimization problem, define slack and surplus variables, by using Simplex method.
4. To state transportation and assignment problem as a linear programming problem to determine optimality conditions by using Simplex method.
5. To study and explain nonlinear programming techniques, unconstrained or constrained, and define exterior and interior penalty functions for optimization problems.
6. To explain Dynamic programming technique as a powerful tool for making a sequence of interrelated decisions.

UNIT – I:

Introduction and Classical Optimization Techniques:

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

UNIT – II:

Classical Optimization Techniques

Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of

Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT – III:

Linear Programming

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm - Duality in Linear Programming – Dual Simplex method.

UNIT – IV:

Transportation Problem

Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems – Special cases in transportation problem.

UNIT – V:

Nonlinear Programming:

Unconstrained cases - One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method - Univariate method, Powell's method and steepest descent method.

Constrained cases - Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

UNIT – VI:

Dynamic Programming:

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

Learning Outcomes:

The student should be able to:

1. State and formulate the optimization problem, without and with constraints, by using design variables from an engineering design problem.

2. Apply classical optimization techniques to minimize or maximize a multi-variable objective function, without or with constraints, and arrive at an optimal solution.
3. Formulate a mathematical model and apply linear programming technique by using Simplex method. Also extend the concept of dual Simplex method for optimal solutions.
4. Solve transportation and assignment problem by using Linear programming Simplex method.
5. Apply gradient and non-gradient methods to nonlinear optimization problems and use interior or exterior penalty functions for the constraints to derive the optimal solutions.
6. Formulate and apply Dynamic programming technique to inventory control, production planning, engineering design problems etc. to reach a final optimal solution from the current optimal solution.

Text Books:

1. "Engineering optimization : Theory and practice"-by S. S.Rao, New Age International (P) Limited, 3rd edition, 1998.
2. "Introductory Operations Research" by H.S. Kasene & K.D. Kumar, Springer (India), Pvt. LTd.

Reference Books:

1. "Optimization Methods in Operations Research and systems Analysis" – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers, 3rd edition, 1996.
2. Operations Research – by Dr. S.D.Sharma, Kedarnath, Ramnath & Co
3. "Operations Research : An Introduction" – by H.A.Taha,PHI pvt. Ltd., 6th edition
4. Linear Programming–by G. Hadley.

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IV Year – I SEMESTER

T	P	C
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MICROPROCESSORS AND MICROCONTROLLERS LAB

Learning Objectives:

- To study programming based on 8086 microprocessor and 8051 microcontroller.
- To study 8056 microprocessor based ALP using arithmetic, logical and shift operations.
- To study modular and Dos/Bios programming using 8086 micro processor.
- To study to interface 8086 with I/O and other devices.
- To study parallel and serial communication using 8051 micro controller.

Any 8 of the following experiments are to be conducted :

I. Microprocessor 8086 :

Introduction to MASM/TASM.

1. Arithmetic operation – Multi byte addition and subtraction, multiplication and division – Signed and unsigned arithmetic operation, ASCII – Arithmetic operation.
2. Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
3. By using string operation and Instruction prefix: Move block, Reverse string Sorting, Inserting, Deleting, Length of the string, String comparison.
4. Modular Program: Procedure, Near and Far implementation, Recursion.
5. Dos/BIOS programming: Reading keyboard (Buffered with and without echo) – Display characters, Strings.
6. Interfacing 8255–PPI
7. Programs using special instructions like swap, bit/byte, set/reset etc.
8. Programs based on short, page, absolute addressing.
9. Interfacing 8259 – Interrupt Controller.

10. Interfacing 8279 – Keyboard Display.
11. Stepper motor control using 8253/8255.

Any 2 of the following experiments are to be conducted:

Microcontroller 8051

12. Reading and Writing on a parallel port.
13. Timer in different modes.
14. Serial communication implementation.
15. Understanding three memory areas of 00 – FF (Programs using above areas).

    Using external interrupts.

Learning Outcomes:

- Will be able to write assembly language program using 8086 micro based on arithmetic, logical, and shift operations.
- Will be able to do modular and Dos/Bios programming using 8086 micro processor.
- Will be able to interface 8086 with I/O and other devices.
- Will be able to do parallel and serial communication using 8051 micro controllers.

IV Year – I SEMESTER

T	P	C
0	3	2

ELECTRICAL SIMULATION LAB

Learning objectives:

- To simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full convertor and PWM inverter.
- To simulate transmission line by incorporating line, load and transformer models.
- To perform transient analysis of RLC circuit and single machine connected to infinite bus (SMIB).
- To find load flow solution for a transmission network with Newton–Rampson method.

Following experiments are to be conducted:

1. Simulation of transient response of RLC circuits
    a. Response to pulse input
    b. Response to step input
    c. Response to sinusoidal input
2. Analysis of three phase circuit representing the generator transmission line and load. Plot three phase currents & neutral current.
3. Simulation of single–phase full converter using RLE loads and single phase AC voltage controller using RL loads.
4. Plotting of Bode plots, root locus and nyquist plots for the transfer functions of systems up to 5th order.
5. Power system load flow using Newton–Raphson technique.
6. Simulation of Boost and Buck converters.
7. Integrator & Differentiator circuits using op–amp.
8. Simulation of D.C separately excited motor using transfer function approach.

Any 2 of the following experiments are to be conducted:

1. Modeling of transformer and simulation of lossy transmission line.
2. Simulation of single phase inverter with PWM control.
3. Simulation of three phase full converter using MOSFET and IGBTs.
4. Transient analysis of single machine connected to infinite bus (SMIB).

Learning outcomes:

- Able to simulate integrator circuit, differentiator circuit, Boost converter, Buck converter, full convertor and PWM inverter.
- Able to simulate transmission line by incorporating line, load and transformer models.
- Able to perform transient analysis of RLC circuit and single machine connected to infinite bus (SMIB).
- Able to find load flow solution for a transmission network with Newton–Rampson method.

Reference Books:

1. "Simulation of Power Electronic Circuit", by M.B. Patil, V.Ramanarayan, V.T. Ranganathan. Narosha, 2009.
2. Pspice for circuits and electronics using PSPICE – by M.H.Rashid, M/s PHI Publications.
3. Pspice A/D user`s manual – Microsim, USA.
4. Pspice reference guide – Microsim, USA.
5. MATLAB user`s manual – Mathworks, USA.
6. MATLAB – control system tool box – Mathworks, USA.
7. SIMULINK user`s manual – Mathworks, USA.
8. EMTP User`s Manual.
9. SEQUEL– A public domain circuit simulator available at www.ee.iitb.ac.in/~sequel.

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IV Year – I SEMESTER

	T	P	C
	0	3	2

POWER SYSTEMS LAB

Learning Objectives:

To impart the practical knowledge of functioning of various power system components and determination of various parameters and simulation of load flows, transient stability, LFC and Economic dispatch.

Any 10 of the Following experiments are to be conducted:

1. Sequence impedances of 3 phase Transformer.
2. Sequence impedances of 3 phase Alternator by Fault Analysis.
3. Sequence impedances of 3 phase Alternator by Direct method.
4. ABCD parameters of Transmission network.
5. Power Angle Characteristics of 3phase Alternator with infinite bus bars.
6. Dielectric strength of Transformer oil.
7. Calibration of Tong Tester.

8&9. Load flow studies any two methods.

10. Transient Stability Analysis
11. Load frequency control without control
12. Load frequency control with control
13. Economic load dispatch without losses
14. Economic load dispatch with losses.

Learning Outcomes:

The student is able to determine the parameters of various power system components which are frequently occur in power system studies and he can execute energy management systems functions at load dispatch centre.

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IV Year – II SEMESTER	T	P	C
	3+1	0	3

DIGITAL CONTROL SYSTEMS

Preamble:

In recent years digital controllers have become popular due to their capability of accurately performing complex computations at high speeds and versatility in leading non linear control systems. In this context, this course focuses on the analysis and design of digital control systems.

Learning objectives:

- To understand the concepts of digital control systems and assemble various components associated with it. Advantages compared to the analog type.
- The theory of z–transformations and application for the mathematical analysis of digital control systems.
- To represent the discrete–time systems in state–space model and evaluation of state transition matrix.
- To examine the stability of the system using different tests.
- To study the conventional method of analyzing digital control systems in the w–plane.
- To study the design of state feedback control by "the pole placement method."

UNIT – I:

Introduction and signal processing

Introduction to analog and digital control systems – Advantages of digital systems – Typical examples – Signals and processing – Sample and hold devices – Sampling theorem and data reconstruction – Frequency domain characteristics of zero order hold.

UNIT–II:

Z–transformations

Z–Transforms – Theorems – Finding inverse z–transforms – Formulation of difference equations and solving – Block diagram representation – Pulse transfer functions and finding open loop and closed loop responses.

UNIT–III:

State space analysis and the concepts of Controllability and observability

State Space Representation of discrete time systems – State transition matrix and methods of evaluation – Discretization of continuous – Time state equations – Concepts of controllability and observability – Tests (without proof).

UNIT – IV:

Stability analysis

Mapping between the S–Plane and the Z–Plane – Primary strips and Complementary Strips – Stability criterion – Modified routh's stability criterion and jury's stability test.

UNIT – V:

Design of discrete–time control systems by conventional methods

Transient and steady state specifications – Design using frequency response in the w–plane for lag and led compensators – Root locus technique in the z–plane.

UNIT – VI:

State feedback controllers:

Design of state feedback controller through pole placement – Necessary and sufficient conditions – Ackerman's formula.

Learning outcomes:

- The students learn the advantages of discrete time control systems and the "know how" of various associated accessories.
- The learner understand z–transformations and their role in the mathematical analysis of different systems(like laplace transforms in analog systems).
- The stability criterion for digital systems and methods adopted for testing the same are explained.
- Finally, the conventional and state–space methods of design are also introduced.

Text Book:

1. Discrete–Time Control systems – K. Ogata, Pearson Education/PHI, 2nd Edition

Reference Books:

1. Digital Control Systems, Kuo, Oxford University Press, 2nd Edition, 2003.
2. Digital Control and State Variable Methods by M.Gopal, TMH

IV Year – II SEMESTER

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ELECTIVE – II

ADVANCED CONTROL SYSTEMS

Preamble:

This subject aims to study state space, describing function, phase plane and stability analysis including controllability and observability. It also deals with modern control and optimal control systems.

Learning Objectives:

- Review of the state space representation of a control system: Formulation of different models from the signal flow graph, diagonalization.
- To introduce the concept of controllability and observability. Design by pole placement technique.
- Analysis of a nonlinear system using Describing function approach and Phase plane analysis.
- The Lypanov's method of stability analysis of a system.
- Formulation of Euler Laugrange equation for the optimization of typical functionals and solutions.
- Formulation of linear quadratic optimal regulator (LQR) problem by parameter adjustment and solving riccatti equation.

UNIT – I:

State space analysis

State Space Representation – Solution of state equation – State transition matrix, –Canonical forms – Controllable canonical form – Observable canonical form, Jordan Canonical Form.

UNIT – II:

Controllability, observability and design of pole placement

Tests for controllability and observability for continuous time systems – Time varying case – Minimum energy control – Time invariant case – Principle of duality – Controllability and observability form Jordan canonical form and other canonical forms – Effect of state feedback on controllability and observability – Design of state feedback control through pole placement.

UNIT – III:

Describing function analysis

Introduction to nonlinear systems, Types of nonlinearities, describing functions, Introduction to phase–plane analysis.

UNIT–IV:

Stability analysis

Stability in the sense of Lyapunov – Lyapunov's stability and Lypanov's instability theorems – Direct method of Lypanov for the linear and nonlinear continuous time autonomous systems.

UNIT–V:

Calculus of variations

Minimization of functional of single function – Constrained minimization – Minimum principle – Control variable inequality constraints – Control and state variable inequality constraints – Euler lagrangine equation.

UNIT –VI:

Optimal control

Linear quadratic optimal regulator (LQR) problem formulation – Optimal regulator design by parameter adjustment (Lyapunov method) – Optimal regulator design by continuous time algebraic riccatti equation (CARE) - Optimal controller design using LQG framework.

Learning Outcomes:

- State space representation of control system and formulation of different state models are reviewed.
- Able to design of control system using the pole placement technique is given after introducing the concept of controllability and observability.
- Able to analyse of nonlinear system using the describing function technique and phase plane analysis.
- Able to analyse the stability analysis using lypnov method.
- Minimization of functionals using calculus of variation studied.
- Able to formulate andsolve the LQR problem and riccatti equation.

Text Books:

- Modern Control Engineering – by K. Ogata, Prentice Hall of India, 3rd edition, 1998
- Automatic Control Systems by B.C. Kuo, Prentice Hall Publication

Reference Books:

1. Modern Control System Theory – by M. Gopal, New Age International Publishers, 2nd edition, 1996
2. Control Systems Engineering by I.J. Nagarath and M.Gopal, New Age International (P) Ltd.
3. Digital Control and State Variable Methods – by M. Gopal, Tata Mc Graw– Hill Companies, 1997.
4. Systems and Control by Stainslaw H. Zak , Oxford Press, 2003.
5. Optimal control theory: an Introduction by Donald E.Kirk by Dover publications.

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HIGH VOLTAGE ENGINEERING
(ELECTIVE – II)

Preamble:

With the growth of power, HV power transmission has become an important subject. The performance of generating equipment requires knowledge of different phenomena occurring at higher voltage. Thus evaluations of various insulating materials are required for protection of HV equipments. Keeping this in view the course is designed to understand various phenomena related to breakdown study and withstand characteristics of insulating materials. The course also describes the generation and measurement of DC, AC and Impulse voltages as well various testing techniques.

Learning Objectives:

- To understand electric field distribution and computation in different configuration of electrode systems.
- To understand HV breakdown phenomena in gases, liquids and solids dielectric materials.
- To acquaint with the generating principle of operation and design of HVDC, AC and Impulse voltages and impulse currents.
- To understand various techniques of AC, DC and Impulse measurement of high voltages and currents.
- To understand the insulating characteristics of dielectric materials.
- To understand the various testing techniques of HV equipments.

UNIT–I:

Introduction to High Voltage Technology

Electric Field Stresses – Uniform and non–uniform field configuration of electrodes – Estimation and control of electric Stress – Numerical methods for electric field computation.

UNIT–II:

Break down phenomenon in gaseous, liquid and solid insulation

Gases as insulating media – Collision process – Ionization process – Townsend's criteria of breakdown in gases – Paschen's law – Liquid as Insulator – Pure and commercial liquids – Breakdown in pure and commercial liquid – Intrinsic breakdown – Electromechanical breakdown – Thermal breakdown –Breakdown of solid dielectrics in practice – Breakdown in composite dielectrics used in practice.

UNIT–III:

Generation of High voltages and High currents

Generation of high DC voltages – Generation of high alternating voltages – Generation of impulse voltages – Generation of impulse currents – Tripping and control of impulse generators.

UNIT–IV:

Measurement of high voltages and High currents

Measurement of high AC, DC and Impulse voltages – Voltages and measurement of high currents – Direct, alternating and Impulse.

UNIT–V:

Non–destructive testing of material and electrical apparatus

Measurement of DC resistivity – Measurement of dielectric constant and loss factor – Partial discharge measurements.

UNIT–VI:

High voltage testing of electrical apparatus

Testing of insulators and bushings – Testing of isolators and circuit breakers – Testing of cables – Testing of transformers – Testing of surge arresters – Radio interference measurements.

Learning Outcomes:

- To be acquainted with the performance of high voltages with regard to different configurations of electrode systems.
- To be able to understand theory of breakdown and withstand phenomena of all types of dielectric materials.
- To acquaint with the techniques of generation of AC,DC and Impulse voltages.
- To be able to apply knowledge for measurement of high voltage and high current AC,DC and Impulse.
- To be in a position to measure dielectric property of material used for HV equipment.
- To know the techniques of testing various equipment's used in HV engineering.

Text Books:

1. High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications, 3rd Edition.

2. High Voltage Engineering : Fundamentals by E.Kuffel, W.S. Zaengl, J. Kuffel by Elsevier, 2nd Edition.
3. High Voltage Engineering and Technology by Ryan, IET Publishers.

Reference Books:

1. High Voltage Engineering by C.L.Wadhwa, New Age Internationals (P) Limited, 1997.
2. High Voltage Insulation Engineering by Ravindra Arora, Wolfgang Mosch, New.

Age International (P) Limited, 1995.

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SPECIAL ELECTRICAL MACHINES

(Elective – II)

Preamble:

This is an advanced course on electrical machines. Students will be exposed to various special machines which are gaining importance in industry. This course covers topics related to principles, performance and applications of these special machines including switched reluctance motors, stepper motors, permanent magnet dc motors, linear motors and electric motors for traction drives.

Learning Objective:

- To explain theory of operation and control of switched reluctance motor.
- To explain the performance and control of stepper motors, and their applications.
- To describe the operation and characteristics of permanent magnet dc motor.
- To distinguish between brush dc motor and brush less dc motor.
- To explain the theory of travelling magnetic field and applications of linear motors.
- To understand the significance of electrical motors for traction drives.

UNIT I:

Switched Reluctance Motor

Principle of operation – Design of stator and rotor pole arc – Power converter for switched reluctance motor – Control of switched reluctance motor.

UNIT II:

Stepper Motors

Construction – Principle of operation – Theory of torque production – Hybrid stepping motor – Variable reluctance stepping motor – Open loop and closed loop control.

UNIT III:

Permanent Magnet DC Motors

Construction – Principle of working – Torque equation and equivalent circuits – Performance characteristics – Moving coil motors.

UNIT IV:

Permanent Magnet Brushless DC Motor

Construction – Principle of operation – Theory of brushless DC motor as variable speed synchronous motor – Sensor less and sensor based control of BLDC motors.

UNIT V:

Linear motors

Linear induction motor: Construction– principle of operation– applications. Linear synchronous motor: Construction – principle of operation– applications.

UNIT VI:

Electric Motors for traction drives

AC motors– DC motors –Single sided linear induction motor for traction drives – Comparison of AC and DC traction.

Learning Outcomes:

The student should be able to

- Explain theory of operation and control of switched reluctance motor.
- Explain the performance and control of stepper motors, and their applications.
- Describe the operation and characteristics of permanent magnet dc motor.
- Distinguish between brush dc motor and brush less dc motor.
- Explain the theory of travelling magnetic field and applications of linear motors.
- Understand the significance of electrical motors for traction drives.

Text Books:

1. Special electrical Machines, K.Venkata Ratnam, University press, 2009, New Delhi.
2. Brushless Permanent magnet and reluctance motor drives, Clarenden press, T.J.E. Miller, 1989, Oxford.
3. Special electrical machines, E.G. Janardhanan, PHI learning private limited, 2014.

IV Year – II SEMESTER

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ELECTIVE – III

ELECTRIC POWER QUALITY

Preamble:

Power quality is a major problem for utilities and customers. Customers using sensitive critical loads need quality power for proper operation of the electrical equipment. It is important for the student to learn the power quality issues and improvement measures provided by the utility companies. This course covers the topics on voltage and current imperfections, harmonics, voltage regulation, power factor improvement, distributed generation, power quality monitoring and measurement equipment.

Learning Objectives:

- To learn different types of power quality phenomena.
- To identify sources for voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
- To describe power quality terms and study power quality standards.
- To learn the principle of voltage regulation and power factor improvement methods.
- To explain the relationship between distributed generation and power quality.
- To understand the power quality monitoring concepts and the usage of measuring instruments.

UNIT–I:

Introduction

Overview of power quality – Concern about the power quality – General classes of power quality and voltage quality problems – Transients – Long–duration voltage variations – Short–duration voltage variations – Voltage unbalance – Waveform distortion – Voltage fluctuation – Power frequency variations.

UNIT–II:

Voltage imperfections in power systems

Power quality terms – Voltage sags – Voltage swells and interruptions –

Sources of voltage sag, swell and interruptions – Nonlinear loads – IEEE and IEC standards. Source of transient over voltages – Principles of over voltage protection – Devices for over voltage protection – Utility capacitor switching transients.

UNIT–III

Voltage Regulation and power factor improvement:

Principles of regulating the voltage – Device for voltage regulation – Utility voltage regulator application – Capacitor for voltage regulation – End–user capacitor application – Regulating utility voltage with distributed resources – Flicker – Power factor penalty – Static VAR compensations for power factor improvement.

UNIT– IV

Harmonic distortion and solutions

Voltage distortion vs. Current distortion – Harmonics vs. Transients – Harmonic indices – Sources of harmonics – Effect of harmonic distortion – Impact of capacitors, transformers, motors and meters – Point of common coupling – Passive and active filtering – Numerical problems.

UNIT–V

Distributed Generation and Power Quality

Resurgence of distributed generation – DG technologies – Interface to the utility system – Power quality issues and operating conflicts – DG on low voltage distribution networks.

UNIT–VI

Monitoring and Instrumentation

Power quality monitoring and considerations – Historical perspective of PQ measuring instruments – PQ measurement equipment – Assessment of PQ measuring data – Application of intelligent systems – PQ monitoring standards.

Learning Outcomes:

At the end of this course the student should be able to

- Differentiate between different types of power quality problems.
- Explain the sources of voltage sag, voltage swell, interruptions, transients, long duration over voltages and harmonics in a power system.
- Analyze power quality terms and power quality standards.

- Explain the principle of voltage regulation and power factor improvement methods.
- Demonstrate the relationship between distributed generation and power quality.
- Explain the power quality monitoring concepts and the usage of measuring instruments.

Textbooks:

1. Electrical Power Systems Quality, Dugan R C, McGranaghan M F, Santoso S, and Beaty H W, Second Edition, McGraw–Hill, 2012, 3rd edition.
2. Electric power quality problems –M.H.J. Bollen IEEE series-Wiley india publications, 2011.
3. Power Quality Primer, Kennedy B W, First Edition, McGraw–Hill, 2000.

Reference Books:

1. Understanding Power Quality Problems: Voltage Sags and Interruptions, Bollen M HJ, First Edition, IEEE Press; 2000.
2. Power System Harmonics, Arrillaga J and Watson N R, Second Edition, John Wiley & Sons, 2003.
3. Electric Power Quality control Techniques, W. E. Kazibwe and M. H. Sendaula, Van Nostrad Reinhold, New York.
4. Power Quality c.shankaran, CRC Press, 2001
5. Harmonics and Power Systems –Franciso C.DE LA Rosa–CRC Press (Taylor & Francis).
6. Power Quality in Power systems and Electrical Machines–EwaldF. fuchs, Mohammad A.S. Masoum–Elsevier.

DIGITAL SIGNAL PROCESSING

(Elective – III)

Preamble:

Signals analysis is very important in daily life. Hence it is required to study the different signals (continuous and discrete) and their properties. The behavior of the signals in time and frequency domain are important in analyzing the response of the network. The tools like FFT, DFT, Z–transforms may be used in the analysis of the signals. Filters must be required to eliminate the unwanted signals. Hence digital filter design also required to be studied. Sampling of signals are required to convert continuous to discrete signals. To have knowledge on the implementation signals, DSP processors must be studied.

Learning Objectives:

- To study different types of signals and properties of systems.
- To study the application of Fourier transform to discrete time systems.
- To study the FFT and inverse FFT and its applications to discrete sequences.
- To study the realization of digital filters and their design.
- To study the multi–rate signal processing.
- To study the architecture of digital signal processors.

UNIT–I:

Introduction

Introduction to Digital Signal Processing: Discrete time signals & sequences – Linear shift invariant systems – Stability and causality – Linear constant coefficient difference equations.

UNIT–II:

Discrete Fourier Series

Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT, Computation of DFT. Relation between Z–transform and DFS.

UNIT–III:

Fast Fourier Transforms

Frequency domain representation of discrete time signals and systems – Fast

Fourier transforms (FFT) – Radix–2 decimation in time and decimation in frequency FFT Algorithms – Inverse FFT – and FFT for composite N.

UNIT–IV:

Realization of Digital Filters

Solution of difference equations of digital filters – Block diagram representation of linear constant – Coefficient difference equations – Basic structures of IIR systems – Transposed forms – Basic structures of FIR systems – System function.

IIR Digital Filters

Analog filter approximations – Butter worth and Chebyshev – Design of IIR Digital filters from analog filters – Design Examples: Analog–Digital transformations.

FIR Digital Filters

Characteristics of FIR Digital Filters – Frequency response – Design of FIR Digital Filters using Window Techniques – Frequency Sampling technique – Comparison of IIR & FIR filters.

UNIT–V:

Multirate Digital Signal Processing:

Decimation – Interpolation – Down sampling – Up sampling rate – Conversion – Implementation of sampling rate conversion.

UNIT–VI:

Introduction to Digital Signal Processors(DSP):

Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC) – Modified bus structures and memory access schemes in DSPs – Multiple access memory – Multiport memory – VLSI architecture – Pipelining – Special addressing modes – On–chip peripherals – Architecture of TMS 320C5X – Introduction – Bus structure – Central arithmetic logic unit – Auxiliary registrar – Index registrar – Auxiliary register compare register – Block move address register – Parallel logic unit – Memory mapped registers – Program controller – Some flags in the status registers – On–chip registers, On–chip peripherals.

Learning outcomes:

- Able to study different types of signals and properties of systems.
- Able to apply of Fourier transform to discrete time systems.
- Able to apply the FFT and inverse FFT to discrete sequences.

- Able to realize and design digital filters.
- Able to understand the multi–rate signal processing.
- Able to understand architecture of digital signal processors.

Text Books:

1. Digital Signal Processing – Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006
2. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007

Reference Books:

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc–Graw Hill, 2007.
3. DSP Primer – C. Britton Rorabaugh, Tata Mc Graw Hill, 2005.
4. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007.
5. Digital Signal Processors – Architecture, Programming and Applications, B.Venkataramani, M.Bhaskar, TATA McGraw Hill, 2002.

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FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS (FACTS)

(Elective – III)

Preamble:

Flexible Alternating Current Transmission System controllers have become a part of modern power system. It is important for the student to understand the principle of operation of series and shunt compensators by using power electronics. As the heart of many power electronic controllers is a voltage source converter (VSC), the student should be acquainted with the operation and control of VSC. Two modern power electronic controllers are also introduced.

Learning Objectives:

- To learn the basics of power flow control in transmission lines by using FACTS controllers
- To explain the operation and control of voltage source converter.
- To discuss compensation methods to improve stability and reduce power oscillations in the transmission lines.
- To learn the method of shunt compensation by using static VAR compensators.
- To learn the methods of compensation by using series compensators
- To explain the operation of two modern power electronic controllers (Unified Power Quality Conditioner and Interline Power Flow Controller).

UNIT–I:

Introduction to FACTS

Power flow in an AC System – Loading capability limits – Dynamic stability considerations – Importance of controllable parameters – Basic types of FACTS controllers – Benefits from FACTS controllers – Requirements and characteristics of high power devices – Voltage and current rating – Losses and speed of switching – Parameter trade–off devices.

UNIT–II:

Voltage source and Current source converters

Concept of voltage source converter(VSC) – Single phase bridge converter – Square–wave voltage harmonics for a single–phase bridge converter – Three–phase full wave bridge converte r– Three–phase current source converter – Comparison of current source converter with voltage source converter.

UNIT–III:

Shunt Compensators–1

Objectives of shunt compensation – Mid–point voltage regulation for line segmentation – End of line voltage support to prevent voltage instability – Improvement of transient stability – Power oscillation damping.

Methods of controllable VAR generation

Variable impedance type static VAR generators – Thyristor Controlled Reactor (TCR) and Thyristor Switched Reactor (TSR).

UNIT–IV:

Shunt Compensators–2

Thyristor Switched Capacitor(TSC)– Thyristor Switched Capacitor – Thyristor Switched Reactor (TSC–TCR). Static VAR compensator(SVC) and Static Compensator(STATCOM): The regulation and slope transfer function and dynamic performance – Transient stability enhancement and power oscillation damping– Operating point control and summary of compensation control.

UNIT V:

Series Compensators

Static series compensators: Concept of series capacitive compensation – Improvement of transient stability – Power oscillation damping – Functional requirements. GTO thyristor controlled Series Capacitor (GSC) – Thyristor Switched Series Capacitor (TSSC) and Thyristor Controlled Series Capacitor (TCSC).

UNIT–VI:

Combined Controllers

Schematic and basic operating principles of unified power flow controller(UPFC) and Interline power flow controller(IPFC) – Application of these controllers on transmission lines.

Learning Outcomes:

The student should be able to

- Determine power flow control in transmission lines by using FACTS controllers.
- Explain operation and control of voltage source converter.

- Discuss compensation methods to improve stability and reduce power oscillations in the transmission lines.
- Explain the method of shunt compensation by using static VAR compensators.
- Appreciate the methods of compensations by using series compensators.
- Explain the operation of modern power electronic controllers (Unified Power Quality Conditioner and Interline Power Flow Controller).

Text Books:

1. "Understanding FACTS" N.G.Hingorani and L.Guygi, IEEE Press.Indian Edition is available:—Standard Publications, 2001.
2. "Flexible ac transmission system (FACTS)" Edited by Yong Hue Song and Allan T Johns, Institution of Electrical Engineers, London.
3. Thyristor-based FACTS Controllers for Electrical Transmission Systems, by R.Mohan Mathur and Rajiv K.Varma, Wiley.

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IV Year – II SEMESTER

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ELECTIVE – IV

OOPS THROUGH JAVA

Preamble:

This course teaches students how to develop Java applications. Topics covered include the Java programming language syntax, OO programming using Java, exception handling, file input/output, threads, collection classes, and networking.

Learning Objectives:

- Focus on object oriented concepts and java program structure and its installation.
- Comprehension of java programming constructs, control structures in Java.
- Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling.
- Understanding of Thread concepts and I/O in Java.
- Being able to build dynamic user interfaces using applets and Event handling in java.
- Understanding of various components of Java AWT and Swing and writing code snippets using them.

UNIT I:

Introduction to OOP

Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program structures, Installation of JDK1.6

UNIT II:

Programming Constructs

Variables, Primitive Datatypes, Identifiers- Naming Coventions, Keywords, Literals, Operators-Binary, Unary and ternary, Expressions, Precedence rules and Associativity, Primitive TypeConversion and Casting, Flow of control-Branching, Conditional, loops.

Classes and Objects- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments.

UNIT III:

Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class.

Interfaces, Packages and Enumeration: Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages, using Packages, Access protection, java. lang package.

Exceptions & Assertions - Introduction, Exception handling techniques-try... catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions.

UNIT IV:

MultiThreading : java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive () and join (), Syncronization, suspending and Resuming threads, Communication between Threads

Input/Output: reading and writing data, java.io package

UNIT V:

Applets- Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint (), update () and repaint ()

Event Handling -Introduction, Event Delegation Model, java.awt.event Description, Sources of Events, Event Listeners, Adapter classes, Inner classes.

UNIT VI:

Abstract Window Toolkit

Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar

Swing:

Introduction, JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box Pluggable Look and Feel.

Learning Outcomes:

- Understand the format and use of objects.
- Understand basic input/output methods and their use.
- Understand object inheritance and its use.
- Understand development of JAVA applets vs. JAVA applications.
- Understand the use of various system libraries.

Text Books:

1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabh choudhary, Oxford.
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
4. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH.
5. Introduction to Java rogramming, 7^{th} ed, Y Daniel Liang, Pearson.

Reference Books:

1. JAVA Programming, K. Rajkumar. Pearson.
2. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech
3. Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
4. Object Oriented Programming through JAVA , P Radha Krishna, University Press.

UNIX AND SHELL PROGRAMMING

(Elective – IV)

Learning Objectives:

- to provide a comprehensive introduction to Shell Programming.
- have the fundamental skills required to write simple and complex Shell scripts to automate jobs and processes in the Unix environment.

UNIT I:

Introduction to Unix:- Architecture of Unix, Features of Unix, Unix Commands – PATH, man, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, od, tar, gzip.

UNIT II :

Unix Utilities:- Introduction to unix file system, vi editor, file handling utilities, security by file permissions, process utilities, disk utilities, networking commands, unlink, du, df, mount, umount, find, unmask, ulimit, ps, w, finger, arp, ftp, telnet, rlogin.Text processing utilities and backup utilities, detailed commands to be covered are tail, head, sort, nl, uniq, grep, egrep, fgrep, cut, paste, join, tee, pg, comm, cmp, diff, tr, awk, cpio.

UNIT III :

File Management : File Structures, System Calls for File Management – create, open, close, read, write, lseek, link, symlink, unlink, stat, fstat, lstat, chmod, chown, Directory API – opendir, readdir, closedir, mkdir, rmdir, umask.

Introduction to Shells : Unix Session, Standard Streams, Redirection, Pipes, Tee Command, Command Execution, Command- Line Editing, Quotes, Command Substitution, Job Control, Aliases, Variables, Predefined Variables, Options, Shell/Environment Customization.

Filters : Filters and Pipes, Concatenating files, Display Beginning and End of files, Cut and Paste, Sorting, Translating Characters, Files with Duplicate Lines, Count characters, Words or Lines, Comparing Files.

UNIT IV :

Grep : Operation, grep Family, Searching for File Content.

Sed : Scripts, Operation, Addresses, commands, Applications, grep and sed.

awk: Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String.

Functions, String Functions, Mathematical Functions, User – Defined Functions, Using System commands, in awk, Applications, awk and grep, sed and awk.

UNIT V :

Interactive Korn Shell : Korn Shell Features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, Options, Startup Scripts, Command History, Command Execution Process.

Korn Shell Programming : Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

UNIT VI :

Interactive C Shell : C shell features, Two Special Files, Variables, Output, Input, Exit Status of a Command, eval Command, Environmental Variables, On-Off Variables, Startup and Shutdown Scripts, Command History, Command Execution Scripts.

C Shell Programming : Basic Script concepts, Expressions, Decisions: Making Selections, Repetition, special Parameters and Variables, changing Positional Parameters, Argument Validation, Debugging Scripts, Script Examples.

Learning Outcomes:

Upon completing this course students will have skills in:

1. Use UNIX shells and commands to create powerful data processing applications.
2. Build UNIX applications using the shell command interpreter and UNIX commands.
3. Use UNIX at the command line to manage data, files, and programs.
4. Use UNIX editors and tools to create and modify data files and documents.

Text Books :

1. Unix and shell Programming Behrouz A. Forouzan, Richard F. Gilberg. Thomson.

2. Your Unix the ultimate guide, Sumitabha Das, TMH. 2nd Edition. 2007-2008 Page 34 of 95.

References Books:

1. Unix for programmers and users, 3rd edition, Graham Glass, King Ables, Pearson Education.
2. Unix programming environment, Kernighan and Pike, PHI. / Pearson Education.
3. The Complete Reference Unix, Rosen, Host, Klee, Farber, Rosinski, Second Edition, TMH.

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AI TECHNIQUES
(Elective IV)

Preamble:

The aim of this course is to study the AI techniques such as neural networks and fuzzy systems. The course focuses on the application of AI techniques to electrical engineering.

Learning Objectives:

- To study various methods of AI
- To study the models and architecture of artificial neural networks.
- To study the ANN paradigms.
- To study the fuzzy sets and operations.
- To study the fuzzy logic systems.
- To study the applications of AI.

UNIT–I:

Introduction to AI techniques

Introduction to artificial intelligence systems– Humans and Computers – Knowledge representation – Learning process – Learning tasks – Methods of AI techniques.

UNIT–II:

Neural Networks

Organization of the Brain – Biological Neuron – Biological and Artificial neuron Models, MC Culloch-pitts neuron model, Activation functions, Learning rules, neural network architectures- Single-layer feed-forward networks: – Perceptron, Learning algorithm for perceptron- limitations of Perceptron model

UNIT–III:

ANN paradigm

Multi-layer feed-forward network (based on Back propagation algorithm)– Radial-basisn function networks- Recurrent networks (Hopfield networks).

UNIT – IV:

Classical and Fuzzy Sets

Introduction to classical sets – properties – Operations and relations – Fuzzy sets – Membership – Uncertainty – Operations – Properties – Fuzzy relations – Cardinalities – Membership functions.

UNIT–V:

Fuzzy Logic System Components

Fuzzification – Membership value assignmen – Development of rule base and decision making system – Defuzzification to crisp sets – Defuzzification methods – Basic hybrid system.

UNIT–VI:

Application of AI techniques

Load forecasting – Load flow studies – Economic load dispatch – Load frequency control – Reactive power control – Speed control of dc and ac motors.

Text Books:

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by S.Rajasekaran and G.A. Vijayalakshmi Pai – PHI Publication.
2. Fuzzy logic with fuzzy applications- by T.J. Ross, TMH.

Reference Books:

1. Introduction to Artificial Neural Systems – Jacek M. Zurada, Jaico Publishing House, 1997.
2. Fundamentals of Neural Networks Architectures, Algorithms and Applications - by laurene Fausett, Pearson.
3. Neural Networks, Algorithms, Applications and programming Techniques by James A. Freeman, David M. Skapura.
4. Introduction to Neural Networks using MATLAB 6.0 by S N Sivanandam, S Sumathi, S N Deepa TMGH

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POWER SYSTEM REFORMS
(Elective IV)

Preamble:

This course introduces the concepts and issues of power system reforms and aims at computation of Available Transfer Capability (ATC), Congestion Management, Electricity Pricing, Ancillary services Management and Power system operation in competitive environment.

Learning Objectives:

- To study fundamentals of power system deregulation and restructuring.
- To study available transfer capability.
- To study congestion management
- To study various electricity pricing.
- To study operation of power system in deregulated environment.
- To study importance of Ancillary services management.

UNIT–I

Over view of key issues in electric utilities

Introduction – Restructuring models – Independent system operator (ISO) – Power Exchange – Market operations – Market Power – Standard cost – Transmission Pricing – Congestion Pricing – Management of Inter zonal/Intra zonal Congestion.

UNIT–II

OASIS: Open Access Same–Time Information System

Structure of OASIS – Processing of Information – Transfer capability on OASIS – Definitions Transfer Capability Issues – ATC – TTC – TRM – CBM calculations – Methodologies to calculate ATC.

UNIT–III

Congestion Management

Introduction to congestion management – Methods to relieve congestion

UNIT–IV

Electricity Pricing:

Introduction – Electricity price volatility electricity price indexes –

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Challenges to electricity pricing – Construction of forward price curves – Short–time price forecasting.

UNIT–V

Power system operation in competitive environment:

Introduction – Operational planning activities of ISO – The ISO in pool markets – The ISO in bilateral markets – Operational planning activities of a Genco.

UNIT–VI

Ancillary Services Management:

Introduction – Reactive power as an ancillary service – A review – Synchronous generators as ancillary service providers.

Learning Outcomes:

- Will understand importance of power system deregulation and restructuring.
- Able to compute ATC.
- Will understand transmission congestion management.
- Able to compute electricity pricing in deregulated environment.
- Will be able to understand power system operation in deregulated environment.
- Will understand importance of ancillary services.

Text Books:

1. Kankar Bhattacharya, Math H.J. Boller, Jaap E.Daalder, 'Operation of Restructured Power System' Klum,er Academic Publisher – 2001
2. Mohammad Shahidehpour, and Muwaffaq alomoush, – "Restructured electrical Power systems" Marcel Dekker, Inc. 2001
3. Loi Lei Lai; "Power system Restructuring and Deregulation", Jhon Wiley & Sons Ltd., England.
4. Electrical Power Distribution Case studies from Distribution reform, upgrades and Management (DRUM) Program, by USAID/India, TMH.

SYSTEMS ENGINEERING

(Elective IV)

Preamble:

This course is intended to introduce the student to the systems engineering process used to create multidisciplinary solutions to complex problems which have multiple, often conflicting objectives. The course will provide an overview of systems engineering in the context of large developmental programs. By focusing on the objectives, principles and practices of systems engineering, the course will enable the student to better understand the functions, capabilities and limitations of systems engineering.

Learning Objectives:

- To understand the foundations of systems Engineering.
- To understand the process of engineering systems systematically
- To understand how to deploy (put to use) the systems engineered.
- To understand the supporting systems during systems life cycle.
- To understand the application of systems engineering in product and service space.
- To understand systems engineering in perspective of related disciplines project management and software engineering.

UNIT–I:

Introduction to Systems: Systems Fundamentals – Systems Science – Systems Thinking – Modeling Systems.

UNIT –II:

Systems Engineering and Management: System life cycle models – System vision and mission – Stakeholder needs and requirements – System requirements – Logical architecture design – Physical architecture design – System analysis – System realization – System implementation – System integration – System verification – System validation.

UNIT – III:

System deployment and use – System deployment – Operation of the system – System maintenance – Logistics.

UNIT – IV:

Systems engineering management – Planning – Assessment and Control

Risk Management – Measurement – Decision Management – Configuration Management – Information Management – Quality Management.

UNIT – V:
Applications of systems engineering – Product systems engineering – Services Systems engineering – Enterprise systems engineering

UNIT – VI:
Enabling systems engineering – People: Enabling teams and individuals – Software engineering, Project management – Case studies.

Learning Outcomes:

- To be able to appreciate and evaluate systems in general and apply to specific systems.
- Should engineer successful systems fit for intended purpose. Right from concept to development.
- Should be able to successfully deploy the new systems developed.
- Should be able to leverage the support systems for success of systems from womb to tomb.
- Should be able to apply systems engineering in engineering product and services.
- Should be able to relate systems engineering with project management and software engineering.

Text books:

1. SEBOK Guide to the Systems Engineering Body of Knowledge (SEBoK), version 1.2 – INCOSEwww.sebowiki.org/wiki/incose systems engineering Hand Book.

Reference Books:

1. Systems engineering principles and practice second edition John wiley Alexander Kossiakoff etal.
2. Systems engineering with Economics, Probability and Statistics Khisty C.Jotin. 2nd edition, 2nd edition J Ross publications.

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IV Year – II SEMESTER

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Project

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I B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	3

PROGRMMING WITH C

(COMMON TO ECE, EEE, CIVIL AND MECHANICAL)

COURSE OBJECTIVE:

- To gain experience about structured programming
- To help students to understand the implementation of C language
- To understand various features in C

COURSE OUTCOME:

CO1: Study and Understand basics of computer Hardware and Software.
CO2: Study, Analyze and Understand logical structure of computer programming and different constructs to develop programs in C language.
CO3: Understand and Analyze simple data structures and use of pointers and dynamic memory allocation technique.
CO4: Create files and apply file I/O operations.

UNIT - I:
INTRODUCTION: Computer systems, Hardware and Software Concepts,
PROBLEM SOLVING: Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and high-level languages, Creating and Running Programs: Writing, Editing(vi/emacs editor), Compiling(gcc), Linking and Executing in under Linux.
BASICS OF C: Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arthmetic , relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

UNIT - II:
SELECTION – MAKING DECISION: TWO WAY SELECTION: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples.
ITERATIVE: loops- while, do-while and for statements, break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.
ARRAYS: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix.
STRINGS: concepts, c strings.

UNIT - III:
FUNCTIONS MODULAR PROGRAMMING: Functions, basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

UNIT - IV:
POINTERS: pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and

functions, pointers to pointers, pointers and multi-dimensional arrays, dynamic memory management functions, command line arguments

UNIT - V:

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types -structures-declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields, program applications.

UNIT - VI:

FILE HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs.

TEXT BOOKS:

1. Programming in C, Reema Thareja, OXFORD.
2. The C programming Language by Dennis Richie and Brian Kernighan 2^{nd} ed..

REFERENCE BOOKS:

1. Programming in ANSI C, Dr.E.Balaguruswamy, Tata McGraw-Hill Education.
2. Problem Solving and Program Design in C, Hanly, Koffman, 7^{th} ed, PEARSON.
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
4. Programming in C, Second Edition by Ashok N.Kamthane, Pearson.

I B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	3

ENGINEERING MECHANICS

(COMMON TO ME, CE BRANCHES)

COURSE OBJECTIVES:

The course is mainly intended

- To impart the basic concepts and fundamentals of Engineering Mechanics and the principles of various force systems under static and dynamic conditions
- To develop the problem solving skills of engineering mechanics essential for mechanical engineering

COURSE OUTCOMES:

At the end of this course student will acquire ability to

- Determine the resultant of the given force systems.
- Construct free body diagrams and develop equilibrium equations.
- Understand the concepts of friction and to apply in real life problems.
- Determine the centroid, center of gravity and Moment of Inertia of areas, bodies and composite sections.
- Understand the dynamic analysis of rigid body motion and analyze the dynamic equilibrium of moving bodies
- Apply the work-energy principle to particles and connected systems

UNIT – I:
Introduction to Engineering Mechanics-Basic concepts
RESULTANT OF COPLANAR CONCURRENT FORCE SYSTEM: Parallelogram law, Graphical method, Method of resolution.
EQUILIBRIUM OF FORCE SYSTEMS: Free body diagrams, Equations of Equilibrium for coplanar concurrent force system, Lami's theorem.
MOMENTS: Moment of Force and its Applications, Principle of moments – Couples and Resultant of Force Systems.

UNIT - II:
FRICTION: Introduction, Classification of friction, Laws of Friction, Coefficent of Friction, Angle of Friction, Angle of Repose, Frictional Forces on moving bodies, Wedge friction, Ladder friction.

UNIT - III:
CENTROID: Centroids of simple figures (from basic principles)-Centroids of composite figures, Centre of Gravity: Centre of Gravity of simple body (from basic principles), Centre of gravity of composite bodies, pappus theorem.

UNIT - IV:
AREA MOMENTS OF INERTIA: Definition, Radius of gyration, Parallel axis theorem, perpendicular axis theorem, Moments of Inertia of composite figures, polar moment of Inertia.

UNIT – V:
MASS MOMENT OF INERTIA: Moment of Inertia of Rigid body-Moment of Inertia from basic principles-Slender bar, Rectangular Plate, Circular Plate, Moment of Inertia of 3D Bodies Cone, Solid Cylinder, Solid Sphere.

UNIT - VI:

KINETICS: Analysis as a particle, Newton's laws of motion, D'Alembert's principle –simple applications- analysis as a rigid body in translation-fixed axis rotation-Simple applications.

WORK-ENERGY METHOD: Equations for Translation, work-Energy applications to particle motion, connected system-Impulse momentum method-simple applications.

TEXT BOOKS:

1. Engg. Mechanics by S.Timoshenko & D.H.Young., 4th Edn - ,Mc Graw Hill publications.
2. Engg. Mechanics by S.S. Bhavikatti-New age publications

REFERENCES:

1. Engineering Mechanics by Fedinand . L. Singer , Harper – Collins.
2. Engineering Mechanics by A.K.Tayal-Umesh Publications.

I B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	2	-	4	40	60	100	3

ENGINEERING DRAWING

(COMMON TO ME, CE, BRANCHES)

(NOTE: USE I ANGLE PROJECTIONS ONLY)

COURSE OBJECTIVES:

The course is mainly intended to

- Impart basic knowledge and skills required to prepare engineering drawing which is an universal language of engineers for communication, designing and production
- Get enhanced imagination capacity, visualize and communicate geometrical elements
- Understand the fundamentals of geometry like engineering curves, planes, solids, sections, developments & isometric views and its applications in design and manufacturing of various engineering components

COURSE OUTCOMES:

At the end of this course student will acquire ability to

- Apply principles of drawing to represent dimensions of an object and use the different types of scales for drawing of various sizes of engineering curves
- Draw various polygons and conic sections of Ellipse, Parabola and Hyperbola
- Draw different orientations of points, lines, planes and solids with reference to principal planes.
- Understand Development of surfaces and their representation
- Draw orthographic views (2D) from the given isometric view (3D) and vice versa

UNIT - I:

INTRODUCTION TO ENGINEERING DRAWING: Importance, construction of regular polygons. Conic sections: Construction of Ellipse, parabola & Hyperbola by general Method, ellipse by others methods- Arcs of circles Method, Concentric Circles Method and Oblong Method. Scales: Representation fraction-Construction of plain, diagonal and vernier scale.

UNIT - II:

ORTHOGRAPHIC PROJECTIONS: Principle of orthographic projections, projections, of points. Projection of Straight lines: parallel to both the planes, parallel to one plane and inclined to the other plane.

UNIT - III:

Projection of Straight lines inclined to both the planes, determination of true length, angles of inclination and Traces.

UNIT – IV:

PROJECTIONS OF PLANES: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT - V:

PROJECTIONS OF SOLIDS: prisms, pyramids, cones and cylinders with the axis inclined to one of the planes

DEVELOPMENT OF SURFACES of right regular solids- Prisms, Cylinder, Pyramids, Cone.

UNIT - VI:
Conversion of isometric views to orthographic views; Conversion orthographic views to isometric views

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers.
3. Engineering Graphics by PI Varghese, McGrawHill Publishers

REFERENCE BOOKS:

1. Engineering Graphics for Degree by K.C. John, PHI Publishers
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

I B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2

ENGINEERING WORKSHOP

(COMMON TO ME, CE BRANCHES)

COURSE OBJECTIVES:

- To impart knowledge to students to develop their technical skill sets for creating entities from raw material.
- To give hands on training and practice to students for use of various tools, devices, machines.
- To develop ability of students to understand, plan and implement various processes and operations to be performed on the raw material to create object of desired shape and size.

COURSE OUTCOMES:

- Thorough knowledge of various tools, machines, devices used in engineering practice for creating objects from material.
- Thorough knowledge of carrying out various operations in basic engineering shops.
- Ability of interpretation of job drawing, application of processes and operations to produce basic components from raw material.

LIST OF EXPERIMENTS:

TRADES FOR EXERCISE:

ϖ **CARPENTRY**

1. Cross-Lap joint
2. Dove tail joint
3. Mortise & Tenon joint

ϖ **FITTING**

1. V-fit
2. Square fit
3. Dovetail fit

ϖ **TINSMITHY**

1. Funnel
2. Square box without lid
3. Tapper tray

ϖ **HOUSE WIRING**

1. Two lamps series connection & parallel connection
2. Fluorescent Tube Wiring & Stair Case Wiring

TRADES FOR DEMONSTRATION

ϖ **BLACK SMITHY**

1. S-Hook
2. Round rod to square rod

WELDING

1. Lap Joint
2. Butt Joint

I B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2

COMPUTER PROGRAMMING LAB

(COMMON TO ECE, EEE, CIVIL AND MECHANICAL)

COURSE OBJECTIVE:

The purpose of this course is to introduce to students to the field of language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

COURSE OUTCOMES:

After completion of this C Programming Lab, students should be able to:
CO1: Study, analyse and understand logical structure of computer programming and different constructs to develop programs in C Language.
CO2: Know how to write, compile and debug programs in C Language.
CO3: Understand and analyse data types, typecasting and operator precedence.
CO4: Analyse the use of conditional and looping statements to solve problems associated with conditions and repetitions.
CO5: Explain and analyse simple data structures, use of pointers and dynamic memory allocation techniques.
CO6: Summarize the role of functions involving the idea of modularity, know how to create files and apply file I/O operations.

SYLLABUS:

EXERCISE 1:

a) Write an Algorithm, Flowchart and Program to calculate the area of triangle using the formula Area = (s (s-a) (s-b) (s-c)) 1/2 where s= (a+b+c)/2.
b) Write an Algorithm, Flowchart and Program to find the largest of three numbers using ternary operator.
c) Write an Algorithm, Flowchart and Program to swap two numbers without using a temporary variable.

EXERCISE 2:

a) Write a C program to find the roots of a quadratic equation.
b) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement).

EXERCISE 3:

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.
b) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

EXERCISE 4:

a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.

b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.
c) Write a C Program to check whether the given number is Armstrong number or not.

EXERCISE 5:

a) Write a C program to interchange the largest and smallest numbers in the array.
b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them.

EXERCISE 6:

a) Write a C Program to find both the largest and smallest number of an array of integers
b) Write a C Program to find transpose of a matrix.

EXERCISE 7:

Write C programs that use both recursive and non-recursive functions for the following

a) To find the factorial of a given integer.
b) To find the GCD (greatest common divisor) of two given integers.

EXERCISE 8:

Write a C Program for the following.

a) To find Fibonacci sequence
b) Write C programs illustrating call by value and call by reference concepts.

EXERCISE 9:

Write C Programs for the following string operations without using the built in functions - to concatenate two strings

a) To append a string to another string
b) To compare two strings

EXERCISE 10:

Write C Programs for the following string operations without using the built in functions

a) To find the length of a string
b) To find whether a given string is palindrome or not

EXERCISE 11:

Write a C program that uses functions to perform the following operations:

a) To insert a sub-string in to given main string from a given position.
b) To delete n Characters from a given position in a given string.
c) To replace a character of string either from beginning or ending or at a specified location.

EXERCISE 12:

a) Write a C program to implement a linear search.
b) Write a C program to implement binary search
c) Write a C program to implement sorting of an array of elements.

EXERCISE 13:

a) Write C Program to reverse a string using pointers
b) Write a C Program to compare two arrays using pointers
c) Write a C program to swap two numbers using pointers

EXERCISE 14:

Examples which explores the use of structures, union and other user defined variables

EXERCISE 15:

a) Write a C program which copies one file to another.
b) Write a C program to count the number of characters and number of lines in a file.
c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

TEXT BOOKS:

1. Programming in C, Reema Thareja, OXFORD .
2. The C programming Language by Dennis Richie and Brian Kernighan 2nd ed..

REFERENCE BOOKS:

1. Programming in ANSI C, Dr.E.Balaguruswamy, Tata McGraw-Hill Education.
2. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PEARSON.
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.
4. Programming in C, Second Edition by Ashok N.Kamthane, Pearson.

COMPUTATIONAL FLUID DYNAMICS
(DEPARTMENTAL ELECTIVE – I)

Course Objectives:

The course aims at providing required numerical and software techniques for solving various engineering problems involving fluid flow.

UNIT-I

ELEMENTARY DETAILS IN NUMERICAL TECHNIQUES: Number system and errors, representation of integers, fractions, floating point arithmetic, loss of significance and error propagation, condition and instability, computational methods for error estimation, convergence of sequences.

UNIT – II

APPLIED NUMERICAL METHODS: Solution of a system of simultaneous linear algebraic equations, iterative schemes of matrix inversion, direct methods for matrix inversion, direct methods for banded matrices.

REVIEW OF EQUATIONS GOVERNING FLUID FLOW AND HEAT TRANSFER: Introduction, conservation of mass, Newton's second law of motion, expanded forms of navier-stokes equations, conservation of energy principle, special forms of the navier-stokes equations.

UNIT - III

Steady flow, dimensionless form of momentum and energy equations, stokes equation, conservative body force fields, stream function - vorticity formulation.

Finite difference applications in heat conduction and convention – heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.

UNIT - IV

Finite differences, discretization, consistency, stability, and fundamentals of fluid flow modeling: introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT - V

Introduction to first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling, conservative property, the upwind scheme.

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UNIT -VI

FINITE VOLUME METHOD: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, upwind interpolation, linear interpolation and quadratic interpolation.

TEXT BOOKS:

1. Numerical heat transfer and fluid flow / Suhas V. Patankar- Butter-worth Publishers.
2. Computational fluid dynamics - Basics with applications - John. D. Anderson / Mc Graw Hill.

REFERENCES:

1. Computational Fluid Flow and Heat Transfer/ Niyogi, Pearson Publications.
2. Fundamentals of Computational Fluid Dynamics – Tapan K. Sengupta / Universities Press.
3. Computational fluid dynamics, 3rd edition/Wendt/Springer publishers

Course Outcomes:

After undergoing the course the student shall be able to apply various numerical tools like finite volume, finite difference etc for solving the different fluid flow problems.

CONDITION MONITORING
(DEPARTMENTAL ELECTIVE – I)

Course Objectives:

- This course is designed to introduce the benefits and opportunities of health Monitoring and covers a range of techniques.
- The students will be exposed to a range of techniques from Vibration based methods, Thermography, Oil conditions, Debris and ultrasonic monitoring.
- Using overall vibration, vibration limit zones, broadband vibration bandwidth, alert levels, typical severity guidelines, recording overall vibration, using overall vibration for fault finding, trending overall vibration.

Identifying Resonance, Hammer Test, Self Excitation, Exciter Testing. Reducing Resonance - Effects of Frequency, Stiffness, Mass, Damping, Isolation.

UNIT-I

BASICS OF VIBRATION: Basic motion: amplitudes, period, frequency, basic parameters: displacement, velocity, acceleration, units (including dB scales) and conversions, Mass, spring and damper concept, Introduction to SDOF and MDOF systems, Natural frequencies and resonance, Forced response.

UNIT-II

VIBRATION MEASUREMENTS AND ANALYSIS: Transducers and mounting methods, data acquisition using instrumentation recorders/data loggers, time domain signal analysis, orbit analysis, Filters, Frequency domain analysis (Narrow band FFT analysis), Nyquist criteria, Sampling, aliasing, windowing and averaging.

VIBRATION MEASUREMENT AND ANALYSIS: Use of phase; bode, polar and water fall plots, constant percentage band width analysis (1/3 and 1/1 Octave analysis), envelope detection /spike energy analysis, cepstral analysis, advances in analysis (PC based and portable instruments for vibration analysis).

UNIT-III

Fault Diagnosis, Interpreting vibration measurements for common machine faults, imbalance, misalignment, mechanical looseness, bearing and gearing faults, faults in induction motors, resonances, some case studies, static and dynamic balancing, international standards for vibration condition monitoring.

UNIT-IV

THERMOGRAPHY: The basics of infrared thermography, differences in equipment and specific wave length limitations, application of ir to: electrical inspection, mechanical inspection, energy conservation, how to take good thermal images, hands-on demonstrations focusing on proper camera settings and image interpretation, analysis of thermal images and report generation, study of thermo graphy applications

UNIT-V

OIL AND WEAR DEBRIS ANALYSIS: Basics of oil analysis, monitoring condition of oil, lubricant analysis, physio – chemical properties, moisture, tan tbn, wear debris analysis, particle counting, spectroscopy, uses & limitations, ferrography wear particle analysis, concept of ferrography, principle particle classification, size, shape, composition, concentration, analysis procedure, sampling & analytical ferrography equipments, severity rating.

UNIT-VI

ULTRASONIC MONITORING AND ANALYSIS: Ultrasonic monitoring (leak, crack and thickness) basics of ultrasonic monitoring , ultrasonic theory, test taking philosophy, ultrasonic theory, mathematics of ultrasound, equipment and transducers, inspection parameters and calibration, immersion theory, equipment quality control, flaw origins and inspection methods, UT Procedure familiarization, and study recommendations, application of ultrasound to: air leaks, steam trap testing, bearing lubrication, electrical inspection, case studies.

TEXT BOOKS:

1. The Vibration Analysis Handbook, J I Taylor (1994)
2. Machinery Vibration Condition Monitoring, Lynn, Butterworth(1989)

REFERENCE BOOKS:

1. Machinery Vibration: Measurement and Analysis. Victor Wowk (1991).
2. Mechanical fault diagnosis and condition monitoring, RA Collacott (1977).
3. The Vibration Monitoring Handbook (Coxmoor's Machine & Systems Condition Monitoring) (1998).

Course outcomes:

- Gaining invaluable insights into the benefits of Condition Monitoring.
- Understanding the reasons for selecting particular maintenance strategies.
- Understanding effective methodologies for implementing Condition Monitoring Techniques.
- Identifying the optimum maintenance strategy for different types of equipment.
- Gaining practical approaches to minimise the risk of plant and machinery breakdowns.
- Awareness of International Standards covering asset manageme.

RAPID PROTOTYPING
(DEPARTMENTAL ELECTIVE – I)

Course Objectives:

The course aims at the importance of Rapid Prototyping, classifications, models, specifications of various Rapid Prototype Techniques. To learn the different tools, soft-wares required and the applications of Rapid Prototyping.

UNIT – I

INTRODUCTION: Prototyping fundamentals, historical development, fundamentals of rapid prototyping, advantages and limitations of rapid prototyping, commonly used terms, classification of RP process.

LIQUID-BASED RAPID PROTOTYPING SYSTEMS: Stereo lithography Apparatus (SLA): models and specifications, process, working principle, photopolymers, photo polymerization, layering technology, laser and laser scanning, applications, advantages and disadvantages, case studies. Solid Ground Curing (SGC): models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

UNIT-II

SOLID-BASED RAPID PROTOTYPING SYSTEMS: Laminated object manufacturing (LOM) - models and specifications, process, working principle, applications, advantages and disadvantages, case studies. Fused deposition modeling (FDM) - models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

UNIT – III

POWDER BASED RAPID PROTOTYPING SYSTEMS: Selective laser sintering (SLS): models and specifications, process, working principle, applications, advantages and disadvantages, case studies. three dimensional printing (3DP): models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

UNIT-IV

RAPID TOOLING: Introduction to rapid tooling (RT), conventional tooling Vs RT, Need for RT. rapid tooling classification: indirect rapid tooling methods: spray metal deposition, RTV epoxy tools, Ceramic tools, investment casting, spin casting, die casting, sand casting, 3D Keltool process. Direct rapid tooling: direct AIM, LOM Tools, DTM Rapid Tool Process, EOS Direct Tool Process and Direct Metal Tooling using 3DP.

UNIT – V

RAPID PROTOTYPING DATA FORMATS: STL Format, STL File Problems, consequence of building valid and invalid tessellated models, STL file Repairs: Generic Solution, other Translators, Newly Proposed Formats.

RAPID PROTOTYPING SOFTWARE'S: Features of various RP software's like Magics, Mimics, Solid View, View Expert, 3 D View, Velocity 2, Rhino, STL View 3 Data Expert and 3 D doctor.

UNIT –VI

RP APPLICATIONS: Application in engineering, analysis and planning, aerospace industry, automotive industry, jewelry industry, coin industry, GIS application, arts and architecture. RP medical and bioengineering applications: planning and simulation of complex surgery, customized implants & prosthesis, design and production of medical devices, forensic science and anthropology, visualization of bimolecular.

TEXT BOOK:

1. Rapid prototyping: Principles and Applications - Chua C.K., Leong K.F. and LIM C.S, World Scientific publications.

REFERENCE BOOKS:

1. Rapid Manufacturing – D.T. Pham and S.S. Dimov, Springer.
2. Wholers Report 2000 – Terry Wohlers, Wohlers Associates.
3. Rapid Prototyping & Manufacturing – Paul F.Jacobs, ASME Press.

Course Outcomes:

The student shall be able to identify the use of Rapid Prototyping Techniques in the manufacturing of complex components that are otherwise very difficult to manufacture.

III Year – I SEMESTER

	T	P	C
	3+1*	0	3

DYNAMICS OF MACHINERY

Course Objectives:

1. To equip the student with fundamental knowledge of dynamics of machines so that student can appreciate problems of dynamic force balance, transmissibility of forces, isolation of systems, vibrations.
2. Develop knowledge of analytical and graphical methods for calculating balancing of rotary and reciprocating masses.
3. Develop understanding of vibrations and its significance on engineering design.
4. Develop understanding of dynamic balancing, flywheel analysis, gyroscopic forces and moments.

UNIT – I

PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships, static and dynamic force analysis of planar mechanisms, (Demonstration of models in video show).

UNIT – II

FRICTION: Inclined plane, friction of screw and nuts, pivot and collar, uniform pressure, uniform wear, friction circle and friction axis: lubricated surfaces, boundary friction, film lubrication.

CLUTCHES: Friction clutches- single disc or plate clutch, multiple disc clutch, cone clutch, centrifugal clutch.

BRAKES AND DYNAMOMETERS: Simple block brakes, internal expanding brake, band brake of vehicle. General description and operation of dynamometers: Prony, Rope brake, Epicyclic, Bevis Gibson and belt transmission,

UNIT – III

TURNING MOMENT DIAGRAMS: Dynamic force analysis of slider crank mechanism, inertia torque, angular velocity and acceleration of connecting rod, crank effort and turning moment diagrams – fluctuation of energy – fly wheels and their design.

UNIT-IV

GOVERNERS: Watt, porter and proell governors, spring loaded governors

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– Hartnell and Hartung with auxiliary springs. sensitiveness, isochronism and hunting.

UNIT – V

BALANCING: Balancing of rotating masses single and multiple – single and different planes, use analytical and graphical methods. Primary, secondary, and higher balancing of reciprocating masses. analytical and graphical methods, unbalanced forces and couples – examination of "V" multi cylinder in line and radial engines for primary and secondary balancing, locomotive balancing, hammer blow, swaying couple, variation of tractive effort.

UNIT – VI

VIBRATIONS: Free Vibration of spring mass system – oscillation of pendulums, centers of oscillation and suspension. transverse loads, vibrations of beams with concentrated and distributed loads. Dunkerly's methods, Raleigh's method, whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems, Simple problems on forced damped vibration, vibration isolation and transmissibility.

TEXT BOOKS :

1. Theory of Machines / S.S Ratan/ Mc. Graw Hill Publ.
2. Mechanism and machine theory by Ashok G. Ambedkar, PHI Publications.

REFERENCES :

1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age.
2. Theory of Machines / Shiegly / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers
4. Theory of machines / Khurmi / S.Chand.

Course outcomes:

Upon successful completion of this course the student should be able to:

1. Analyze stabilization of sea vehicles, aircrafts and automobile vehicles.
2. Compute frictional losses, torque transmission of mechanical systsms.
3. Analyze dynamic force analysis of slider crank mechanism and design of flywheel.
4. Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement.
5. Understand balancing of reciprocating and rotary masses.

COMPUTATIONAL FLUID DYNAMICS
(DEPARTMENTAL ELECTIVE – I)

Course Objectives:

The course aims at providing required numerical and software techniques for solving various engineering problems involving fluid flow.

UNIT-I

ELEMENTARY DETAILS IN NUMERICAL TECHNIQUES: Number system and errors, representation of integers, fractions, floating point arithmetic, loss of significance and error propagation, condition and instability, computational methods for error estimation, convergence of sequences.

UNIT – II

APPLIED NUMERICAL METHODS: Solution of a system of simultaneous linear algebraic equations, iterative schemes of matrix inversion, direct methods for matrix inversion, direct methods for banded matrices.

REVIEW OF EQUATIONS GOVERNING FLUID FLOW AND HEAT TRANSFER: Introduction, conservation of mass, Newton's second law of motion, expanded forms of navier-stokes equations, conservation of energy principle, special forms of the navier-stokes equations.

UNIT - III

Steady flow, dimensionless form of momentum and energy equations, stokes equation, conservative body force fields, stream function - vorticity formulation.

Finite difference applications in heat conduction and convention – heat conduction, steady heat conduction in a rectangular geometry, transient heat conduction, finite difference application in convective heat transfer, closure.

UNIT - IV

Finite differences, discretization, consistency, stability, and fundamentals of fluid flow modeling: introduction, elementary finite difference quotients, implementation aspects of finite-difference equations, consistency, explicit and implicit methods.

UNIT - V

Introduction to first order wave equation, stability of hyperbolic and elliptic equations, fundamentals of fluid flow modeling, conservative property, the upwind scheme.

UNIT -VI

FINITE VOLUME METHOD: Approximation of surface integrals, volume integrals, interpolation and differentiation practices, upwind interpolation, linear interpolation and quadratic interpolation.

TEXT BOOKS:

1. Numerical heat transfer and fluid flow / Suhas V. Patankar- Butter-worth Publishers.
2. Computational fluid dynamics - Basics with applications - John. D. Anderson / Mc Graw Hill.

REFERENCES:

1. Computational Fluid Flow and Heat Transfer/ Niyogi, Pearson Publications.
2. Fundamentals of Computational Fluid Dynamics – Tapan K. Sengupta / Universities Press.
3. Computational fluid dynamics, 3rd edition/Wendt/Springer publishers

Course Outcomes:

After undergoing the course the student shall be able to apply various numerical tools like finite volume, finite difference etc for solving the different fluid flow problems.

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CONDITION MONITORING
(DEPARTMENTAL ELECTIVE – I)

Course Objectives:

- This course is designed to introduce the benefits and opportunities of health Monitoring and covers a range of techniques.
- The students will be exposed to a range of techniques from Vibration based methods, Thermography, Oil conditions, Debris and ultrasonic monitoring.
- Using overall vibration, vibration limit zones, broadband vibration bandwidth, alert levels, typical severity guidelines, recording overall vibration, using overall vibration for fault finding, trending overall vibration.

Identifying Resonance, Hammer Test, Self Excitation, Exciter Testing. Reducing Resonance - Effects of Frequency, Stiffness, Mass, Damping, Isolation.

UNIT-I

BASICS OF VIBRATION: Basic motion: amplitudes, period, frequency, basic parameters: displacement, velocity, acceleration, units (including dB scales) and conversions, Mass, spring and damper concept, Introduction to SDOF and MDOF systems, Natural frequencies and resonance, Forced response.

UNIT-II

VIBRATION MEASUREMENTS AND ANALYSIS: Transducers and mounting methods, data acquisition using instrumentation recorders/data loggers, time domain signal analysis, orbit analysis, Filters, Frequency domain analysis (Narrow band FFT analysis), Nyquist criteria, Sampling, aliasing, windowing and averaging.

VIBRATION MEASUREMENT AND ANALYSIS: Use of phase; bode, polar and water fall plots, constant percentage band width analysis (1/3 and 1/1 Octave analysis), envelope detection /spike energy analysis, cepstral analysis, advances in analysis (PC based and portable instruments for vibration analysis).

UNIT-III

Fault Diagnosis, Interpreting vibration measurements for common machine faults, imbalance, misalignment, mechanical looseness, bearing and gearing faults, faults in induction motors, resonances, some case studies, static and dynamic balancing, international standards for vibration condition monitoring.

UNIT-IV

THERMOGRAPHY: The basics of infrared thermography, differences in equipment and specific wave length limitations, application of ir to: electrical inspection, mechanical inspection, energy conservation, how to take good thermal images, hands-on demonstrations focusing on proper camera settings and image interpretation, analysis of thermal images and report generation, study of thermo graphy applications

UNIT-V

OIL AND WEAR DEBRIS ANALYSIS: Basics of oil analysis, monitoring condition of oil, lubricant analysis, physio – chemical properties, moisture, tan tbn, wear debris analysis, particle counting, spectroscopy, uses & limitations, ferrography wear particle analysis, concept of ferrography, principle particle classification, size, shape, composition, concentration, analysis procedure, sampling & analytical ferrography equipments, severity rating.

UNIT-VI

ULTRASONIC MONITORING AND ANALYSIS: Ultrasonic monitoring (leak, crack and thickness) basics of ultrasonic monitoring , ultrasonic theory, test taking philosophy, ultrasonic theory, mathematics of ultrasound, equipment and transducers, inspection parameters and calibration, immersion theory, equipment quality control, flaw origins and inspection methods, UT Procedure familiarization, and study recommendations, application of ultrasound to: air leaks, steam trap testing, bearing lubrication, electrical inspection, case studies.

TEXT BOOKS:

1. The Vibration Analysis Handbook, J I Taylor (1994)
2. Machinery Vibration Condition Monitoring, Lynn, Butterworth(1989)

REFERENCE BOOKS:

1. Machinery Vibration: Measurement and Analysis. Victor Wowk (1991).
2. Mechanical fault diagnosis and condition monitoring, RA Collacott (1977).
3. The Vibration Monitoring Handbook (Coxmoor's Machine & Systems Condition Monitoring) (1998).

Course outcomes:

- Gaining invaluable insights into the benefits of Condition Monitoring.
- Understanding the reasons for selecting particular maintenance strategies.
- Understanding effective methodologies for implementing Condition Monitoring Techniques.
- Identifying the optimum maintenance strategy for different types of equipment.
- Gaining practical approaches to minimise the risk of plant and machinery breakdowns.
- Awareness of International Standards covering asset manageme.

– Hartnell and Hartung with auxiliary springs. sensitiveness, isochronism and hunting.

UNIT – V

BALANCING: Balancing of rotating masses single and multiple – single and different planes, use analytical and graphical methods. Primary, secondary, and higher balancing of reciprocating masses. analytical and graphical methods, unbalanced forces and couples – examination of "V" multi cylinder in line and radial engines for primary and secondary balancing, locomotive balancing, hammer blow, swaying couple, variation of tractive effort.

UNIT – VI

VIBRATIONS: Free Vibration of spring mass system – oscillation of pendulums, centers of oscillation and suspension. transverse loads, vibrations of beams with concentrated and distributed loads. Dunkerly's methods, Raleigh's method, whirling of shafts, critical speeds, torsional vibrations, two and three rotor systems, Simple problems on forced damped vibration, vibration isolation and transmissibility.

TEXT BOOKS :

1. Theory of Machines / S.S Ratan/ Mc. Graw Hill Publ.
2. Mechanism and machine theory by Ashok G. Ambedkar, PHI Publications.

REFERENCES :

1. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age.
2. Theory of Machines / Shiegly / MGH
3. Theory of Machines / Thomas Bevan / CBS Publishers
4. Theory of machines / Khurmi / S.Chand.

Course outcomes:

Upon successful completion of this course the student should be able to:

1. Analyze stabilization of sea vehicles, aircrafts and automobile vehicles.
2. Compute frictional losses, torque transmission of mechanical systsms.
3. Analyze dynamic force analysis of slider crank mechanism and design of flywheel.
4. Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement.
5. Understand balancing of reciprocating and rotary masses.

IV Year – I SEMESTER

	T	P	C
	3+1*	0	3

OPEN ELECTIVE

MICRO ELECTRO MECHANICAL SYSTEMS (MEMS)

Course Objectives:

1. To learn basics of Micro Electro Mechanical Systems (MEMS).
2. To learn about various sensors and actuators used in MEMS.
3. To learn the principle and various devices of MOEMS, Fluidic, bio and chemical systems.

Unit – I

INTRODUCTION: Definition of MEMS, MEMS history and development, micro machining, lithography principles & methods, structural and sacrificial materials, thin film deposition, impurity doping, etching, surface micro machining, wafer bonding, LIGA.

MECHANICAL SENSORS AND ACTUATORS: Principles of sensing and actuation: beam and cantilever, capacitive, piezo electric, strain, pressure, flow, pressure measurement by micro phone, MEMS gyroscopes, shear mode piezo actuator, gripping piezo actuator, Inchworm technology.

Unit – II

THERMAL SENSORS AND ACTUATORS: Thermal energy basics and heat transfer processes, thermisters, thermo devices, thermo couple, micro machined thermo couple probe, peltier effect heat pumps, thermal flow sensors, micro hot plate gas sensors, MEMS thermo vessels, pyro electricity, shape memory alloys (SMA), U-shaped horizontal and vertical electro thermal actuator, thermally activated MEMS relay, micro spring thermal actuator, data storage cantilever.

Unit – III

MICRO-OPTO-ELECTRO MECHANICAL SYSTEMS: Principle of MOEMS technology, properties of light, light modulators, beam splitter, micro lens, micro mirrors, digital micro mirror device (DMD), light detectors, grating light valve (GLV), optical switch, wave guide and tuning, shear stress measurement.

Unit – IV

MAGNETIC SENSORS AND ACTUATORS: Magnetic materials for MEMS and properties, magnetic sensing and detection, magneto resistive sensor, more on hall effect, magneto diodes, magneto transistor, MEMS magnetic sensor, pressure sensor utilizing MOKE, mag MEMS actuators, by directional micro actuator, feedback circuit integrated magnetic actuator, large force reluctance actuator, magnetic probe based storage device.

Unit – V

MICRO FLUIDIC SYSTEMS: Applications, considerations on micro scale fluid, fluid actuation methods, dielectro phoresis (DEP), electro wetting, electro thermal flow, thermo capillary effect, electro osmosis flow, opto electro wetting (OEW), tuning using micro fluidics, typical micro fluidic channel, microfluid dispenser, micro needle, molecular gate, micro pumps.

RADIO FREQUENCY (RF) MEMS: RF – based communication systems, RF MEMS, MEMS inductors, varactors, tuner/filter, resonator, clarification of tuner, filter, resonator, MEMS switches, phase shifter.

Unit - VI

CHEMICAL AND BIO MEDICAL MICRO SYSTEMS: Sensing mechanism & principle, membrane-transducer materials, chem.-lab-on-a-chip (CLOC) chemoresistors, chemocapacitors, chemotransistors, electronic nose (E-nose), mass sensitive chemosensors, fluroscence detection, calorimetric spectroscopy.

TEXT BOOK:

MEMS, Nitaigour Premchand Mahalik, TMH Publishing co.

REFERENCE BOOKS:

1. Foundation of MEMS, Chang Liu, Prentice Hall Ltd.
2. MEMS and NEMS, Sergey Edwrd Lyshevski, CRC Press, Indian Edition.
3. MEMS and Micro Systems: Design and Manufacture, Tai-Ran Hsu, TMH Publishers.
4. Introductory MEMS, Thomas M Adams, Richard A Layton, Springer International Publishers.

Course outcomes:

Upon successful completion of this course the student shall be able to know the importance and various devices of MEMS and their applications.

IV Year – I SEMESTER

	T	P	C
	3+1*	0	3

DEPARTMENTAL ELECTIVE – II

MATERIAL CHARACTERIZATION TECHNIQUES

Course objective: The course presents the principles and methods of characterizing the structure and other aspects of materials. Various advanced characterizing techniques and their application will be studied.

UNIT -I

Introduction: Scope of subject, classification of techniques for characterization, macro and micro - characterization structure of solids.

UNIT -II

Bulk averaging techniques: Thermal analysis, DTA, DSC, TGA, dilatometry, resistivity/conductivity.

UNIT -III

Optical & X-ray spectroscopy: Atomic absorption spectroscopy, X-ray spectrometry, infrared spectroscopy and Raman spectroscopy.

UNIT -IV

Metallographic techniques: Optical metallography, image analysis, quantitative phase estimation.

UNIT -V

Diffraction methods: X-ray diffraction (crystal systems and space groups, Bravais lattices, direct and reciprocal lattice, Bragg law, powder diffraction and phase identification, single crystal diffraction, structure factor, X-ray crystal structure determination).

UNIT -VI

Electron optical methods: Scanning electron microscopy and image formation in the SEM.

Course outcomes: At the end of the semester, the student should able to

1. Analyze the microstructure of materials.
2. Apply various characterization techniques like XRD, SEM TEM.
3. Identify the phases existing in the material.
4. Analyze the image.

TEXT BOOKS

1. The Principles of metallogrphy laboratory practices –George L.Khel-Eurasia publishing house (Pvt. Ltd).
2. Transmission electron Microscopy of metals – Garet Thomas.-John wiley and sons.

REFERENCES:

1. Modern Metallographic Techniques & their application – victor phillips.
2. Physical Metallurgy, Part – I – RW Chao and P. Haasan.
3. Experimental Techniques in Physical Metallurgy – VT Cherepin and AK Mallik.
4. Electron Microscopy in the study of materials –P.J. Grundy.

AUTOMATION IN MANUFACTURING
(DEPARTMENTAL ELECTIVE – II)

Course objective:

1. To study the types and strategies and various components in Automated Systems.
2. To understand the automated flow lines, line balancing, material storage and retrieval and inspection.

UNIT-I

INTRODUCTION: Types and strategies of automation, pneumatic and hydraulic components, circuits, automation in machine tools, mechanical feeding and tool changing and machine tool control.

UNIT – II

AUTOMATED FLOW LINES: Methods of part transport, transfer mechanism, buffer storage, control function, design and fabrication considerations.

Analysis of automated flow lines - General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.

UNIT – III

ASSEMBLY SYSTEM AND LINE BALANCING: Assembly process and systems, assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – IV

AUTOMATED MATERIAL HANDLING and STORAGE SYSTEMS: Types of equipment, functions, analysis and design of material handling systems, conveyor systems, automated guided vehicle systems. Automated storage and retrieval systems; work in process storage, interfacing handling and storage with manufacturing.

UNIT – V

ADAPTIVE CONTROL SYSTEMS: Introduction, adaptive control with optimization, adaptive control with constraints, application of adaptive control in machining operations. Consideration of various parameters such as cutting force, temperatures, vibration and acoustic emission in the adaptive controls systems.

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UNIT – VI

AUTOMATED INSPECTION: Fundamentals, types of inspection methods and equipment, Coordinate Measuring Machines, Machine Vision.

TEXT BOOK:

1. Automation, Production Systems and Computer Integrated Manufacturing : M.P. Groover./ PE/PHI.

REFERENCES:

1. Computer Control of Manufacturing Systems by Yoram Coren.
2. CAD / CAM/ CIM by Radhakrishnan.
3. Automation by W. Buekinsham.

Course outcomes:

Upon successful completion of this course student should be able to :

Solve the line balancing problems in the various flow line systems with and without use buffer storage.

Understand the different automated material handling, storage and retrieval systems and automated inspection systems.

Use of Adaptive Control principles and implement the same online inspection and control.

INDUSTRIAL HYDRAULICS & PNEUMATICS
(DEPARTMENTAL ELECTIVE – II)

Course objective

1. Understand the underlying principles of Industrial Hydraulics & Pneumatic System.
2. Analyze circuits and Enumerate the functions & characteristics of circuit elements.
3. Attend to troubleshooting in fluid power systems.
4. identify and describe the basic operation of Hydraulic / Pneumatic systems, the various equipment used in their operation.

UNIT – I

Fundamentals of Fluid Power Systems-Introduction-types advantages, disadvantages & applications-fluid characteristics-terminologies used in fluid power-hydraulic symbols-hydraulic systems and components-sources-pumping theory-gear, vane & piston pumps.

UNIT-II

Fluid Power Actuators: Introduction-hydraulic actuators-hydraulic cylinders-types, construction, specifications and special types. hydraulic motors-working principle-selection criteria for various types-hydraulic motors in circuits- formulae-numerical problems.

UNIT-III

Hydraulic elements in the design of circuits- Introduction-control elements-direction control valve-check valve-pressure control valve-relief valve-throttle valve-temperature & pressure compensation-locations of flow control valve.

UNIT-IV

Accumulators & intensifiers-types, size &function of accumulators-application & circuits of accumulators- intensifiers-circuit & applications.

Design & drawing of hydraulic circuits-Introduction-case study & specifications-method of drawing a hydraulic circuit-hydraulic cylinder-quick return of a hydraulic cylinder.

UNIT-V

Pneumatic systems-Introduction-symbols used-concepts & components-comparision-types & specifications of compressors-arrangement of a complete pneumatic system-compressed air behaviour- understanding pneumatic circuits-direction control valves.

Electro pneumatics- Introduction-Pilot operated solenoid valve-electrical connections to solenoids-electro pneumatic circuit switches-relays-solenoids-P.E converter-concept of latching.

UNIT-VI

Applications-servo systems-introduction-closed loop, hydro-mechanical and electro hydraulic – conventional and proportional valves-characteristics of proportional and servo valves- PLC applications in fluid power – selected pneumatic / electro pneumatic circuit problems – failure and trouble shooting in fluid power systems.

TEXT BOOKS:

1. Introduction to Hydraulics and Pneumatics by S. Ilango and V. Soundararajan, PHI , New Delhi.
2. Applied hydraulics and pneumatics-T. Sunder Selwyn & R. Jayendiran, Anuradha Publications.

REFERENCE BOOKS:

1. Oil Hydraulic Systems, S.R .Majumdar, McGrawHill Companies.
2. Pneumatic Systems : Principles and Maintenance, Majumdar, Mc Graw Hill.

Course outcome:

Upon successful completion of this course student should be able to:

1. understand the general concepts associated with Hydraulic and Pneumatic equipment as found in industry today.
2. The course describes the various types of Hydraulic / Pneumatic equipment as well as the different types of Seals used in such equipment.
3. Understand advantage of fluid power, it provides examples of applications.
4. Understand the operation of hydraulics & pnuematics circuits and components typically used in industry.

	T	P	C
IV Year – II SEMESTER	3+1*	0	3

DEPARTMENTAL ELECTIVE – III

EXPERIMENTAL STRESS ANALYSIS

Course objectives:

Objective of the course is to measure strain through various experimental methods like strain gauges, photo elasticity techniques, brittle coatings, moiré methods and birefrigerent coatings to understand the relation between the mechanics theory and experimental stress analysis to learn usage of the experimental techniques on the practical problems

UNIT – I

Introduction: Stress, strain, Plane stress and plane strain conditions, Compatibility conditions. Problems using plane stress and plane strain conditions, stress functions, mohrs circle for stress strain, Three-dimensional stress strain relations.

UNIT – II

Strain Measurement and Recordings: Various types of strain gauges, Electrical Resistance strain gauges, semiconductor strain gauges, strain gauge circuits. Introduction, static recording and data logging, dynamic recording at very low frequencies, dynamic recording at intermediate frequencies, dynamic recording at high frequencies, dynamic recording at very high frequencies, telemetry systems.

UNIT – III

Photo elasticity: Photo elasticity – Polariscope – Plane and circularly polarized light, Bright and dark field setups, Photo elastic materials – Isochromatic fringes – Isoclinics

Three dimensional Photo elasticity : Introduction, locking in model deformation, materials for three-dimensional photo elasticity, machining cementing and slicing three-dimensional models, slicing the model and interpretation of the resulting fringe patterns, effective stresses, the shear-difference method in three dimensions, applications of the Frozen-stress method, the scattered-light method.

UNIT – IV

Brittle coatings: Introduction, coating stresses, failure theories, brittle coating crack patterns, crack detection, ceramic based brittle coatings, resin based brittle coatings, test procedures for brittle coatings analysis, calibration procedures, analysis of brittle coating data.

UNIT – V

Moire Methods: Introduction, mechanism of formation of Moire fringes, the geometrical approach to Moire-Fringe analysis, the displacement field approach to Moire-Fringe analysis, out of plane displacement measurements, out of plane slope measurements, sharpening and multiplication of Moire-Fringes, experimental procedure and techniques.

UNIT – VI

Birefringent Coatings

Introduction, Coating stresses and strains, coating sensitivity, coating materials, application of coatings, effects of coating thickness, Fringe-order determinations in coatings, stress separation methods.

TEXT BOOKS :

1. Theory of Elasticity by Timoshenke and Goodier Jr.
2. Experimental stress analysis by Dally and Riley, Mc Graw-Hill.

REFERENCES:

1. A treatise on Mathematical theory of Elasticity by LOVE .A.H.
2. Photo Elasticity by Frocht.
3. Experimental stress analysis, Video course by K.Ramesh / NPTEL.

Course Outcomes:

The intended learning outcomes are that on completion of this course the student should be able to:

1. Student should be able to chose the appropriate method for measuring strain.
2. Students should be able to apply optical techniques for measurement of strain & stress.
3. Analyze the results obtained from coating techniques and corroborated with theoretical results.
4. Correlate experimental and analytically derived results.

MECHATRONICS
(DEPARTMENTAL ELECTIVE – III)

Course Objective

The main objective of this course is to introduce the integrative nature of Mechatronics. To describe the different components and devices of mechatronics systems.

UNIT-I

Mechatronics systems – elements & levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.

UNIT-II

Solid state electronic devices - PN junction diode, BJT, FET, DIAC, TRIAC and LEDs. Analog signal conditioning, operational amplifiers, noise reduction, filtering.

UNIT-III

Hydraulic and pneumatic actuating systems - Fluid systems, Hydraulic systems, and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems. Mechanical actuating systems and electrical actuating systems – basic principles and elements.

UNIT-IV

Digital electronics and systems, digital logic control, micro processors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.

UNIT-V

System and interfacing and data acquisition – Data Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital Signal Processing – data flow in DSPs, block diagrams, typical layouts, Interfacing motor drives.

UNIT -VI

Dynamic models and analogies, System response. Process Controllers – Digital Controllers, Programmable Logic Controllers, Design of mechatronics systems & future trends.

TEXT BOOK:

MECHATRONICS Integrated Mechanical Electronics Systems/KP Ramachandran, GK Vijaya Raghavan & MS Balasundaram/WILEY India Edition.

REFERENCES:

1 Mechatronics – Smaili A, Mrad F, Oxford Higher Education, Oxford University Press.
2 Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.
3 Mechatronics – N. Shanmugam / Anuradha Agencies Publishers.
4 Mechatronics System Design / Devdas shetty/Richard/Thomson.
5 Mechatronics/M.D.Singh/J.G.Joshi/PHI.
6 Mechatronics – Electronic Control Systems in Mechanical and Electrical Engg. 4th Edition, Pearson, 2012 W. Bolton.
7 Mechatronics – Principles and Application Godfrey C. Onwubolu, Wlsevier, Indian print.

Course outcomes:

After completion of this course, the student shall be able to use the various mechatronics systems devices and components in the design of electro mechanical systems.

ADVANCED MATERIALS
(DEPARTMENTAL ELECTIVE – III)

Course Objectives

The objective for this course is to understand the mechanics of different materials. This understanding will include concepts such as anisotropic material behavior, constituent properties and manufacturing processes of different composites. Suitability of smart and nano materials for engineering applications.

UNIT-I

INTRODUCTION TO COMPOSITE MATERIALS: Introduction, classification: Polymer matrix composites, metal matrix composites, ceramic matrix composites, carbon–carbon composites, fiber- reinforced composites and nature-made composites, and applications.

REINFORCEMENTS: Fibres- glass, silica, kevlar, carbon, boron, silicon carbide, and born carbide fibres.

UNIT-II

polymer composites, thermoplastics, thermosetting plastics, manufacturing of PMC, MMC & CCC and their applications.

UNIT-III

MANUFACTURING METHODS: Autoclave, tape production, moulding methods, filament winding, man layup, pultrusion, RTM.

UNIT-IV

MACROMECHANICAL ANALYSIS OF A LAMINA: Introduction, generalized hooke's law, reduction of hooke's law in three dimensions to two dimensions, relationship of compliance and stiffness matrix to engineering elastic constants of an orthotropic lamina, laminate-laminate code.

UNIT-V

FUNCTIONALLY GRADED MATERIALS: Types of functionally graded materials-classification-different systems-preparation-properties and applications of functionally graded materials.

SHAPE MEMORY ALLOYS: Introduction-shape memory effect-classification of shape memory alloys-composition-properties and applications of shape memory alloys.

UNIT-VI

NANO MATERIALS: Introduction-properties at nano scales-advantages & disadvantages-applications in comparison with bulk materials (nano – structure, wires, tubes, composites). state of art nano advanced- topic delivered by student.

TEXT BOOKS:

1. Nano material by A.K. Bandyopadyay, New age Publishers.
2. Material science and Technology- Cahan.
3. Engineering Mechanics of Composite Materials by Isaac and M Daniel, Oxford University Press.

REFERENCES:

1. R. M. Jones, Mechanics of Composite Materials, Mc Graw Hill Company, New York, 1975.
2. L. R. Calcote, Analysis of Laminated Composite Structures, Van Nostrand Rainfold.
3. B. D. Agarwal and L. J. Broutman, Analysis and performance of fibre Composites, Wiley-Interscience, New York, 1980.
4. Mechanics of Composite Materials, Second Edition (Mechanical Engineering), Autar K.Kaw, Publisher: CRC.

Course outcomes

Students who successfully complete this course will demonstrate the following :

- Properties of constituents, classification of composites and their suitability for the structural applications.
- Manufacturing processes.
- Smart materials and their applications.
- Nano materials in comparison with bulk materials.

IV Year – II SEMESTER	T	P	C
	3+1*	0	3

DEPARTMENTAL ELECTIVE – IV

NON - DESTRUCTIVE EVALUATION

Course Objectives

- The students are to be exposed to the concepts of various NDE techniques using radiography, ultrasonics, liquid penetrates, magnetic patches and Eddy currents.
- They will learn basic principles of these methods and will be able to select a testing process.
- They will understand the advantages and disadvantages of these techniques.

UNIT – I

Introduction to non-destructive testing: Radiographic test, Sources of X and Gamma Rays and their interaction with Matter, Radiographic equipment, Radiographic Techniques, Safety Aspects of Industrial Radiography

UNIT – II

Ultrasonics test: Principle of Wave Propagation, Reflection, Refraction, Diffraction, Mode Conversion and Attenuation, Sound Field, Piezo-electric Effect, Ultrasonic Transducers and their Characteristics, Ultrasonic Equipment and Variables Affecting Ultrasonic Test, Ultrasonic Testing, Interpretations and Guidelines for Acceptance, Rejection - Effectiveness and Limitations of Ultrasonic Testing.

UNIT – III

Liquid Penetrant Test: Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System, Test Procedure, Effectiveness and Limitations of Liquid Penetrant Testing

UNIT – IV

Magnetic Particle Test: Magnetic Materials, Magnetization of Materials , Demagnetization of Materials,Principle of Magnetic Particle Test, Magnetic Particle Test Equipment, Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation and Evaluation, Effective Applications and Limitations of the Magnetic Particle Test.

UNIT – V

Eddy Current Test: Principle of Eddy Current, Eddy Current Test System, Applications of Eddy Current Testing Effectiveness of Eddy Current Testing

UNIT – VI

Industrial Applications of NDE: Span of NDE Activities Railways, Nuclear, Non-nuclear and Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, Offshore Gas and Petroleum Projects, Coal Mining Industry, NDE of pressure vessels, castings, welded constructions.

TEXT BOOKS:

1. Non-destructive test and evaluation of Materials, J Prasad, GCK Nair, TMH Publishers.
2. Ultrasonic testing by Krautkramer and Krautkramer.
3. Non-destructive testing, Warress, JMc Gonmade.

REFERENCES:

1. Ultrasonic inspection training for NDT: E. A. Gingel, Prometheus Press.
2. ASTM Standards, Vol 3.01, Metals and alloys.
3. Non-destructive, Hand Book – R. Hamchand .

Course Outcomes

1. Comprehensive, theory based understanding of the techniques and methods of non destructive testing.
2. Apply methods knowledge of non destructive testing to evaluate products of railways, automobiles, aircrafts, chemical industries etc.

ADVANCED OPTIMIZATION TECHNIQUES
(DEPARTMENTAL ELECTIVE – IV)

Course objectives:

To enable the students learn the latest non-linear optimization techniques such as classical optimization methods, dynamic programming, integer programming etc. Provide basic knowledge and enough competence to formulate the optimization problems.

UNIT I

INTRODUCTION TO OPTIMIZATION: Engineering applications of optimization- statement of an optimization problem- classification of optimization problem- optimization techniques.

CLASSICAL OPTIMIZATION TECHNIQUES: Single variable optimization- multivariable optimization with equality constraints- multivariable optimization with inequality constraints.

UNIT-II

UNCONSTRAINED OPTIMIZATION TECHNIQUES: pattern search method- rosenbrock's method of rotating coordinates- the simplex method- descent methods- gradient of function- steepest descent method.

UNIT-III

CONSTRAINED OPTIMIZATION TECHNIQUES: characteristics of a constrained problem- methods of feasible directions - basic approach in the penalty function method- interior penalty function method- convex programming problem- exterior penalty function method.

UNIT-IV

GEOMETRIC PROGRAMMING (G.P): Solution of an unconstrained geometric programming, differential calculus method and arithmetic method. primal dual relationship and sufficiency conditions. Solution of a constrained geometric programming problem (G.P.P). Complimentary geometric programming (C.G.P).

UNIT-V

DYNAMIC PROGRAMMING (D.P): Multistage decision processes. concepts of sub optimization, computational procedure in dynamic programming calculus method and tabular methods. Linear programming as a case of D.P., Continuous D.P.

UNIT-VI

INTEGER PROGRAMMING (I.P): Graphical representation. Gomory's cutting plane method. Bala's algorithm for zero-one programming problem. Integer non linear programming.

TEXT BOOK:

1. Optimization Theory and Applications, by S.S.Rao, Wiley Eastern Limited, New Delhi.

REFERENCES:

1. Engineering Optimization By Kalyanmanai Deb, Prentice Hall of India, New Delhi.
2. Optimization Techniques, C.Mohan, Kusum Deep.
3. Operations Research by S.D.Sharma.

Course Out comes:

1. Students at the end of the course learn advanced optimization techniques to show real-life problems.
2. Students can able to formulate and solve various practical optimization problems in manufacturing and service organizations.

QUALITY AND RELIABILITY ENGINEERING (DEPARTMENTAL ELECTIVE – IV)

Course objectives:

1. The aim of this course is to provide students with a basic understanding of the approaches and techniques to assess and improve process and/or product quality and reliability.
2. The objectives are to introduce the principles and techniques of Statistical Quality Control and their practical uses in product and/or process design and monitoring.
3. To understand techniques of modern reliability engineering tools.

UNIT-I

Quality value and engineering – quality systems – quality engineering in product design and production process – system design – parameter design – tolerance design, quality costs – quality improvement.

UNIT-II

Statistical process control $\overline{X}$, R, p, c charts, other types of control charts, process capability, process capability analysis, process capability index. (SQC tables can be used in the examination).

UNIT-III

Acceptance sampling by variables and attributes, design of sampling plans, single, double, sequential and continuous sampling plans, design of various sampling plans.

UNIT-IV

Loss function, tolerance design – N type, L type, S type; determination of tolerance for these types. online quality control – variable characteristics, attribute characteristics, parameter design.

Quality function deployment – house of quality, QFD matrix, total quality management concepts. quality information systems, quality circles, introduction to ISO 9000 standards.

UNIT-V

Reliability – Evaluation of design by tests - Hazard Models, Linear, Releigh, Weibull. Failure Data Analysis, reliability prediction based on weibull distribution, Reliability improvement.

UNIT-VI

Complex system, reliability, reliability of series, parallel & standby systems & complex systems & reliability prediction and system effectiveness. Maintainability, availability, economics of reliability engineering, replacement of items, maintenance costing and budgeting, reliability testing.

TEXT BOOKS:

1. G Taguchi, 'Quality Engineering in Production Systems - Mc Graw Hill.
2. E. Bala Guruswamy, 'Reliability Engineering', Tata McGraw Hill.
3. Montgomery "Statistical Quality Control : A Modern Introduction" Wiley.

REFERENCE BOOKS:

1. Frank.M.Gryna Jr. "Jurans Quality planning & Analysis", McGraw Hill.
2. Philipposs, 'Taguchi Techniques for Quality Engineering', Mc Graw Hill.
3. LS Srinath, 'Reliability Engineering', Affiliated East West Pvt. Ltd..
4. Eugene Grant, Richard Leavenworth "Statistical Process Control", McGraw Hill.
5. W.A. Taylor, 'Optimization & Variation Reduction in Quality', Tata Mc Graw Hill.
6. Quality and Performance Excellence: James R Evans, Cengage learning.

Course outcome:

Upon successful completion of this course, students should be able to:

1. Understand quality and reliability concept, beware of some basic techniques for quality improvement, and acquire fundamental knowledge of statistics and probability.
2. Apply control charts to analyze and improve the process quality.
3. Design a simple sampling plan, construct its OC curve and evaluate its effectiveness on a given sampling process.
4. Acquire the concepts of the reliability, *and* calculate the system reliability based on the given component connection; *calculate* the reliability based on the given failure model.

IV Year – II SEMESTER

T	P	C
0	0	9

PROJECT WORK

Objectives:

The aim of the course is to make the student perform a comprehensive project work that involves either or all of the following: optimum design of a mechanical component or an assembly, thermal analysis, computer aided design & analysis, cost effective manufacturing process, material selection, testing procedures or fabrication of components and prepare a detailed technical thesis report. The completed task should also take into account the significance of real time applications, energy management and the environmental affects.

Outcomes:

After completing the project work the student should learn the technical procedure of planning, scheduling and realizing an engineering product and further acquire the skills of technical report writing and data collection.

Course content:

The student should work in groups to achieve the aforementioned objectives and the outcomes.

IV Year – I SEMESTER

	T	P	C
	3+1*	0	3

OPEN ELECTIVE

MICRO ELECTRO MECHANICAL SYSTEMS (MEMS)

Course Objectives:

1. To learn basics of Micro Electro Mechanical Systems (MEMS).
2. To learn about various sensors and actuators used in MEMS.
3. To learn the principle and various devices of MOEMS, Fluidic, bio and chemical systems.

Unit – I

INTRODUCTION: Definition of MEMS, MEMS history and development, micro machining, lithography principles & methods, structural and sacrificial materials, thin film deposition, impurity doping, etching, surface micro machining, wafer bonding, LIGA.

MECHANICAL SENSORS AND ACTUATORS: Principles of sensing and actuation: beam and cantilever, capacitive, piezo electric, strain, pressure, flow, pressure measurement by micro phone, MEMS gyroscopes, shear mode piezo actuator, gripping piezo actuator, Inchworm technology.

Unit – II

THERMAL SENSORS AND ACTUATORS: Thermal energy basics and heat transfer processes, thermisters, thermo devices, thermo couple, micro machined thermo couple probe, peltier effect heat pumps, thermal flow sensors, micro hot plate gas sensors, MEMS thermo vessels, pyro electricity, shape memory alloys (SMA), U-shaped horizontal and vertical electro thermal actuator, thermally activated MEMS relay, micro spring thermal actuator, data storage cantilever.

Unit – III

MICRO-OPTO-ELECTRO MECHANICAL SYSTEMS: Principle of MOEMS technology, properties of light, light modulators, beam splitter, micro lens, micro mirrors, digital micro mirror device (DMD), light detectors, grating light valve (GLV), optical switch, wave guide and tuning, shear stress measurement.

Unit – IV

MAGNETIC SENSORS AND ACTUATORS: Magnetic materials for MEMS and properties, magnetic sensing and detection, magneto resistive sensor, more on hall effect, magneto diodes, magneto transistor, MEMS magnetic sensor, pressure sensor utilizing MOKE, mag MEMS actuators, by directional micro actuator, feedback circuit integrated magnetic actuator, large force reluctance actuator, magnetic probe based storage device.

Unit – V

MICRO FLUIDIC SYSTEMS: Applications, considerations on micro scale fluid, fluid actuation methods, dielectro phoresis (DEP), electro wetting, electro thermal flow, thermo capillary effect, electro osmosis flow, opto electro wetting (OEW), tuning using micro fluidics, typical micro fluidic channel, microfluid dispenser, micro needle, molecular gate, micro pumps.

RADIO FREQUENCY (RF) MEMS: RF – based communication systems, RF MEMS, MEMS inductors, varactors, tuner/filter, resonator, clarification of tuner, filter, resonator, MEMS switches, phase shifter.

Unit - VI

CHEMICAL AND BIO MEDICAL MICRO SYSTEMS: Sensing mechanism & principle, membrane-transducer materials, chem.-lab-on-a-chip (CLOC) chemoresistors, chemocapacitors, chemotransistors, electronic nose (E-nose), mass sensitive chemosensors, fluroscence detection, calorimetric spectroscopy.

TEXT BOOK:

MEMS, Nitaigour Premchand Mahalik, TMH Publishing co.

REFERENCE BOOKS:

1. Foundation of MEMS, Chang Liu, Prentice Hall Ltd.
2. MEMS and NEMS, Sergey Edwrd Lyshevski, CRC Press, Indian Edition.
3. MEMS and Micro Systems: Design and Manufacture, Tai-Ran Hsu, TMH Publishers.
4. Introductory MEMS, Thomas M Adams, Richard A Layton, Springer International Publishers.

Course outcomes:

Upon successful completion of this course the student shall be able to know the importance and various devices of MEMS and their applications.

IV Year – I SEMESTER

	T	P	C
	3+1*	0	3

DEPARTMENTAL ELECTIVE – II

MATERIAL CHARACTERIZATION TECHNIQUES

Course objective: The course presents the principles and methods of characterizing the structure and other aspects of materials. Various advanced characterizing techniques and their application will be studied.

UNIT -I

Introduction: Scope of subject, classification of techniques for characterization, macro and micro - characterization structure of solids.

UNIT -II

Bulk averaging techniques: Thermal analysis, DTA, DSC, TGA, dilatometry, resistivity/conductivity.

UNIT -III

Optical & X-ray spectroscopy: Atomic absorption spectroscopy, X-ray spectrometry, infrared spectroscopy and Raman spectroscopy.

UNIT -IV

Metallographic techniques: Optical metallography, image analysis, quantitative phase estimation.

UNIT -V

Diffraction methods: X-ray diffraction (crystal systems and space groups, Bravais lattices, direct and reciprocal lattice, Bragg law, powder diffraction and phase identification, single crystal diffraction, structure factor, X-ray crystal structure determination).

UNIT -VI

Electron optical methods: Scanning electron microscopy and image formation in the SEM.

Course outcomes: At the end of the semester, the student should able to

1. Analyze the microstructure of materials.
2. Apply various characterization techniques like XRD, SEM TEM.
3. Identify the phases existing in the material.
4. Analyze the image.

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TEXT BOOKS

1. The Principles of metallogrphy laboratory practices –George L.Khel-Eurasia publishing house (Pvt. Ltd).
2 Transmission electron Microscopy of metals – Garet Thomas.-John wiley and sons.

REFERENCES:

1. Modern Metallographic Techniques & their application – victor phillips.
2. Physical Metallurgy, Part – I – RW Chao and P. Haasan.
3. Experimental Techniques in Physical Metallurgy – VT Cherepin and AK Mallik.
4. Electron Microscopy in the study of materials –P.J. Grundy.

DESIGN FOR MANUFACTURE
(DEPARTMENTAL ELECTIVE – II)

Course Objectives:

1. Understand the design rules and considerations with reference to various manufacturing processes.
2. To discusses capabilities and limitations of each manufacturing process in relation to part design and cost.
3. To examine DFM principles including how the design affects manufacturing cost, lean manufacturing, six sigma, etc.

UNIT - I

Introduction: Design philosophy-steps in design process-general design rules for manufacturability-basic principles of designing for economical production - creativity in design.

UNIT - II

Machining processes: Overview of various machining processes-general design rules for machining-dimensional tolerance and surface roughness-Design for machining – ease –redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

UNIT - III

Metal casting: Appraisal of various casting processes, selection of casting process,-general design considerations for casting-casting tolerance-use of solidification, simulation in casting design-product design rules for sand casting.

UNIT - IV

Metal joining: Appraisal of various welding processes, factors in design of weldments – general design guidelines-pre and post treatment of welds-effects of thermal stresses in weld joints-design of brazed joints. Forging: Design factors for forging – closed die forging design – parting lines of dies – drop forging die design – general design recommendations.

UNIT – V

Extrusion & Sheet metal work: Design guide lines extruded sections-design principles for punching, blanking, bending, deep drawing-Keeler Goodman forging line diagram – component design for blanking.

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UNIT – VI

Plastics: Visco elastic and creep behavior in plastics-design guidelines for plastic components-design considerations for injection moulding – design guidelines for machining and joining of plastics.

TEXT BOOKS:

1. Design for manufacture, John cobert, Adisson Wesley 1995
2. Design for Manufacture by Boothroyd
3. Design for manufacture, James Bralla

REFERENCE:

1. ASM Hand book Vol.20

Course outcomes:

Upon completion of the course, the student will be able to:

1. Design components for machining.
2. Simulate the casting design and choose the best casting process for a specific product.
3. Evaluate the effect of thermal stresses in weld joints.
4. Design components for sheet metal work by understanding in depth the sheet metal processes and their formation mechanisms.
5. Design plastic components for machining and joining and selecting a proper processes for different joining cases.

AUTOMATION IN MANUFACTURING
(DEPARTMENTAL ELECTIVE – II)

Course objective:

1. To study the types and strategies and various components in Automated Systems.
2. To understand the automated flow lines, line balancing, material storage and retrieval and inspection.

UNIT-I

INTRODUCTION: Types and strategies of automation, pneumatic and hydraulic components, circuits, automation in machine tools, mechanical feeding and tool changing and machine tool control.

UNIT – II

AUTOMATED FLOW LINES: Methods of part transport, transfer mechanism, buffer storage, control function, design and fabrication considerations.

Analysis of automated flow lines - General terminology and analysis of transfer lines without and with buffer storage, partial automation, implementation of automated flow lines.

UNIT – III

ASSEMBLY SYSTEM AND LINE BALANCING: Assembly process and systems, assembly line, line balancing methods, ways of improving line balance, flexible assembly lines.

UNIT – IV

AUTOMATED MATERIAL HANDLING and STORAGE SYSTEMS: Types of equipment, functions, analysis and design of material handling systems, conveyor systems, automated guided vehicle systems. Automated storage and retrieval systems; work in process storage, interfacing handling and storage with manufacturing.

UNIT – V

ADAPTIVE CONTROL SYSTEMS: Introduction, adaptive control with optimization, adaptive control with constraints, application of adaptive control in machining operations. Consideration of various parameters such as cutting force, temperatures, vibration and acoustic emission in the adaptive controls systems.

UNIT – VI

AUTOMATED INSPECTION: Fundamentals, types of inspection methods and equipment, Coordinate Measuring Machines, Machine Vision.

TEXT BOOK:

1. Automation, Production Systems and Computer Integrated Manufacturing : M.P. Groover./ PE/PHI.

REFERENCES:

1. Computer Control of Manufacturing Systems by Yoram Coren.
2. CAD / CAM/ CIM by Radhakrishnan.
3. Automation by W. Buekinsham.

Course outcomes:

Upon successful completion of this course student should be able to :

Solve the line balancing problems in the various flow line systems with and without use buffer storage.

Understand the different automated material handling, storage and retrieval systems and automated inspection systems.

Use of Adaptive Control principles and implement the same online inspection and control.

IV Year – II SEMESTER

	T	P	C
	3+1*	0	3

DEPARTMENTAL ELECTIVE – III

EXPERIMENTAL STRESS ANALYSIS

Course objectives:

Objective of the course is to measure strain through various experimental methods like strain gauges, photo elasticity techniques, brittle coatings, moiré methods and birefrigerent coatings to understand the relation between the mechanics theory and experimental stress analysis to learn usage of the experimental techniques on the practical problems

UNIT – I

Introduction: Stress, strain, Plane stress and plane strain conditions, Compatibility conditions. Problems using plane stress and plane strain conditions, stress functions, mohrs circle for stress strain, Three-dimensional stress strain relations.

UNIT – II

Strain Measurement and Recordings: Various types of strain gauges, Electrical Resistance strain gauges, semiconductor strain gauges, strain gauge circuits. Introduction, static recording and data logging, dynamic recording at very low frequencies, dynamic recording at intermediate frequencies, dynamic recording at high frequencies, dynamic recording at very high frequencies, telemetry systems.

UNIT – III

Photo elasticity: Photo elasticity – Polariscope – Plane and circularly polarized light, Bright and dark field setups, Photo elastic materials – Isochromatic fringes – Isoclinics

Three dimensional Photo elasticity : Introduction, locking in model deformation, materials for three-dimensional photo elasticity, machining cementing and slicing three-dimensional models, slicing the model and interpretation of the resulting fringe patterns, effective stresses, the shear-difference method in three dimensions, applications of the Frozen-stress method, the scattered-light method.

UNIT – IV

Brittle coatings: Introduction, coating stresses, failure theories, brittle coating crack patterns, crack detection, ceramic based brittle coatings, resin

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based brittle coatings, test procedures for brittle coatings analysis, calibration procedures, analysis of brittle coating data.

UNIT – V

Moire Methods: Introduction, mechanism of formation of Moire fringes, the geometrical approach to Moire-Fringe analysis, the displacement field approach to Moire-Fringe analysis, out of plane displacement measurements, out of plane slope measurements, sharpening and multiplication of Moire-Fringes, experimental procedure and techniques.

UNIT – VI

Birefringent Coatings

Introduction, Coating stresses and strains, coating sensitivity, coating materials, application of coatings, effects of coating thickness, Fringe-order determinations in coatings, stress separation methods.

TEXT BOOKS :

1. Theory of Elasticity by Timoshenke and Goodier Jr.
2. Experimental stress analysis by Dally and Riley, Mc Graw-Hill.

REFERENCES:

1. A treatise on Mathematical theory of Elasticity by LOVE .A.H.
2. Photo Elasticity by Frocht.
3. Experimental stress analysis, Video course by K.Ramesh / NPTEL.

Course Outcomes:

The intended learning outcomes are that on completion of this course the student should be able to:

1. Student should be able to chose the appropriate method for measuring strain.
2. Students should be able to apply optical techniques for measurement of strain & stress.
3. Analyze the results obtained from coating techniques and corroborated with theoretical results.
4. Correlate experimental and analytically derived results.

MECHATRONICS
(DEPARTMENTAL ELECTIVE – III)

Course Objective

The main objective of this course is to introduce the integrative nature of Mechatronics. To describe the different components and devices of mechatronics systems.

UNIT-I

Mechatronics systems – elements & levels of mechatronics system, Mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and light sensors.

UNIT-II

Solid state electronic devices - PN junction diode, BJT, FET, DIAC, TRIAC and LEDs. Analog signal conditioning, operational amplifiers, noise reduction, filtering.

UNIT-III

Hydraulic and pneumatic actuating systems - Fluid systems, Hydraulic systems, and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems. Mechanical actuating systems and electrical actuating systems – basic principles and elements.

UNIT-IV

Digital electronics and systems, digital logic control, micro processors and micro controllers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.

UNIT-V

System and interfacing and data acquisition – Data Acquisition Systems, Analog to Digital and Digital to Analog conversions; Digital Signal Processing – data flow in DSPs, block diagrams, typical layouts, Interfacing motor drives.

UNIT -VI

Dynamic models and analogies, System response. Process Controllers – Digital Controllers, Programmable Logic Controllers, Design of mechatronics systems & future trends.

TEXT BOOK:

MECHATRONICS Integrated Mechanical Electronics Systems/KP Ramachandran, GK Vijaya Raghavan & MS Balasundaram/WILEY India Edition.

REFERENCES:

1 Mechatronics – Smaili A, Mrad F, Oxford Higher Education, Oxford University Press.

2 Mechatronics Source Book by Newton C Braga, Thomson Publications, Chennai.

3 Mechatronics – N. Shanmugam / Anuradha Agencies Publishers.

4 Mechatronics System Design / Devdas shetty/Richard/Thomson.

5 Mechatronics/M.D.Singh/J.G.Joshi/PHI.

6 Mechatronics – Electronic Control Systems in Mechanical and Electrical Engg. 4th Edition, Pearson, 2012 W. Bolton.

7 Mechatronics – Principles and Application Godfrey C. Onwubolu, Wlsevier, Indian print.

Course outcomes:

After completion of this course, the student shall be able to use the various mechatronics systems devices and components in the design of electro mechanical systems.

ADVANCED MATERIALS
(DEPARTMENTAL ELECTIVE – III)

Course Objectives

The objective for this course is to understand the mechanics of different materials. This understanding will include concepts such as anisotropic material behavior, constituent properties and manufacturing processes of different composites. Suitability of smart and nano materials for engineering applications.

UNIT-I

INTRODUCTION TO COMPOSITE MATERIALS: Introduction, classification: Polymer matrix composites, metal matrix composites, ceramic matrix composites, carbon–carbon composites, fiber- reinforced composites and nature-made composites, and applications.

REINFORCEMENTS: Fibres- glass, silica, kevlar, carbon, boron, silicon carbide, and born carbide fibres.

UNIT-II

polymer composites, thermoplastics, thermosetting plastics, manufacturing of PMC, MMC & CCC and their applications.

UNIT-III

MANUFACTURING METHODS: Autoclave, tape production, moulding methods, filament winding, man layup, pultrusion, RTM.

UNIT-IV

MACROMECHANICAL ANALYSIS OF A LAMINA: Introduction, generalized hooke's law, reduction of hooke's law in three dimensions to two dimensions, relationship of compliance and stiffness matrix to engineering elastic constants of an orthotropic lamina, laminate-laminate code.

UNIT-V

FUNCTIONALLY GRADED MATERIALS: Types of functionally graded materials-classification-different systems-preparation-properties and applications of functionally graded materials.

SHAPE MEMORY ALLOYS: Introduction-shape memory effect-classification of shape memory alloys-composition-properties and applications of shape memory alloys.

UNIT-VI

NANO MATERIALS: Introduction-properties at nano scales-advantages & disadvantages-applications in comparison with bulk materials (nano - structure, wires, tubes, composites). state of art nano advanced- topic delivered by student.

TEXT BOOKS:

1. Nano material by A.K. Bandyopadyay, New age Publishers.
2. Material science and Technology- Cahan.
3. Engineering Mechanics of Composite Materials by Isaac and M Daniel, Oxford University Press.

REFERENCES:

1. R. M. Jones, Mechanics of Composite Materials, Mc Graw Hill Company, New York, 1975.
2. L. R. Calcote, Analysis of Laminated Composite Structures, Van Nostrand Rainfold.
3. B. D. Agarwal and L. J. Broutman, Analysis and performance of fibre Composites, Wiley-Interscience, New York, 1980.
4. Mechanics of Composite Materials, Second Edition (Mechanical Engineering), Autar K.Kaw, Publisher: CRC.

Course outcomes

Students who successfully complete this course will demonstrate the following :

- Properties of constituents, classification of composites and their suitability for the structural applications.
- Manufacturing processes.
- Smart materials and their applications.
- Nano materials in comparison with bulk materials.

	T	P	C
IV Year – II SEMESTER	3+1*	0	3

DEPARTMENTAL ELECTIVE – IV

NON - DESTRUCTIVE EVALUATION

Course Objectives

- The students are to be exposed to the concepts of various NDE techniques using radiography, ultrasonics, liquid penetrates, magnetic patches and Eddy currents.
- They will learn basic principles of these methods and will be able to select a testing process.
- They will understand the advantages and disadvantages of these techniques.

UNIT – I

Introduction to non-destructive testing: Radiographic test, Sources of X and Gamma Rays and their interaction with Matter, Radiographic equipment, Radiographic Techniques, Safety Aspects of Industrial Radiography

UNIT – II

Ultrasonics test: Principle of Wave Propagation, Reflection, Refraction, Diffraction, Mode Conversion and Attenuation, Sound Field, Piezo-electric Effect, Ultrasonic Transducers and their Characteristics, Ultrasonic Equipment and Variables Affecting Ultrasonic Test, Ultrasonic Testing, Interpretations and Guidelines for Acceptance, Rejection - Effectiveness and Limitations of Ultrasonic Testing.

UNIT – III

Liquid Penetrant Test: Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System, Test Procedure, Effectiveness and Limitations of Liquid Penetrant Testing

UNIT – IV

Magnetic Particle Test: Magnetic Materials, Magnetization of Materials , Demagnetization of Materials,Principle of Magnetic Particle Test, Magnetic Particle Test Equipment, Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation and Evaluation, Effective Applications and Limitations of the Magnetic Particle Test.

UNIT – V

Eddy Current Test: Principle of Eddy Current, Eddy Current Test System, Applications of Eddy Current Testing Effectiveness of Eddy Current Testing

UNIT – VI

Industrial Applications of NDE: Span of NDE Activities Railways, Nuclear, Non-nuclear and Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, Offshore Gas and Petroleum Projects, Coal Mining Industry, NDE of pressure vessels, castings, welded constructions.

TEXT BOOKS:

1. Non-destructive test and evaluation of Materials, J Prasad, GCK Nair, TMH Publishers.
2. Ultrasonic testing by Krautkramer and Krautkramer.
3. Non-destructive testing, Warress, JMc Gonmade.

REFERENCES:

1. Ultrasonic inspection training for NDT: E. A. Gingel, Prometheus Press.
2. ASTM Standards, Vol 3.01, Metals and alloys.
3. Non-destructive, Hand Book – R. Hamchand .

Course Outcomes

1. Comprehensive, theory based understanding of the techniques and methods of non destructive testing.
2. Apply methods knowledge of non destructive testing to evaluate products of railways, automobiles, aircrafts, chemical industries etc.

ADVANCED OPTIMIZATION TECHNIQUES
(DEPARTMENTAL ELECTIVE – IV)

Course objectives:

To enable the students learn the latest non-linear optimization techniques such as classical optimization methods, dynamic programming, integer programming etc. Provide basic knowledge and enough competence to formulate the optimization problems.

UNIT I

INTRODUCTION TO OPTIMIZATION: Engineering applications of optimization- statement of an optimization problem- classification of optimization problem- optimization techniques.

CLASSICAL OPTIMIZATION TECHNIQUES: Single variable optimization- multivariable optimization with equality constraints- multivariable optimization with inequality constraints.

UNIT-II

UNCONSTRAINED OPTIMIZATION TECHNIQUES: pattern search method- rosenbrock's method of rotating coordinates- the simplex method- descent methods- gradient of function- steepest descent method.

UNIT-III

CONSTRAINED OPTIMIZATION TECHNIQUES: characteristics of a constrained problem- methods of feasible directions - basic approach in the penalty function method- interior penalty function method- convex programming problem- exterior penalty function method.

UNIT-IV

GEOMETRIC PROGRAMMING (G.P): Solution of an unconstrained geometric programming, differential calculus method and arithmetic method. primal dual relationship and sufficiency conditions. Solution of a constrained geometric programming problem (G.P.P). Complimentary geometric programming (C.G.P).

UNIT-V

DYNAMIC PROGRAMMING (D.P): Multistage decision processes. concepts of sub optimization, computational procedure in dynamic programming calculus method and tabular methods. Linear programming as a case of D.P., Continuous D.P.

UNIT-VI

INTEGER PROGRAMMING (I.P): Graphical representation. Gomory's cutting plane method. Bala's algorithm for zero-one programming problem. Integer non linear programming.

TEXT BOOK:

1. Optimization Theory and Applications, by S.S.Rao, Wiley Eastern Limited, New Delhi.

REFERENCES:

1. Engineering Optimization By Kalyanmanai Deb, Prentice Hall of India, New Delhi.
2. Optimization Techniques, C.Mohan, Kusum Deep.
3. Operations Research by S.D.Sharma.

Course Out comes:

1. Students at the end of the course learn advanced optimization techniques to show real-life problems.
2. Students can able to formulate and solve various practical optimization problems in manufacturing and service organizations.

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QUALITY AND RELIABILITY ENGINEERING
(DEPARTMENTAL ELECTIVE – IV)

Course objectives:

1. The aim of this course is to provide students with a basic understanding of the approaches and techniques to assess and improve process and/or product quality and reliability.
2. The objectives are to introduce the principles and techniques of Statistical Quality Control and their practical uses in product and/or process design and monitoring.
3. To understand techniques of modern reliability engineering tools.

UNIT-I

Quality value and engineering – quality systems – quality engineering in product design and production process – system design – parameter design – tolerance design, quality costs – quality improvement.

UNIT-II

Statistical process control $\overline{X}$, R, p, c charts, other types of control charts, process capability, process capability analysis, process capability index. (SQC tables can be used in the examination).

UNIT-III

Acceptance sampling by variables and attributes, design of sampling plans, single, double, sequential and continuous sampling plans, design of various sampling plans.

UNIT-IV

Loss function, tolerance design – N type, L type, S type; determination of tolerance for these types. online quality control – variable characteristics, attribute characteristics, parameter design.

Quality function deployment – house of quality, QFD matrix, total quality management concepts. quality information systems, quality circles, introduction to ISO 9000 standards.

UNIT-V

Reliability – Evaluation of design by tests - Hazard Models, Linear, Releigh, Weibull. Failure Data Analysis, reliability prediction based on weibull distribution, Reliability improvement.

UNIT-VI

Complex system, reliability, reliability of series, parallel & standby systems & complex systems & reliability prediction and system effectiveness.
Maintainability, availability, economics of reliability engineering, replacement of items, maintenance costing and budgeting, reliability testing.

TEXT BOOKS:

1. G Taguchi, 'Quality Engineering in Production Systems - Mc Graw Hill.
2. E. Bala Guruswamy, 'Reliability Engineering', Tata McGraw Hill.
3. Montgomery "Statistical Quality Control : A Modern Introduction" Wiley.

REFERENCE BOOKS:

1. Frank.M.Gryna Jr. "Jurans Quality planning & Analysis", McGraw Hill.
2. Philipposs, 'Taguchi Techniques for Quality Engineering', Mc Graw Hill.
3. LS Srinath, 'Reliability Engineering', Affiliated East West Pvt. Ltd..
4. Eugene Grant, Richard Leavenworth "Statistical Process Control", McGraw Hill.
5. W.A. Taylor, 'Optimization & Variation Reduction in Quality', Tata Mc Graw Hill.
6. Quality and Performance Excellence: James R Evans, Cengage learning.

Course outcome:

Upon successful completion of this course, students should be able to:

1. Understand quality and reliability concept, beware of some basic techniques for quality improvement, and acquire fundamental knowledge of statistics and probability.
2. Apply control charts to analyze and improve the process quality.
3. Design a simple sampling plan, construct its OC curve and evaluate its effectiveness on a given sampling process.
4. Acquire the concepts of the reliability, *and* calculate the system reliability based on the given component connection; *calculate* the reliability based on the given failure model.

IV Year – II SEMESTER	T	P	C
	0	0	9

PROJECT WORK

Objectives:

The aim of the course is to make the student perform a comprehensive project work that involves either or all of the following: optimum design of a mechanical component or an assembly, thermal analysis, computer aided design & analysis, cost effective manufacturing process, material selection, testing procedures or fabrication of components and prepare a detailed technical thesis report. The completed task should also take into account the significance of real time applications, energy management and the environmental affects.

Outcomes:

After completing the project work the student should learn the technical procedure of planning, scheduling and realizing an engineering product and further acquire the skills of technical report writing and data collection.

Course content:

The student should work in groups to achieve the aforementioned objectives and the outcomes.

M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ADVANCED OPTIMIZATION TECHNIQUES							

Course Objectives

- To create awareness of the importance of various optimization techniques and project scheduling applicable to engineering techniques.

Course Outcomes

- Capable of applying optimization techniques in engineering applications.
- Ability to use linear & nonlinear programming techniques.
- Ability to develop schedule for projects and apply PERT & CPM techniques

UNIT-I

Single Variable Non-Linear Unconstrained Optimization: One dimensional Optimization methods, Uni-modal function, elimination method, Fibonacci method, golden section method, interpolation methods- quadratic & cubic interpolation methods.

UNIT-II

Multi Variable Non-Linear Unconstrained Optimization: Direct search method – Univariant Method – pattern search methods – Powell’s – Hook – Jeeves, Rosen rock search methods – gradient methods, gradient of function, steepest decent method, Fletcher reeves method, Variable Metric method.

UNIT-III

Geometric Programming: Polynomials – arithmetic – geometric inequality – unconstrained G.P– constrained G.P

Dynamic Programming: Multistage decision process, principles of optimality, examples, conversion of final problem to an initial value problem, application of dynamic programming, production inventory. Allocation, scheduling replacement.

UNIT-IV

Linear Programming: Formulation – Sensitivity analysis. Change in the constraints, cost coefficients, coefficients of the constraints, addition and deletion of variable, constraints.

SIMULATION: Introduction – Types – Steps – application – inventory – queuing – thermal system.

UNIT-V

Integer Programming: Introduction – formulation – Gomory cutting plane algorithm – Zero or one algorithm, branch and bound method.

UNIT-VI

Stochastic Programming: Basic concepts of probability theory, random variables Distributions, mean, variance, Correlation, co variance, joint probability distribution, stochastic linear, dynamic programming

REFERENCE BOOKS:

1. Optimization theory & Applications, S.S Rao, New Age International
2. Introductory to operation research, Kasan& Kumar, Springer
3. Optimization Techniques theory and practice, M.C Joshi, K.M &Moudgalya, Narosa Publications.
4. Operation Research, H.A. Taha, Tata McGraw-Hill Publications
5. Optimization in operations research, R.L Rardin, Prentice Hall
6. Optimization Techniques, Benugundu&Chandraputla, Pearson Asia

M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ADVANCED THERMODYNAMICS							

Course Objectives:

- To create awareness of the importance of thermodynamic principles in engineering applications such as I.C engine combustion,
- To understand thermodynamic applications in psychometric, refrigeration and heat transfer
- To understand the basic principles power cycles and its relation with combustion processes
- To understand various methods of direct energy conversion

Course Outcomes:

- A student will be able to apply various laws of thermodynamics for combustion phenomena in IC engine
- A student will be able to select and design air conditioning or psychometric process depending on application and comfort conditions.
- A student will be able to study of combustion phenomena in IC engines
- A student will be able to understand various energy conversion methods like fuel cells etc.

UNIT-I

Review Of Thermodynamic Laws And Corollaries: Transient flow analysis, Second law thermodynamics, Entropy, Availability and unavailability, Thermodynamic potential. Maxwell relations, Specific heat relations, Mayer's relation. Evaluation of thermodynamic properties of working substance

UNIT-II

Exergy: Concept of exergy – second law efficiency, exergy change of a system, exergy transfer by heat, work and mass, the decrease of exergy principle and exergy destruction, Exergy balance for open and closed systems.
Irreversibility: Introduction - irreversibility for closed and open system – steady flow process -second law efficiency of steady flow devices.

UNIT-III

P.V.T Surface: Equation of state, Real gas behavior, Vander Waal's equation, Generalization compressibility factor, Energy properties of real gases, Vapor pressure, Clausius, Clapeyro equation, Throttling, Joule Thompson coefficient, Non-reactive mixtures of perfect gases. Governing laws, Evaluation of properties, Psychometric mixture properties and psychometric chart, Air conditioning processes, cooling towers Real gas mixture.

UNIT-IV

Combustion: Combustion Reactions, Enthalpy of formation. Entropy of formation, Reference levels of tables. Energy of formation, Heat reaction, Adiabatic flame temperature generated product Enthalpies, Equilibrium. Chemical equilibrium of ideal gassed, Effect of non-reacting gases equilibrium in multiple reactions, the vent Hoff's equation. The chemical potential and phase equilibrium, The Gibbs phase rule.

UNIT-V

Power Cycles: Review binary vapor cycle, co-generation and combined cycles, Second law analysts of cycles, Refrigeration cycles, Thermodynamics of irreversible processes, Introduction, Phenomenological laws, Onsager Reciprocity relation, Applicability of the Phenomenological relations, Heat flux and entropy production, Thermodynamic phenomena, Thermoelectric circuits.

UNIT-VI

Direct Energy Conversion Introduction: Fuel cells, Thermo electric energy, Thermionic power generation, Thermodynamic devices magneto hydrodynamic generations and Photovoltaic cell

REFERENCE BOOKS:

1. Basic and Applied Thermodynamics, P.K.Nag, Tata McGraw Hill.
2. Thermodynamics, Holman, Tata McGraw Hill.
3. Engineering Thermodynamics, PL.Dhar, Elsevier Publications
4. Thermodynamics for Engineers, Doolittle-Messe, John Wiley & Sons
5. Thermal Engineering, Soman, PHI Publishers
6. Thermal Engineering, Rathore, Tata McGraw Hill.

M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ADVANCED HEAT AND MASS TRANSFER							

Course Objectives

- To understand the basic principles of mass transfer occurring in process industry and other applications
- To study advanced heat transfer methods of two dimensional concepts
- To familiarize the basic concepts of various equations and empirical laws pertaining
- to convection and radiation and also phase transfer phenomena

Course Outcomes

- A student will be able to apply the laws of various modes of heat transfer depending on application
- A student will be able to solve two dimensional equations in Cartesian coordinates by exact methods
- A student will be able to calculate heat transfer rate associated with phase change heat transfer
- A student will be able to estimate mass diffusion phenomena applied to process industries

UNIT-I

Brief Introduction to Different Modes Of Heat Transfer: Conduction: General heat Conduction equation-initial and boundary conditions.

Transient Heat Conduction: Lumped system analysis, Heisler charts-semi-infinite solid-use of shape factors in conduction-2D transient heat conduction-product solutions.

UNIT-II

Finite Difference Methods For Conduction: ID & 2D steady state and simple transient heat conduction problems-implicit and explicit methods.

Forced Convection: Equations of fluid flow-concepts of continuity, momentum equations-derivation of energy equation-methods to determine heat transfer coefficient: Analytical methods-dimensional analysis and concept of exact solution. Approximate method-integral analysis.

UNIT-III

External Flows: Flow over a flat plate: integral method for laminar heat transfer coefficient for different velocity and temperature profiles, Application of empirical relations to variation geometries for laminar and turbulent flows.

Internal Flows: Fully developed flow: integral analysis for laminar heat transfer coefficient-types of flow-constant wall temperature and constant heat flux boundary conditions-hydrodynamic &thermal entry lengths; use of empirical correlations.

UNIT-IV

Free Convection: Approximate analysis on laminar free convective heat transfer-Boussinesq approximation-different geometries-combined free and forced convection.
Boiling and condensation: Boiling curve-correlations-Nusselt's theory of film condensation on a vertical plate-assumptions & correlations of film condensation for different geometries.

UNIT-V
Radiation Heat Transfer: Radiant heat exchange in grey, non-grey bodies, with Transmitting, Reflecting and absorbing media, specular surfaces, gas radiation-radiation from flames.
Gas Radiation: Radiation transfer in enclosures containing absorbing and emitting media - interaction of radiation with conduction and Convection.

UNIT-VI
Mass Transfer: Concepts of mass transfer-diffusion & convective mass transfer analogies significance of non-dimensional numbers.

REFERENCE BOOKS:

1. Principals of Heat Transfer, Frank Kreith, Cengage Learning
2. Elements of Heat Transfer, E. Radha Krishna, CRC Press/2012
3. Heat Transfer, RK Rajput, S.Chand
4. Introduction to Heat Transfer, SK Som, PHI
5. Engineering Heat & Mass Transfer, Mahesh Rathore, Lakshmi Publications
6. Engineering Heat & Mass Transfer, Sarit K. Das, DhanpatRai
7. Heat Transfer, P.K.Nag, TMH

M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ADVANCED IC ENGINES							

Course Objectives

- To create awareness of the importance of working principles of I.C. Engines
- To familiarize various techniques to use alternate fuel technology
- To understand different exhaust emissions with the use of alternate fuels.
- To understand the basic concepts of recent trends with change of engine configuration

Course Outcomes

- A student will be able to differentiate the phenomena of combustion in SI and CI engines
- A student will be able to apply alternative fuel technology for gasoline and diesel fuel

UNIT-I

Introduction: Engine Types – Design and operating Parameters.

Spark Ignition Engines: SI Engine mixture requirements, Injection systems Monopoint, Multipoint injection and direct injection.

Compression Ignition Engines: Direct and indirect injection systems –GDI,CRDI, Combustion chambers – Fuel spray behavior – spray structure, spray Penetration and evaporation – air motion.

UNIT-II

Gas Exchange Processes: Volumetric Efficiency – Flow through ports –Supercharging and Turbo charging. Charge Motion- Mean velocity and Turbulent characteristics – Swirl, Squish – Pre-chamber Engine flows.

UNIT-III

Recent Trends: Lean Burn Engines – Stratified charge Engines – HCCI engines– Plasma Ignition - Wankel engine, Stirling cycle engine, free piston Engine and Adiabaticengine.

UNIT-IV

Pollutant Formation And Control

Pollutant – Sources – Formation of carbon monoxide, Unburnt hydrocarbon, NOx, Smoke and Particulate matter – Methods of controlling Emissions – Catalytic converters and Particulate Traps, Methods of measurements and Introduction to emission norms and Driving cycles

UNIT-V

Alternative Fuels: Liquid fuels **-** Alcohol, Methanol, Ethanol, Gaseous fuels –Hydrogen, Natural Gas and Liquefied Petroleum Gas-properties, production, storage, dispensing, fuel kits, Merits and Demerits, Engine Modifications, use of Bio fuels.

UNIT-VI

Electric Vehicles: Introduction, EV -components, batteries, charges, drives tractive force, transmission, power devices and controllers-Advantages and Disadvantages

Fuel Cell Power Vehicles: Fuel cell vehicle- Efficiency, Types of fuel cellsfuel cell hybrid vehicle-Fuel cell solar vehicle, solar car electrical system, Benefits, fuel regulations.

REFERENCE BOOKS:

1. Internal combustion engines fundamentals, Heywood J.B., McGraw Hill
2. Internal combustion Engines, Mathur& R.P. Sharma, DhanpatRaiPublications
3. Hybrid and Alternative Fuel Vehicles, James D. Halderman, Prentice Hall 4th ed.
4. Internal Combustion Engines, V. Ganesan, TMH Pub, 2008
5. Alternate fuels, SS Thipse, JAICO Publishers, 2010
6. Alternative Fuel Technology, Erjavec, Arias, Yesdee publications, 2007

M.TECH-I SEMESTER **(ELECTIVE-I)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3

GAS DYNAMICS

Course objectives:

- To create awareness of the importance of principles of various turbo machines
- To understand the basic fundamentals of compressible flow concepts
- To study non-dimensional numbers in compressible flow and to solve the simple compressible flow problems
- To understand the effect of compressibility in nozzles and diffusers
- To understand the design criteria of nozzles and diffusers
- To solve isentropic compressible flow problems

Course outcomes:

- Apply the fundamental flow equations (conservation of mass and momentum and energy) and basic solution techniques in solving compressible one dimensional flow.
- Obtain first order solutions for compressible internal flows for variable geometry ducts.
- Obtain first order solutions for compressible internal flows with friction and heat transfer.
- Evaluate basic supersonic flight and associated propulsion systems.

UNIT-I

Fundamental Aspects of Gas Dynamics: Introduction, Isentropic flow in a stream tube, speed of sound, Mach waves; One dimensional Isentropic Flow: Governing equations, stagnation conditions, critical conditions, maximum discharge velocity, isentropic relations.

UNIT-II

Normal Shock Waves: Shock waves, stationary normal shock waves, normal shock wave relations in terms of Mach number

UNIT-III

Oblique Shock Waves: Oblique shock wave relations, reflection of oblique shock waves, interaction of oblique shock waves, conical shock waves; Expansion Waves: Prandtl-Meyer flow, reflection and interaction of expansion waves, flow over bodies involving shock and expansion waves

UNIT-IV

Variable Area Flow: Equations for variable area flow, operating characteristics of nozzles, convergent-divergent supersonic diffusers; Adiabatic Flow in a Duct with Friction: Flow in a constant area duct, friction factor variations, and the Fanno line.

UNIT-V

Flow With Heat Addition Or Removal: One-dimensional flow in a constant area duct neglecting viscosity, variable area flow with heat addition, one-dimensional constant area flow with both heat exchange and friction.

UNIT-VI

Generalized Quasi- One-Dimensional Flow: Governing equation sand influence coefficients, solution procedure for generalized flow with and without sonic point; Two-Dimensional Compressible Flow: Governing equations, vorticity considerations, the velocity potential, linearized solutions, linearized subsonic flow, linearized supersonic flow, method of characteristics.

REFERENCE BOOKS:

1. Gas Dynamics, E. Rathakrishnan, Prentice Hall of India Pvt. Ltd
2. The dynamics and thermodynamics of compressible fluid flow, Ascher H. Shapiro, The Ronald press Co
3. Elements of Gas Dynamics, HW.Lipmann and A. Roshko, Dover Publications
4. Compressible Fluid Dynamics, Thomson P.A, McGraw-Hill

M.TECH-I SEMESTER **(ELECTIVE-I)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
FUELS AND COMBUSTION							

Course Objectives:

- To create awareness of the importance of working principles of combustion, and familiarize the knowledge of various types of fuels
- To familiarize various processing methods of solid fuels
- To understand principles of refining liquid fuels, and various types of gaseous fuels and their production
- To familiarize the concept of air fuel ratios for various types of fuel, their importance in combustion and different types of combustion phenomena.

Course Outcomes:

- A student will be able to know the processing of solid fuels
- A Student will be able to know various methods of gasification of liquid fuels
- A student will be able to understand the production of various methods of gaseous fuels
- A student will be able to estimate air fuel ratio based on the fuel, adiabatic temperatures and understand the kinetics of combustion

UNIT-I

Fuels: detailed classification – Conventional and Unconventional Solid, Liquid, gaseous fuels and nuclear fuels – Origin of Coal – Analysis of coal, Coal – Carburization, Gasification and liquefaction – Lignite: petroleum based fuels – problems associated with very low calorific value gases: Coal Gas – Blast Furnace Gas Alcohols and Biogas.

UNIT-II

Principles Of Combustion: Chemical composition – Flue gas analysis – dew point of products – Combustion stoichiometry, Chemical kinetics – Rate of reaction – Reaction order – Molecularity – Zeroth, first, second and third order reactions - complex reactions – chain reactions, Theories of reaction Kinetics – General oxidation behavior of HC's.

UNIT-III

Thermodynamics Of Combustion: Enthalpy of formation – Heating value of fuel - Adiabatic flame, Temperature – Equilibrium composition of gaseous mixtures.

UNIT-IV

Factors influencing flame velocity and thickness flame stabilization - Diffusion flames

Combustion Appliances: Gas burners - Functional requirement of burners, Gas burner Classification –Stoker firing –pulverized system of firing.

UNIT-V

Laminar And Turbulent Flames Propagation And Structure: Flame stability – Burning velocity of fuels – Measurement of burning velocity – factors affecting the burning velocity, Combustion of fuel, droplets and sprays – Combustion systems – Pulverized fuel furnaces – fixed Entrained and Fluidized Bed Systems.

UNIT-VI

Environmental Considerations: Air pollution – Effects on Environment, Human Health etc., Principal pollutants – Legislative Measures – Methods of Emission control.

REFERENCE BOOKS:

1. Combustion Fundamentals, Roger A strehlow, McGraw Hill
2. Fuels and combustion, Sharma and Chander Mohan, Tata McGraw Hill
3. Combustion Engineering and Fuel Technology, Shaha A.K., Oxford and IBH
4. Principles of Combustion, Kanneth K.Kuo, Wiley and Sons
5. An Introduction to Combustion, Stephen R. Turns, McGraw Hill
6. Combustion Engineering, Gary L. Berman & Kenneth W. Ragland, McGraw Hill
7. Combustion, Sarkar, McGraw Hill

M.TECH-I SEMESTER **(ELECTIVE-I)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
MEASUREMENTS FOR THERMAL ENGINEERING							

Course Objectives:
To make the student

- Introduce to analyze experimental error, static and dynamic characteristics of instruments
- Learn the working of various measuring instruments used in the field of thermal engineering
- Learn the measurement of properties like thermal conductivity of solids, liquids and gases
- Learn the measurement of transport properties like diffusion, convective heat transfer
- Introduce to electronic control systems associated with automatically controlling the measuring parameters
- Introduce to applications and important features of various measuring instruments

Course Outcomes:
The student will be able to

- Use appropriate instrument for measurement of specific parameter
- Analyze experimental error, Static and Dynamic characteristics of instruments
- Use appropriate instrument measurement of transport properties
- Practically apply the principles of measurement to engineering applications / projects.

UNIT-I
Instrument classification, static and dynamic characteristics of instruments, experimental error analysis, systematic and random errors, statistical analysis, uncertainty, reliability of instruments, Variable resistance transducers, capacitive transducers, piezoelectric transducers, photoconductive transducers, photovoltaic cells, ionization transducers, Hall effect transducers

UNIT-II
Dynamic response considerations, Bridgman gauge, McLeod gauge, Pirani thermal conductivity gauge, Knudsen gauge, Alphatron guage.

UNIT-III
Flow measurement by drag effects; hot-wire anemometers, magnetic flow meters, flow visualization methods, interferometer, Laser Doppler anemometer,Temperature measurement by mechanical effect, temperature measurement by radiation, transient response of thermal systems, thermocouple compensation, temperature measurements in high- speed flow.

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Thermal conductivity measurement of solids, liquids, and gases, measurement of gas diffusion, convection heat transfer measurements, humidity measurements, heat-flux meters, Detection of thermal radiation, measurement of emissivity, reflectivity and transmissivity, solar radiation measurement.

UNIT-V

Review of open and closed loop control systems and servo mechanisms, Transfer functions of Mechanical Systems, input and output systems.

UNIT-VI

Measurement Analysis : Chemical, thermal, magnetic and optical gas analyzers, measurement of smoke, dust and moisture, gas chromatography, spectrometry, measurement of pH, Review of basic measurement techniques.

REFERENCE BOOKS:

1. Experimental methods for engineers, Holman, J.P., McGraw-Hill, 1988
2. Intelligent Instrumentation, Barney, Prentice Hall of India, 1988
3. Measurements and Instrumentation in Heat Engineering, Prebrashensky.V.,Vol.1 and 2, MIR Publishers, 1980
4. Instrumentation Devices and systems, Raman,C.S., Sharma, G.R., Mani, V.S.V., Tata McGraw Hill, New Delhi, 1983.
5. Measurements System Application and Design, Doeblin, McGraw Hill, 1978
6. Principles of Measurements and Instrumentation, Morris. A.S, Prentice Hall of India, 1998

M.TECH-I SEMESTER **(ELECTIVE-II)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
FINITE ELEMENT METHOD FOR THERMAL ENGINEERING							

Course objectives:

- To make student to understand the basics of finite element analysis and its applications in engineering with one dimensional and two dimensional elements.

Course outcomes:

- Student can have knowledge on basics of Finite Element analysis
- Student can analyze different elements like bar, truss, beam and triangular elements using FEM.
- Student can solve problems related one dimensional heat transfer, fluid flow and torsion problems.

UNIT-I

Basic Concepts Of The Finite Element Method: Introduction, working of finite element method, comparison of finite element method with exact, FDM and FVM. Method of weighted residuals, Galerkin's method for 1 -D heat conduction and fluid flow.

UNIT-II

Interpolation Functions For General Element Formulation: Compatibility and completeness requirements, Polynomial forms for 1-D elements, geometric isotropy, triangular elements, rectangular elements, isoparametric formulation, axisymmetric elements, Numerical Integration (1-D and 2-D).

UNIT-III

1-D Steady-State Heat Transfer: FE Formulation using linear and quadratic elements, Numerical problems in composite walls and fins of uniform cross section use linear elements.
1-D Transient Heat Transfer: Derivation of element matrices, solution techniques, Numerical problem with 2 elements.

UNIT-IV

2-D Steady-State Heat Transfer: FE Formulation using linear triangle elements, Problem modeling and boundary conditions.
Axisymmetric Heat Transfer: Finite element formulation using linear triangular elements, Problem modeling and boundary conditions.

UNIT-V

Applications In Fluid Mechanics: Finite Element formulation of 1-D and 2-D Steady, incompressible, inviscid, irrotational fluid flows, Problem modeling and boundary conditions.

UNIT-VI

Mesh Generation & Fem Software: Convergence requirements-mesh generation using tessellation method, Quadtree method and Octree method-Mesh refinement-h, p, x and r refinement band width- preprocessor – solution- post processor-use of software.

REFERENCE BOOKS:

1. Introduction to Finite elements in Engineering, Chandraputla & Belagondu, Universities Press.PHI, Third edition, 2002
2. The finite element method in Heat Transfer, Lewis R.W. et al, Wiley-Blackwell, 1996
3. Finite element method in Heat transfer and fluid dynamics, J.N. Reddy, CRC press, third edition, 2010
4. The Finite Element Method for Fluid Dynamics, Olek C Zienkiewicz, Robert L Taylor, P. Nithiarasu, Elsevier, 7th edition, 2013

M.TECH-I SEMESTER **(ELECTIVE-II)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
HYDROGEN AND FUEL CELL TECHNOLOGIES							

Course objectives:

- To enlighten on various technological advancements, benefits and prospects of utilizing hydrogen/fuel cell for meeting the future energy requirements.
- To detail on the hydrogen production methodologies, possible applications and various storage options
- To discuss on the working of a typical fuel cell, its types and to elaborate on its thermodynamics and kinetics
- To analyze the cost effectiveness and eco-friendliness of Fuel Cells

Course outcomes:

- Good understanding of hydrogen as alternate fuel for present and future engines
- Fundamentally strong understanding on the working of various fuel cells, their relative advantages/ disadvantages and hydrogen generation/storage technologies

UNIT -I

Hydrogen – Basics And Production Techniques

Hydrogen – physical and chemical properties, salient characteristics. Production of hydrogen – steam reforming – water electrolysis – gasification and woody biomass conversion – biological hydrogen production – photo dissociation – direct thermal or catalytic splitting of water

UNIT-II

Hydrogen Storage and Applications

Hydrogen storage options – compressed gas – liquid hydrogen – Hydride – chemical Storage –

Comparisons, Carbon-Nano tubes– Safety and management of hydrogen

UNIT-III

Applications of Hydrogen

Hydrogen fuel applications–internal combustion engines–turbines and jet engines. Hybrid elective vehicles–ships and submarines

UNIT-IV

Fuel Cells

History – principle - working - thermodynamics and kinetics of fuel cell process – performance evaluation of fuel cell – comparison on battery Vs. fuel cell

UNIT-V

Fuel Cell–Types: Types of fuel cells – AFC, PAFC, SOFC, MCFC, DMFC, PEMFC – relative merits and demerits

UNIT-VI

Application of Fuel Cell And Economics

Fuel cell usage for domestic power systems, large scale power generation, Automobile, Space. Economic and environmental analysis on usage of Hydrogen and Fuel cell, Future trends in fuel cells

REFERENCE BOOKS:

1. Fuel Cells – Principles and Applications, Viswanathan, B and M AuliceScibioh, Universities Press (2006)
2. Hydrogen and Fuel Cells: A Comprehensive Guide, Rebecca L. and Busby, Penn Well Corporation, Oklahoma (2005)
3. Hydrogen and Fuel Cells: Emerging Technologies and Applications, Bent Sorensen (Sorensen),, Elsevier, UK (2005)
4. Fuel Cell and Their Applications, Kordesch, K and G.Simader, Wiley-Vch, Germany (1996)
5. Fuel Cells: Theory and Application, Hart, A.B and G.J.Womack, Prentice Hall, NewYork Ltd., London (1989)
6. The Hydrogen Economy, Jeremy Rifkin, Penguin Group, USA (2002)

M.TECH-I SEMESTER **(ELECTIVE-II)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
THERMAL & NUCLEAR POWER PLANTS							

Course objectives:

- To create the awareness of working of thermal and nuclear power plants along with economics
- To understand the importance of steam power plants, their limitations and to familiarize the working principles of boilers, condensers and steam turbines
- To familiarize the working principle of gas turbine plants, stress the need for waste heat recovery and various methods of nuclear power.
- To understand the principles of various flow meters in power plants and stress the need for pollution control

Course outcomes:

- A student will be able to analyze the flue gases
- A student will be able to opt various methods for waste heat recovery
- A student will be able to justify the economics for requirement of nuclear power plants
- A student will be able to measure various parameters involved in power plants and suggest various remedies to control pollutants.

UNIT-I

Introduction: Sources of energy, Type of Power plants. Direct energy conversion system, Energy sources in India, Recent developments in power generation, Combustion of coal, Volumetric analysis, Gravimetric analysis, Fuel gas analysis.

Steam Power Plant: Introduction. General layout of steam power plant, Modern coal, Fired Steam, Steam power plant, Power plant cycle, Fuel Handling, Combustion equipment, Ash handling, Dust collectors

UNIT-II

Steam Generators: Types, Accessories. Feed water heaters, Performance of boiling, Water treatment, Cooling towers, Steam turbines. Compounding of turbines, Steam condensers, Jet and surface condensers.

UNIT-III

Gas Turbine Power Plant: Open and Closed cycle gas turbine plants, Cogeneration. Combined cycle power plant, Analysis, Waste heat recovery, IGCC power plant, Fluidized bed, Combustion, Advantages, Disadvantages

UNIT-IV

Nuclear Power Plant: Nuclear physics, Nuclear Reactor, Classification, Types of reactors, Site selection, Method of enriching uranium, Application of nuclear power plant. Nuclear Power Plant Safety: Bi-Product of nuclear power generation, Economics of nuclearpower plant, Nuclear power plant in India, Future of nuclear power.

UNIT-V

Economics of Power Generation: Factors affecting the economics, loading factors, Utilization factor, Performance and operating characteristics of power plant, Point economic load sharing, Depreciation, Energy rate, Criteria for optimum loading. Specific economic energy problem

UNIT-VI

Power Plant Instrumentations: Classification, Pressure measuring instrument, Temperature measurement and Flow Measurement, Analysis of combustion gases, Pollution types, Methods of control.

REFERENCE BOOKS:

1. Power Plant Engineering, P.K.Nag, TMH Publications
2. Power Plant Engineering, R.K.Rajput, Lakshmi Publications
3. Power Plant Engineering, P.C.Sharma, Kataria Publications
4. Power Plant Technology, M.M. EI-Wakil, TMH Publications

M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	6	25	50	75	3
ADVANCED THERMAL ENGINEERING LABORATORY							

Course Objectives:
To make the student learn

- Measurement of compressibility factor of real gases
- Estimation of dryness fraction of steam
- Analysis of exhaust gases and flame propagation
- Performance test of variable compression ratio diesel engine , R& AC systems and heat pipe
- Pin fin experiment under forced and natural convection
- Double pipe heat exchanger performance under parallel and counter flow conditions
- Evacuated tube concentrator

Courses Outcomes:
The student will be able to

- Measure the compressibility factor of real gases
- Estimate the dryness fraction of steam
- Analyze exhaust gases and flame propagation
- Conduct performance test on variable compression ratio diesel engine , R& AC systems and heat pipe
- Conduct performance test on pin fin under forced and natural convection
- Conduct performance test on double pipe heat exchanger under parallel and counter flow conditions
- Test the evacuated tube concentrator

LIST OF EXPERIMENTS:
Any TEN Experiments

1. Compressibility factor measurement of different real gases.
2. Dryness fraction estimation of steam.
3. Performance test on a variable compression ratio (VCR) diesel engine.
4. Exhaust gas analysis with gas analyzer.
5. COP of refrigeration system.
6. Performance of an air-conditioning system.
7. Pin fin experiment under natural convection heat transfer conditions.
8. Pin fin experiment under forced convection heat transfer conditions.
9. Double pipe heat exchanger with parallel and counter flow.
10. Finned tube heat exchanger.
11. Performance of heat pipe.
12. Evacuated tube concentrator.

M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
COMPUTATIONAL FLUID DYNAMICS							

Course objectives:

- To understand basic concepts and principles of fluid mechanics
- To develop various types of flows, models and develop algorithms
- To study various methods of grid generation
- To create the awareness of the importance of principles of fluid dynamics in engineering

Course outcomes:

- A student will be able to apply the knowledge of CFD, which is useful for engineering applications such as aerodynamic, heat transfer, turbo-machinery etc,.
- A student will be able to apply his knowledge of CFD for advanced topics like conjugate heat transfer and use effectively different software packages relevant to CFD.
- A student will be able to understand CFD modeling
- A Student will be able to write algorithms for CFD techniques for steady flows

UNIT–I

Introduction to Numerical Methods: Finite Difference, Finite Element and Finite Volume Methods, Classification of Partial Differential Equations – Solution of Linear Algebraic Equations – Direct and Iterative Approaches.

UNIT-II

Finite Difference Methods: Taylor's series – FDE formulation for 1D and 2D steady state heat transfer problems – Cartesian, cylindrical and spherical co-ordinate systems – boundary conditions – Un steady state heat conduction – Errors associated with FDE - Explicit Method – Stability criteria – Implicit Method – Crank Nicolson method – 2-D FDE formulation – ADI – ADE

UNIT–III

Finite Volume Method: Formation of Basic rules for control volume approach using 1D steady heat conduction equation – Interface Thermal Conductivity - Extension of General Nodal Equation to 2D and 3D Steady heat conduction and unsteady heat conduction

UNIT–IV

FVM to Convection and Diffusion: Concept of Elliptic, Parabolic and Hyperbolic Equations applied to fluid flow – Governing Equations of Flow and Heat transfer – Steady 1D Convection Diffusion – Discretization Schemes and their assessment – Treatment of Boundary Conditions

UNIT–V

Calculation of Flow Field: Vorticity & Stream Function Method - Staggered Grid as Remedy for representation of Flow Field - Pressure and Velocity Corrections – Pressure Velocity Coupling - SIMPLE & SIMPLER (revised algorithm) Algorithm.

UNIT–VI

Turbulent Flows: Direct Numerical Simulation, Large Eddy Simulation and RANS Models

Compressible Flows: Introduction - Pressure, Velocity and Density Coupling.

REFERENCE BOOKS:

1. Computational Fluid Flow and Heat Transfer, Muralidharan & Sundarajan, Narosa Pub
2. Numerical heat transfer and fluid flow, S.V. Patankar, Hemisphere Pub. House
3. An Introduction to Computational Fluid Dynamics, FVM Method – H.K. Versteeg, W. Malalasekhara PHI Publications
4. Computational Fluid Dynamics, Anderson, TMH Publications
5. Computational Methods for Fluid Dynamics, Ferziger, Peric, Springer
6. Computational Fluid Dynamics, T.J. Chung, Cambridge University
7. Computational Fluid Dynamics, A Practical Approach–Tu, Yeoh, Liu (Elsevier)
8. Text Book of Fluid Dynamics, Frank Chorlton, CBS Publishers

M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
DESIGN OF THERMAL SYSTEMS							

Course objectives:

- To create awareness of the importance of Heat exchangers design,
- To understand the basic principles of design and modelling of heat exchangers
- To familiarize principles of design of heat exchangers pertaining to industry
- To understand the basic principles of different types of heat exchangers and cooling towers

Course outcomes:

- A student will be able to select heat exchanger as per its application in engineering
- A student will be able to do root design heat exchanges
- A student will be able to understand selection and design of cooling towers
- A student will be able to select and design of heat exchangers for advanced applications like process industry

UNIT-I

Classification Of Heat Exchangers: Introduction, Recuperation & regeneration, Tabular heat exchangers, Double pipe, shell & tube heat exchanger, Plate heat Exchangers, Gasketed plate heat exchanger. Spiral plate heat exchanger, Lamella heat exchanger, extended surface heat exchanger, Plate fin and Tabular fin.

UINT-II

Basic Design Methods of Heat Exchanger: Introduction, Basic equations in design, Overall heat transfer coefficient, LMTD method for heat exchanger analysis, Parallel flow, and Counter flow, Multi pass, cross flow heat exchanger design calculations:

UNIT-III

Double Pipe Heat Exchanger: Film coefficient for fluids in annulus, fouling factors, calorific temperature, Average fluid temperature, The calculation of double pipe exchanger, Double pipe exchangers in series parallel arrangements, Shell & Tube Heat Exchangers: Tube layouts for exchangers, Baffle heat exchangers, Calculation of shell and tube heat exchangers, Shell side film coefficients, Shell side equivalent diameter, The true temperature difference in a 1-2 heat exchanger. Influence of approach temperature on correction factor. Shell side pressure drop, Tube side pressure drop, Analysis of performance of 1-2 heat exchanger and design of shell & tube heat exchangers, Flow arrangements for increased heat recovery, the calculation of 2-4 exchangers.

UNIT-IV

Condensation of Single Vapours: Calculation of horizontal condenser, Vertical condenser, De-Super heater condenser, Vertical condenser-sub-Cooler, Horizontal Condenser-Sub cooler, Vertical reflux type condenser, Condensation of steam.

UNIT-V

Vaporizers, Evaporators and Reboilers: Vaporizing processes, Forced circulation vaporizing exchanger, Natural circulation vaporizing exchangers, Calculations of a reboiler, Extended Surfaces: Longitudinal fins. Weighted fin efficiency curve, Calculation of a Double pipe fin efficiency curve. Calculation of a double pipe finned exchanger, Calculation of a longitudinal fin shell and tube exchanger.

UNIT-VI

Direct Contact Heat Exchanger: Cooling towers, relation between wet bulb & dew point temperatures, The Lewis number and Classification of cooling towers, Cooling tower internals and the roll of fill, Heat Balance. Heat Transfer by simultaneous diffusion and convection, Analysis of cooling tower requirements, Deign of cooling towers, Determination of the number of diffusion units, Calculation of cooling tower performance.

REFERENCE BOOKS:

1. Process Heat Transfer, D.Q.Kern, TMH Publications
2. Cooling Towers, J.D.Gurney and I.A. Cotter, Maclaren Publications
3. Heat Exchanger Design, A.P.Fraas and M.N.Ozisicj, John Wiely& sons

M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ADVANCED REFRIGERATION AND AIR CONDITIONING							

Course objectives:
To enable the student

- Understand the principles of refrigeration and air conditioning.
- Calculate the cooling load for different applications.
- Select the suitable equipment for a particular application.
- Design and implement refrigeration and air conditioning systems using standards.

Course Outcomes:
The student will be able to

- Differentiate between various refrigeration systems
- Apply refrigeration and air conditioning principles
- Design refrigeration systems
- Design air conditioning systems

UNIT –I
Vapour Compression Refrigeration: Performance of Complete vapor compression system.
Components of Vapor Compression System: The condensing unit – Evaporators – Expansion valve – Refrigerants – Properties – ODP & GWP - Load balancing of vapor compression Unit.
Compound Compression: Flash inter-cooling – flash chamber – Multi-evaporator & Multistage systems.

UNIT–II
Production Of Low Temperature: Liquefaction system; Cascade System – Applications.– Dry ice system.
Vapor Absorption System: Simple and modified aqua – ammonia system – Representation on Enthalpy –Concentration diagram. Lithium – Bromide system Three fluid system – HCOP.

UNIT–III
Air Refrigeration: Applications – Air Craft Refrigeration -Simple, Bootstrap, Regenerative and Reduced ambient systems – Problems based on different systems
Steam Jet Refrigeration System: Representation on T-s and h-s diagrams – limitations and applications
Unconventional Refrigeration System: Thermo-electric – Vortex tube & Pulse tube – working principles.

UNIT–IV

Air-Conditioning: Psychometric properties and processes – Construction of Psychometric chart. Requirements of Comfort Air –conditioning – Thermodynamics of human body – Effective temperature and Comfort chart – Parameters influencing the Effective Temperature. Summer, winter and year round air – conditioning systems.

UNIT-V

Cooling Load Calculations: Psychometric– Comfort air conditioning -Factors affecting human comfort – Cooling Load calculations.

UNIT–VI

Air-Conditioning Systems: All Fresh air, Re-circulated air with and without bypass, with reheat systems – Calculation of Bypass Factor, ADP, RSHF, ESHF and GSHF for different systems.

Components: Humidification and dehumidification equipment – Systems of Air cleaning – Grills and diffusers – Fans and blowers – Measurement and control of Temperature and Humidity.

REFERENCE BOOKS:

1. Refrigeration & Air Conditioning, C.P. Arora, TMH Publications
2. Refrigeration & Air Conditioning, Arora&Domkundwar, DhanpatRai Publications
3. Refrigeration and Air Conditioning, Stoecker, McGraw Hill Publications
4. Principles of Refrigeration, Roy. J. Dossat, John Wiley Publications
5. Refrigeration and Air Conditioning, Ananthanarayana, TMH Publications

M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
GAS TURBINES AND JET PROPULSION							

Course objectives:

- To make student to acquire knowledge on power generation through gas turbine.
- To make student to gain knowledge in the application of gas turbine in the field of jet propulsion.
- To make student aware of combustion chambers

Course outcomes:

- Student can know the methods of improving thermal efficiency and specific power output of a gas turbine cycle.
- Students can aware working of various military profiles like Ramjet, Pulse jet, Turbojet and Turboprop etc.
- Student can study drawing velocity triangles of turbine blades and compressor blades.

UNIT-I

Introduction: Cycles for Gas turbine, Performance of Gas turbines, open and closed cycle gas turbine analysis, Components of Turbine, Combustors for gas turbine, fuel requirements.

UNIT-II

Axial Flow Compressors: Principle of operation, Momentum or Filament analysis and energy transfer in rotors, Losses & coefficients of performance, cascade characteristics, overall performance, compressor characteristics, surging, choking and stalling.

UNIT-III

Axial Flow Gas Turbines: Elementary Theory, Turbine and nozzle efficiencies, Degree of reaction, Impulse turbine analysis, Reaction turbine analysis, comparison of Turbine types.

UNIT-IV

Applications of Gas Turbines: Typical applications of gas turbines-electric power generation applications-marine application locomotive applications automotive applications aircraft applications-process applications, additional features of gas turbine engines-trends in future development.

UNIT-V

Jet Propulsion: Introduction, Air breathing Jet engines, classification-Ram jet, pulse jet, Turbo jet, Turbo prop, Thrust, Efficiency-Ram, Thermal, Transmission, overall. Effect of forward speed, altitude, Thrust augmentation - After burning, wateralcohol mixtures, Bleed burn cycle

UNIT-VI

Rocket Propulsion: Principle, classification-chemical, rocket-solid propellant, liquid propellant, advantages, free radical, Nuclear, Electro dynamic, plasma, photon propulsion.

REFERENCE BOOKS:

1. Gas Turbines, Ganesan V, TMH, 3rd Edition
2. Gas turbines and propulsive systems, KhajuriaP.R. DubeyS.P, DhanpatRai pub.
3. Gas turbines and jet & rocket propulsion, Mathur M.L, Sharma R.P. Standard Publishers
4. Gas Turbine Theory, Cohen H, Rogers and Saravanamuthu H, John Wiley
5. Turbines, Compressors and Fans, Yahya S.H, Tata McGraw-Hill.
6. Aero-thermodynamics of gas turbine and rocket propulsion, Gordon Oates, AIAA Education series

M.TECH-II SEMESTER **(ELETIVE-III)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ENERGY CONSERVATION AND MANAGEMENT							

Course objectives:

- To create awareness of the importance of the energy auditing and determination of evaluation methods of engineering projects
- To understand the principles of energy management for various types of industries
- To understand the need and necessity of energy auditing and estimate the budget for industry
- To understand the importance of renewable energies in the scenario of depletion of conventional energy resources

Course outcomes:

- A student will be able to grasp the importance of energy auditing
- A student will be able to estimate the requirement of any proposed industry

UNIT-I

Introduction: Principles of energy management. Managerial organization, Functional areas for i) manufacturing industry, ii) Process industry, iii) Commerce, iv) Government, Role of Energy manager in each of these organizations. Initiating, Organizing and managing energy management programs

UNIT-II

Energy Audit: Definition and concepts, Types of energy audits, Basic energy concepts, Resources for plant energy studies, Data gathering, Analytical techniques. Energy Conservation: Technologies for energy conservation, Design for conservation of energy materials, Energy flow networks, Critical assessment of energy usage. Formulation of objectives and constrains, Synthesis of alternative options and technical analysis of options, Process integration.

UNIT-III

Economic Analysis: Scope, Characterization of an investment project. Types of depreciation, Time value of money. Budget considerations, Risk analysis.

UNIT-IV

Methods Of Evaluation Of Projects: Payback, Annualized costs, Investor's rate of return, Present worth, Internal rate of return, Pros and cons of the common method of analysis, Replacement analysis.

UNIT-V

Alternative Energy Sources: SOLAR ENERGY: Types of devices for solar energy collections, Thermal storage system, Control systems. Wind Energy, Availability, Wind Devices, Wind Characteristics, performance of turbines and systems.

UNIT-VI

Energy Conservation In Electric Utility And Industry : Energy cost and two part tariff, energy conservation in utility by improving load factor, load curve analysis energy efficient motors, Energy conservation in illuminating system, importance of power factor in energy conservation power factor improvement methods, energy conservation in industries.

REFERENCE BOOKS:

1. Energy Management Principles, CB Smith, Pergamon Press
2. Energy Management, W.R.Murthy and G.Mc.Kay, BS Publication
3. Management, H.Koontz and CyrillDonnel, McGraw Hill
4. Financial Management**,** S.C.Kuchhal**,** Chaitanya Publishing House

M.TECH-II SEMESTER **(ELETIVE III)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
SOLAR ENERGY TECHNOLOGY							

Course objectives:

- To understand the students potential and importance of non-conventional energy sources
- To understand the concept of Solar radiation and Energy conversion
- To understand PV technology principles and techniques of various solar cells / materials for energy conversion.
- To understand Economical and environmental merits of solar energy for variety of applications.

Course Outcomes:

- Knowledge on radiation principles with respective solar energy estimation
- Be familiar with various collecting techniques of solar energy and storage
- PV technology principles and techniques of various solar cells / materials for energy conversion will be learnt
- Economic and environmental merits of solar energy for variety of applications will be understood

UNIT-I

Solar Radiation: Source of radiation – Sun earth relationship- extraterrestrial radiation.– Atmospheric attenuation – Terrestrial radiation-radiation on a horizontal surfaces and inclined planes - relations between monthly, daily and hourly radiation and components of the radiations– solar charts – Critical radiation-Measurement of global, direct and diffuse solar radiation - pyroheliometer, pyranometer, pyrogeometer, sunshine recorder – an overview of solar radiation data in India.

UNIT-II

Solar Flat Plate Collectors: Design considerations – classification- Flat plate collectors- air heating collectors liquid heating –Temperature distributions- Heat removal rate- Useful energy gain - Losses in the collectors-for efficiency of flat plate collectors – selective surfaces.

UNIT-III

Solar Concentric Tube Collectors: Tubular solar energy collectors analysis of concentric tube collector – testing of flat plate collectors. Concentric collectors - Limits to concentration – concentrator mounting – tracking mechanism - performance analysis focusing solar concentrators: Heliostats.

UNIT-IV

Photovoltaic Systems: Conversion of Solar energy into Electricity - Photovoltaic Effect, Photovoltaic material - Solar Cell – Module – Silicon solar cell, Efficiency limits, Variation of efficiency with band-gap and temperature, Efficiency measurements, High efficiency cells, Recent developments in Solar Cells- PV systems - applications

UNIT-V

Energy Storage: Sensible Heat Storage – Liquid media storage – Solid media storage – Latent heat storage - Phase change materials – Chemical storage

UNIT-VI

Industrial Applications Of Solar Heat: Solar Thermal Power Plant, Solar Desalination, Solar Water Heating, Solar Air Heating, Solar Drying, Solar Cooking, Solar Greenhouse technology: Fundamentals, design, modeling and applications

REFERENCE BOOKS:

1. Solar Cells and Their Applications, L D. Partain, L M. Fraas, John Wiley and Sons, 2010
2. Solar Energy Engineering, SoterisKalogirou, Academic Press, 2009
3. Solar Energy, Sukhatme S P, Tata McGraw-Hill Education, 2008
4. Handbook of Photovoltaic Science and Engineering, A Luque, S Hegedus, John Wiley and Sons, 2003
5. Solar Energy Fundamentals, Design, Modeling and Applications, G. N. Tiwari, Narosa Publishing House Pvt. Ltd., 2002
6. Solar Energy- Fundamentals & Applications, H.P. Garg and J. Prakash, Tata McGraw-Hill, 2000.

M.TECH-II SEMESTER **(ELECTIVE-III)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
RENEWABLE ENERGY TECHNOLOGY							

Course Objectives:

- To understand the students potential and importance of non-conventional energy sources
- To under the methods of extracting solar energy, wind energy ocean energy and geothermal energy.

Course Outcomes:

- Student can know the working of flat plate collector, concentrating collectors to extract solar energy.
- Student can know the power generation through horizontal and vertical axis wind turbines.
- Student can know the extraction methods of OTEC, Wave energy and power generation through MHD.
- Student can aware of applications of solar energy

UNIT-I

Introduction: Energy Scenario – Survey of Energy Resources – Classification – Need for Non-Conventional Energy Resources.

Solar Energy: The Sun - Sun-Earth Relationship –Solar radiation – Attention –Radiation measuring Instruments.

UNIT-II

Solar Energy Applications: Solar water Heating, Space heating – Active and Passive heating – Energy storage – selective surface – solar stills and ponds – solar refrigeration – photovoltaic generation.

UNIT-III

Wind Energy: Wind – characteristics – wind energy conversion systems – types – Betz model – Interference Factor – Power Coefficient – Torque Coefficient and thrust coefficient – Lift machines and drag machines – matching – electricity generation..

Geothermal Energy: Structure of Earth – Geothermal Regions – Hot springs – Hot Rocks – Hot Aquifers – Analytical Methods to estimate Thermal Potential – Harnessing Techniques – Electricity Generation Systems.

UNIT–IV

Energy from Oceans: Tidal Energy; Tides – Diurnal and Semi – Diurnal Nature – Power from Tides.

Wave Energy: Waves – Theoretical Energy Available – Calculation of period and phase velocity of waves – wave power systems – submerged devices.

Ocean Thermal Energy: Principles – Heat Exchangers – Pumping requirements – Practical Considerations

UNIT-V

Bio–Energy: Biomass Energy Sources – Plant Productivity, Biomass Wastes – Aerobic and Anaerobic bio-conversion processes – Raw Materials and properties of Bio-gas-Bio-gas plant Technology and Status – The Energetic and Economics of Biomass systems – Biomass gasification – Biodiesel

UNIT-VI

Direct Energy Conversion Systems: Fuel Cells and Solar Cells–Thermionic and Thermoelectric Generation – MHD Generator-Open and Closed Systems.

REFERENCE BOOKS:

1. Renewable Energy Resources, JohnTwidell&Tony Weir, Routledge Publishers
2. Non-Conventional Energy Sources, G.D Rai, (4th ed.), Khanna Publishers
3. Renewable Energy Resources, G.N.Tiwari and M.K.Ghosal, Narosa Publication Ltd
4. Renewable Energy Resources, G.N.Tiwari and M.K.Ghosal, Narosa Publication Ltd
5. Non-Conventional Energy, Ashok V Desai, Wiley Eastern

M.TECH-II SEMESTER **(ELETIVE-IV)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ENVIRONMENTAL POLLUTION AND CONTROL							

Course objectives:

- The course has been designed to improve the understanding of the students about different pollution control strategies and the skills of application of remediation techniques to combat pollution in three environmental compartments i.e. air, water and soil.
- The course will also be dealing about the sources of pollution in air, soil, water, thermal and noise and the impacts these sources on the environment and health.
- In addition, the students will be given the training to develop the particular kills required in pollution related structured research.

Course outcomes:

- Understanding of air/water pollution regulations and their scientific basis
- Apply knowledge for the protection and improvement of the environment
- Ability to monitor marine and nuclear land/soil noise and thermal pollution control systems

UNIT-I

Introduction: Classification of Pollution and Pollutants, Causes, Effects and Sources of Pollution

UNIT-II

Air Pollution: Primary and Secondary Pollutants, Automobile Pollution, Industrial Pollution, Ambient Air Quality Standards, Air pollution sampling and Measurement-types of pollutant sampling and measurement-Ambient air sampling-collection of gaseous air pollutants-collection of particulate pollutants- stock sampling, analysis of air pollutants-sulfur dioxide-nitrogen dioxide, carbon monoxide, oxidants and ozone hydrocarbons-particulate matter.

UNIT-III

Water Pollution: Point and Non-point Source of Pollution, Major Pollutants of Water, Water Quality Requirement for Different Uses, Global water crisis Issues.

UNIT-IV

Marine And Nuclear Pollution: Misuse of International Water for Dumping of Hazardous Waste, Coastal Pollution Due to Industrial Effluents, Nuclear Power Plants, Nuclear Radiation, Disasters and Impacts, Genetically Disorders.

UNIT-V

Land/Soil Pollution: Effects of urbanization on land degradation, Impact of Modern Agriculture on Soil, Effect on Environment and Life sustenance, Abatement measures.

UNIT-VI

Noise and Thermal Pollution: Sources of Noise, Effects of Noise, Industrial Noise - Occupational Health Hazards, Thermal Comforts, Heat Island Effect, Radiation Effects

REFERENCE BOOKS:

1. Introduction to Engineering and Science, Manster, G.M, Pearson Publishers, 2004.
2. Environmental Pollution Control Engineering, Rao, E.S, Wiley Eastern Ltd., 1991
3. Pollution Control in Process Industries, Mahajan, S.P., Tata McGraw-Hill, 1985
4. Air Pollution Control Theory, Crawford, M., TMH, 1976.

M.TECH-II SEMESTER **(ELETIVE-IV)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
AIRCRAFT AND SPACE PROPULSION							

Course objectives:

- To enhance the knowledge of the students on aircrafts and space propulsion
- To gain insight on the working principle of rocket engines, different feed systems, propellants and their properties and dynamics of rockets.

Course outcomes:

- On successful completion of this course the student will be able to understand the working of different types of aircraft and rocket propulsion systems and their performance characteristics.

UNIT-I

Gas Dynamics

Wave motion - Compressible fluid flow through variable area devices – Stagnation state Mach Number and its influence and properties, Isentropic Flow, Rayleigh and Fanno Flow, Deflagration and Detonation – Normal shock and oblique shock waves

UNIT-II

Thermodynamics of Aircraft Engines

Theory of Aircraft propulsion – Thrust – Various efficiencies – Different propulsion systems – Turboprop – Ram Jet – Turbojet, Turbojet with after burner, Turbo fan and Turbo shaft. Variable thrust- nozzles – vector control

UNIT-III

Performance Characteristics of Aircraft Engines

Engine - Aircraft matching – Design of inlets and nozzles – Performance characteristics of Ramjet, Turbojet, Scramjet and Turbofan engines.

UNIT–IV

Rocket Propulsion

Theory of rocket propulsion – Rocket equations – Escape and Orbital velocity – Multi-staging of Rockets – Space missions – Performance characteristics – Losses and efficiencies

UNIT-V

Solid Propellant Rocket Engines- Combustion of solid propellants– stability of the burning surface– solid propellant composition preparation– design of propellant grains– trends in solid propellant rocket development

UNIT-VI

Liquid Propellant Rocket Engines

Introduction-Performance analysis of ideal rocket motor– departure from ideal performance– theoretical specific impulse calculations– combustor design principles– cooling of rocket motors– liquid rocket-systems

REFERENCE BOOKS:

1. Mechanics and Thermodynamics of Propulsion, Philip G. Hill and Carl R. Peterson, Wesley Publishing Company, New York, 2009
2. Principles of Jet Propulsion and Gas Turbines, Zucrow N.J., John Wiley and Sons New York, 1970.
3. Aircraft and Missile Propulsion, Zucrow N.J., Vol. I and Vol. II, John Wiley and Sons Inc, New
4. Fundamentals of Compressible Flow, S. M.Yahya, New Age International Pvt Ltd, 2003.
5. Principles of Guided Missile Design, Bonney E.A. Zucrow N.J., Van Nostranc Co., 1956
6. Jet Propulsion Engines, Lancaster O.E., Princeton Legacy Library

M.TECH-II SEMESTER **(ELECTIVE–IV)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
CRYOGENIC ENGINEERING							

Course Objectives:

At the end of the completion of the course the student will be able to

- Understand the mechanism of variation of properties of materials at low temperatures
- Apply the principles of thermodynamics to analyze the low-temperature air separation systems.
- Apply the principles of thermodynamics to the analyze gas liquefaction systems.
- Understand use of effective and environmentally safe cryogenic technology for applications in industry, construction, agriculture, medicine and living organisms.

Course Outcomes:

- Student can know the working of flat plate collector, concentrating collectors to extract solar energy.
- Student can know the power generation through horizontal and vertical axis wind turbines.
- Student can know the extraction methods of OTEC, Wave energy and power generation through MHD.
- Student can aware of applications of solar energy

UNIT-I

Introduction To Cryogenic Systems: Mechanical Properties at low temperatures, Properties of Cryogenic Fluids

GAS LIQUEFACTION: Minimum work for liquefaction, Methods to protect low temperature, Liquefaction systems for gages other than Neon, Hydrogen and Helium

UNIT-II

Liquefaction Cycles: Carnot Liquefaction Cycle, F.O.M. and Yield of Liquefaction Cycles, Inversion Curve - Joule Thomson Effect, Linde Hampson Cycle Precooled Linde Hampson Cycle, Claudes Cycle, Dual Cycle, Helium Refrigerated Hydrogen Liquefaction Systems. Critical components in Liquefaction Systems

UNIT-III

Separation of Cryogenic Gases: Binary Mixtures, T-C and H-C. Diagrams, Principle of Rectification, Rectification Column Analysis – McCabe Thiele Method. Adsorption Systems for purification

UNIT-IV

Cryogenic Refrigerators: J.T. Cryocoolers, Stirling Cycle Refrigerators, G.M. Cryocoolers, Pulse Tube Refrigerators, Regenerators used in Cryogenic Refrigerators, Magnetic Refrigerators.

UNIT-V

Handling of Cryogens: Cryogenic Dewar Construction and Design, Cryogenic Transfer Lines. Insulations used in Cryogenic Systems, Different Types of Vacuum Pumps, Instrumentation to measure Flow, Level and Temperature.

UNIT-VI

Applications: Applications of Cryogenics in Space Programs, Superconductivity, Cryo Metallurgy, Medical applications.

REFERENCE BOOKS:

1. Cryogenic Systems, Randall F.Barron, McGraw Hill
2. Cryogenic Engineering, Scott R.B., Van Nostrand and Co
3. Cryogenic Technology, Robert W.Vance, Johnwiley& Sons, Inc., New York, London
4. Cryogenic Process Engineering, Klaus D.Timmerhaus, Plenum Press New York

M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	6	25	50	75	3
COMPUTATIONAL METHODS LABORATORY							

Course Objectives:
To make the student understand

- Solution of problems of heat conduction using fem software
- Solving problems involving heat transfer from fins by writing program codes in MAT lab software
- Solving problems containing flow and heat transfer using FVM software

Course Outcomes:
The student will be able to

- Write program source codes to some heat transfer problems and solve them using MAT lab
- Solve some heat transfer problems using FEM software
- Solve certain problems involving flow and heat transfer using FVM software

LIST OF NUMERICAL PROBLEMS
Any TEN numerical problems
The following problems are solved using MATLAB, FEM and FVM software.

1. Two dimensional steady state heat conduction in a slab.
2. One dimensional unsteady state heat conduction in a slab.
3. Heat transfer from a rectangular fin.
4. Heat transfer from a triangular fin.
5. Laminar flow through a rectangular duct.
6. Laminar natural convection from a vertical plate.
7. Parallel flow double pipe heat exchanger.
8. Counter flow heat exchanger.
9. Solution of a Tridiagonal matrix (TDM) using Thomas algorithm.
10. Solution of a second order ordinary differential equation by fourth-order Runge-Kutta Method.
11. Solution of simultaneous first order ordinary differential equations by fourth-order Runge Kutta Method.

I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
COMPUTATIONAL METHODS IN ENGIN EERING							

Course Objectives:

- Know how to solve system of equations, ordinary differential equations and partial differential equations numerically.
- Understand correlation and regression.
- Know optimization techniques in solving linear, integer and fractional programming problems.

Learning Outcomes:

Student will be able to

- Find the solutions of system of linear and non linear equations.
- Solve ordinary and partial differential equations numerically.
- Find correlation coefficient and regression.
- Optimize linear, integer and fractional programming problems.

UNIT-I

Introduction to numerical methods applied to engineering Problems:

Solving system of linear equations by Gauss Seidel and Relaxation methods. Solving system of non-linear equations by Newton-Raphson method.

UNIT-II

Numerical Solutions of Ordinary Differential Equations:

Boundary Value Problems: Shooting Method–solution through a set of equations - derivative boundary conditions - Rayleigh Ritz Method.

UNIT-III

Numerical Solutions of Partial Differential Equations:

Finite-Difference Approximations to Derivatives, Laplace Equation – Jacobi Method - ADI Method, Parabolic Equation – Crank Nicolsen method.

UNIT-IV

Applied Statistics:

Correlation Analysis - Correlation Coefficient – coefficient of Correlation for grouped bi-variate data – coefficient of determination – Test of significance for correlation coefficient. Regression Analysis - Simple linear regression - Multiple linear regression.

UNIT-V

Optimization Techniques:
Linear Programming Problem – Simplex Method, Artificial variable method –Big-M Method, Integer Programming Problem – Branch and Bound Method, Linear Fractional Programming Problem.

UNIT-VI

Curve fitting and approximation of functions:
Least square approximation fitting of non-linear curves by least squares –computer programs

HYPERBOLIC PARTIAL DIFFERENTIAL EQUATIONS: Solving wave equation by finite differences-stability of numerical method – method of characteristics wave equation in two space dimension-computer programs.

TEXT BOOKS:

1. Steven C.Chapra, Raymond P.Canale "Numerical Methods for Engineers" Tata Mc-Graw Hill
2. Curtis F.Gerald, Partick.O.Wheatly,"Applied numerical analysis" , Addison-Wesley,1989

REFERENCE BOOKS:

1. Douglas J.Faires,RichedBurden"Numerical methods", Brooks/Cole publishing company,1998.Second edition.
2. Ward Cheney and David Kincaid "Numerical mathematics and computing" Brooks/Cole publishing company1999, Fourth edition.
3. Riley K.F,.M.P.Hobson and BenceS.J,"Mathematical methods for physics and engineering", Cambridge University press,1999.
4. S.S.Sastry, Introductory Methods of Numerical Analysis, PHI.
5. Basic Statistics – Agarrval, B.L. Wiley 1991, 2^{nd} edition.
6. Operations Research – S.D. Sarma.

I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
ADVANCED MECHANICS OF SOLIDS							

Course Objectives:

- To familiarize with the concepts of stresses and strains in un symmetric bending and torsion using classical methods.

Learning Outcomes:

Student will be able to

- Apply the theory of elasticity including strain/displacement and Hooke's Law relationships.
- Analyze solid mechanics problems using classical and energy methods.
- Solve torsion problems in bars and thin walled methods.
- Solve for stresses and deflection beam under unsymmetrical loading.
- Assess various failure criteria in engineering problems.

UNIT-I

Theories of Stress and Strain: Definition of stress at a point, stress notation, principal stresses, differential equations of motion of a deformable body, deformation of a deformable body, strain theory, principal strains.

Stress–Strain Temperature Relations: Elastic and non-elastic response of a solid, Hooke's law, anisotropic elasticity, Isotropic elasticity, initiation of yield, yield criteria.

UNIT-II

Shear Center:

Bending axis and shear center-shear center for axi-symmetric and unsymmetrical sections

UNIT-III

Unsymmetrical bending:

Bending stresses in Beams subjected to nonsymmetrical bending; deflection of straight beams due to nonsymmetrical bending

UNIT-IV

Curved Beam Theory:

Winkler Bach formula for circumferential stress –limitations – correction factors –radial stress in curved beams – closed ring subjected to concentrated and uniform loads-stresses in chain links.

UNIT-V

Axi-Symmetric Problems:

Rotating Discs- flat discs, discs of uniform thickness, discs of uniform strength, rotating cylinders

UNIT-VI

Torsion:

Linear elastic solution, Prandtl elastic membrane (Soap-Film) analogy, narrow rectangular cross section, hollow thin wall torsion members, multiple connected cross sections. Hollow thin wall torsion members, Thin wall torsion members with restrained ends.

TEXT BOOKS:

1. Boresi& Sidebottom, "Advanced Mechanics of materials" Wiely International, 6th edition.
2. Dr Sadhu singh , "Strength of materials" Khanna Publication, 1st edition

REFERENCE BOOKS:

1. Timoschenko S.P. and Goodier J.N., " Theory of elasticity", McGraw- Hill Publishers, 3rd Edition.
2. L.S Srinath, "Advanced Mechanics of Solids", McGraw Hill Education(India)Pvt. Ltd. 3rd edition.

I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
ANALYSIS AND SYNTHESIS OF MECHANISMS							

Course Objectives:

- To introduce the concepts used for kinematic analysis of planar and spatial mechanisms.
- To familiarize with the concepts of force analysis and synthesis of mechanisms.

Learning Outcomes:

Student will be able to

- Determine the displacement, velocity and accelerations of links of mechanism.
- Apply path curvature characteristics in analysis of mechanisms.
- Apply analytical and synthesis techniques in design of mechanisms.
- Determine the forces and torque acting by performing force analysis.
- Apply forward and reverse kinematic analysis techniques in performance evaluation of manipulators.

UNIT-I

Introduction: Elements of Mechanisms,degrees of freedom,Kutchback equation and grublers criterion -applications of Grublers criterion, transmission angles- extreme values of transmission angles , toggle positions.

Displacement, Velocity and Acceleration Analysis (Analytical methods only): Analysis for four bar and single slider crank mechanisms.

UNIT-II

Path Curvature Theory: Introduction , fixed and moving centrodes , inflection points and inflection circle ,Euler Savary Equation , Bobilliers Construction , Collineation axis , Bobillier theorem ,Hartmann construction , Bresse circle , Return circle , Cusp Points , Crunode points.

UNIT-III

Kinematic Synthesis: Introduction , type, dimensional and number Synthesis , synthesis for function generation, path and motion generation ,Chebyschev Spacing of accuracy points

Graphical Synthesis Techniques: Motion generation for two prescribed positions and three prescribed positions – path generation for three prescribed positions without and with prescribed timing – function generation for three prescribed positions.

UNIT-IV

Analytical Synthesis Techniques: Four bar and slider crank function generator with three accuracy points– use of complex numbers and dyads – three prescribed positions for motion, path and function generation using dyad.

UNIT-V

Static Force Analysis: Static equilibrium , equilibrium of two and three force members , equilibrium of four force members , static force analysis of four bar and slider crank mechanisms.
Dynamic Force Analysis: D Alembert Principle , dynamic analysis of four bar mechanism and single slider crank mechanism – dynamically equivalent system – inertia of Connecting Rod – inertia force and torque in reciprocating Engine (Analytical Method only).

UNIT-VI
Spatial Mechanisms: D-H transformation matrix; forward kinematic analysis of serial manipulators–Reverse kinematic analysis – iterative solution techniques.

TEXT BOOKS:

1. Erdman and Sandor ,"Advanced Mechanism Design (Vol II)",Prentice Hall International 1984.
2. S.S. Rattan, " Theory of Machines",TataMcGraw Hill, 2011

REFERENCE BOOKS:

1. Uicker, Pennock and Shigley," Theory of machines and Mechanisms", Oxford Univ Press,2010.
2. AmitabhaGhosh and Ashok Kumar Mallik, " Theory of Mechanism and machines", East West Press pvt Ltd,2nd edition.
3. Robert L.Norton," Design of Machinery", Tata McGraw Hill 3rd edition.

I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
MECHANICAL VIBRATIONS							

Course Objectives:

- Formulate mathematical models of problems in vibrations using Newton's second law or energy principles.
- Determine a complete solution to the modeled mechanical vibration problems.
- Correlate results from the mathematical model to physical characteristics of the actual system.
- Design of a mechanical system using fundamental principles developed in the class.

Learning Outcomes:

Student will be able to

- Understand the causes and effects of vibration in mechanical systems and their classification.
- Develop schematic models for physical systems and formulate governing equations of motion.
- Understand the role of damping, stiffness and inertia in mechanical systems.
- Analyze rotating and reciprocating systems and design machine supporting structures, vibration isolators and absorbers.
- Calculate free and forced vibration responses of multi degree freedom systems using modal analysis.
- Analysis and design for the control/ to reduce vibration effects in machinery.

UNIT-I

Fundamentals of Vibrations Analysis

Introduction; Elements of vibration; classification of vibration; vibration analysis procedure; spring elements – equivalent stiffness; mass or inertia elements; damping elements – equivalent damping; types of damping; definitions and terminology; simple harmonic motion.

UNIT-II

Free Vibration Analysis - Single Degree Of Freedom Systems :

Undamped Vibrations: Different methods for equation of motion– Newton’s second law, D’Alembert’s principle, principle of virtual displacement, principle of conservation of energy, Rayleigh’s method.

Damped Vibrations: Differential equation of motion; critical damping coefficient and damping ratio; damped natural frequency; logarithmic decrement; energy dissipated in viscous damping

UNIT-III

Forced Vibration Analysis (Single Degree Of Freedom System): Response of damped and undamped systems to harmonic excitation; frequency response curve; magnification factor; harmonic excitation of the base, vibration isolation, transmissibility, force transmission to foundations.

Vibration measuring instruments – working principle of Seismic mass, vibrometer, accelerometer

UNIT-IV

Damped and Undamped Vibrations – Two degree of freedom system Free and forced vibration analysis of a two degree of freedom system – different methods for the formulation of equation equations of motion, natural frequencies, principal modes - physical interpretation and orthogonality; general method, eigen value method

UNIT-V

Torsional Vibrations: Torsional vibration of one, two and three rotor system; Equivalent shafting; torsional vibration of a geared system; coordinate coupling – static and dynamic coupling; whirling of rotating shafts

UNIT-VI

Vibrations of continuous systems : Vibrations of springs, bars and beams, formulation of equation of motion, characteristic equation, eigen values, identification of node and mode shapes.

TEXT BOOKS:

1. G.K. Grover & Nigam , "Mechanical Vibrations", Nem Chand and Brothers, 8th edition
2. S.S. Rao , "Mechanical vibration", pearson India, 4th edition.

REFERENCE BOOKS:

1. Thomson, " Theory of Vibration with Application", pearson India, 5th edition.
2. V.P.Singh,"Mechanical vibration" DhanpatRai& Co.
3. Schaum Series," Mechanical vibration" McGraw-Hill, 1st edition.
4. F.S. Tse, Morse &Hinkle,"Mechanical Vibration", CBS Publisher, 2nd edition.

I M.TECH-I-SEMESTER **(ELECTIVE-I)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
THEORY OF ELASTICITY AND PLASTICITY							

Course Objectives:

- To introduce the basic concepts of theory of elasticity

Learning Outcomes:

Student will be able to

- Determine stress distribution and strain components for simple and symmetric problems
- analyze three dimensional problems using equilibrium and compatibility equations
- Determine stresses induced in beams of different cross sections
  Apply concepts of plasticity to determine the shear stresses and strain energy

UNIT-I

Elasticity : Two dimensional stress analysis - plane stress - plane strain - equations of compatibility -stress function - boundary conditions.

Problem in rectangular coordinates : Solution by polynomials - Saint Venent's principles – determination of displacement - simple beam problems.

UNIT-II

Problems in polar coordinates : General equations in polar coordinates - stress distribution symmetrical about axis - strain components in polar coordinates - simple and symmetric problems.

UNIT-III

Analysis of stress and strain in three dimensions : Principle stresses–homogeneous deformations -strain spherical and deviatoric stress - hydrostatic strain.

General theorems : Differential equations of equilibrium and compatibility - displacement – uniqueness of solution - reciprocal theorem.

UNIT-IV

Bending of prismatic bars : Stress function - bending of cantilever beam - beam of rectangular cross-section - beams of circular cross-section.

UNIT-V

Plasticity : Plastic deformation of metals - structure of metals - deformation - creep stress relaxation of deformation - strain rate condition of constant maximum shear stress - condition of constant strain energy - approximate equation of plasticity.

UNIT-VI

Methods of solving practical problems : The characteristic method - engineering method – compression of metal under press - theoretical and experimental data drawing.

TEXT BOOKS:

1. S.P. Timoshenko & J.K Goodier , “Theory of Elasticity”, MGH,3rd Edition

REFERENCE BOOKS:

1. E.P. Unksov ,”An Engineering Theory of Plasticity”, Butterworths scientific publications,1961
2. Hoffman and Sacks , “Theory of Plasticity” , McGraw-Hill, New York, 1953.

I M.TECH-I-SEMESTER **(ELECTIVE-I)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
TRIBOLOGY							

Course Objectives:

- To know the selection of lubricating system for different types of bearings in various environmental conditions;
- To understand the principles of design of Hydrostatic and Hydro Dynamic bearings.

Learning Outcomes:

Student will be able to

- Select the appropriate bearing materials.
- Select the rolling element bearing for the given conditions.
- Design hydrostatic, hydrodynamic and air lubrication systems used in bearings.
- Minimize the boundary friction and dry friction.

UNIT-I

Introduction: Nature of surfaces and contact-surface topography, friction and wear mechanisms, wear maps, effect of lubricants- methods of fluid film formation.

Lubrication: Choice of lubricants, types of oil, grease and solid lubricants- additives-lubrication systems and their selection.

UNIT-II

Selection of rolling element bearings: Nominal life, static and dynamic capacity-equivalent load,probabilities of survival- cubic mean load bearing mounting details, pre loading of bearings, conditioning monitoring using shock pulse method.

UNIT-III

Hydrostatic Bearings: Thrust bearings–pad coefficients- restriction optimum film thickness-journal bearings – design procedure –aerostatic bearings; thrust bearings and journal bearings – design procedure.

UNIT-IV

Hydrodynamic bearings: Fundamentals of fluid formation– Reynold’s equation; hydrodynamic journal bearings – Sommer field number, performance parameters – optimum bearing with maximum load capacity – friction – heat generated and heat dissipated. hydrodynamic thrust bearings; Raimondi and Boyd solution for hydrodynamic thrust bearings - fixed tilting pads, single and multiple pad bearings-optimum condition with largest minimum film thickness.

UNIT-V

Seals: Different type-mechanical seals, lip seals, packed glands, soft piston seals, mechanical piston rod packing, labyrinth seals and throttling bushes, oil flinger rings and drain grooves – selection of mechanical seals.

UNIT-VI

Failure of Tribological components: Failure analysis of plain bearings, rolling bearings, gears and seals, wear analysis using soap and ferrography.

Dry rubbing Bearings: porous metal bearings and oscillatory journal bearings–qualitative approach only.

TEXT BOOKS:

1. Rowe WW& O' Dionoghue,"Hydrostatic and Hybrid bearing design" ,Butterworths& Co. Publishers Ltd,1983.
2. Collacott R.A, "Mechanical Fault diagnosis and condition monitoring", Chapman and Hall, London ,1977.
3. Bernard J. Hamrock, "Fundamentals of fluid film lubricant", McGraw-Hill Co., 1994.

REFERENCE BOOKS:

1. Neale MJ, (Editor) "Tribology hand Book" ,Neumann Butterworths,1975.
2. Connor and Boyd JJO (Editors) "Standard hand book of lubrication engineers" ASLE, McGraw Hill Book & Co.,1968.
3. Shigley J, E Charles, " Mechanical Engineering Design", McGraw Hill Co.,6th Edition.

I M.TECH-I-SEMESTER (ELECTIVE-I)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
ROTOR DYNAMICS							

Course Objectives:

- To develop expertise regarding rotor dynamics and vibration in rotating machinery.
- To expose the concepts of rigid rotor dynamics, rotor vibration and critical speeds.

Learning Outcomes:

Student will be able to

- Analyze vibrations in rotating machinery.
- Determine the whirling speed of rotor.
- Identify the effect of bearings on rotor vibrations.
- Monitor the condition of rotors

UNIT-I

Introduction to Vibration and the Laval-Jeffcott Rotor Model: Co-ordinate systems, steady state rotor motion, elliptical motion, single degree of freedom systems, free and forced vibrations.

UNIT-II

The two degrees of freedom rotor system, translational motion, natural frequencies and natural modes, steady state response to unbalance, the effect of flexible support.

UNIT-III

Torsional Vibration in Rotating Machinery: modeling of rotating machinery shafting - multi degree of freedom systems - determination of natural frequencies and mode shapes - branched systems - Holzer method.

UNIT-IV

Rigid Rotor Dynamics and Critical Speeds: rigid disk equation - rigid rotor dynamics-rigid rotor on flexible rotor - the gyroscopic effect on rotor dynamics - whirling of an unbalanced simple elastic rotor, simple shafts with several disks - effect of axial stiffness - determination of bending critical speeds - Campbell diagram.

UNIT-V

Influence of Bearing on Rotor Vibration: Support stiffness on critical speeds- stiffness and damping coefficients of journal bearings-computation and measurements of journal bearing coefficients - mechanics of hydro dynamic instability- half frequency whirl and resonance whip- design configurations of stable journal bearings

UNIT-VI

Balancing and Condition Monitoring of Rotors: Single plane balancing, multi-plane balancing, balancing of rigid rotors, balancing of flexible rotors noise spectrum, real time analysis, knowledge based expert systems.

TEXT BOOKS:

1. J. S.Rao, "*Rotor Dynamics"*, New Age International Publishers, New Delhi, 2004.
2. S.Timoshenko, D H.Young and W. Weaver , "Vibration Problems in Engineering", John Wiley,2000.

REFERENCE BOOKS:

1. WengJeng Chen and J Edger Gunter, "Introduction to Dynamics of Rotor – Bearing Systems", Trafford Publishing Ltd., London 2007.
2. T. Yamamoto and Y.Ishida , "Linear and Nonlinear Rotordynamics: A Modern Treatment with Applications", John Wiley and Sons Inc, New York, 2001.
3. J. S.Rao, "Vibratory Condition Monitoring of Machines",NarosaPubulishing House, 2000.

<table>
<tr><td rowspan="2">I M.TECH-I-SEMESTER
(ELECTIVE-I)</td><td>L</td><td>T</td><td>P</td><td>INTERNAL MARKS</td><td>EXTERNAL MARKS</td><td>TOTAL MARKS</td><td>CREDITS</td></tr>
<tr><td>4</td><td>-</td><td>-</td><td>40</td><td>60</td><td>100</td><td>3</td></tr>
<tr><td colspan="8">DESIGN FOR MANUFACTURING AND ASSEMBLY</td></tr>
</table>

Course Objectives:

- To introduce the design factors this will ease the manufacturing and assembly.

Learning Outcomes:

Student will be able to

- Incorporate the process constraints & other influencing factors for design.
- Design a metal casting product considering trouble shooting elements.
- Design a defect free weldment.
- Select appropriate material and manufacturing process for product development.
- Plan an assembly for ease of manufacture and automation.

UNIT-I

Design for manufacturing: Reduce the cost of manufacturing process, understanding the process and constraints, standard components and process, consider the impact of DFM decisions and other factors.

UNIT-II

Machining processes: Overview of various machining processes general design rules for machining-dimensional tolerance and surface roughness-Design for machining – ease – redesigning of components for machining ease with suitable examples. General design recommendations for machined parts.

UNIT-III

Design consideration in metal casting: Mold and gating system design, directional solidification, and trouble shooting.

UNIT-IV

Design for Welding: Selection of materials for joining, welding defects, minimize the residual stressesetc. design for forging and sheet metal and powder metal process.

UNIT-V

Plastics: Visco elastic and creep behavior in plastics-design guidelines for plastic components-design considerations for injection moulding– design guidelines for machining and joining of plastics

UNIT-VI

Design for assembly and automation: Application of design for manufacture and assembly with selection of materials and ranking of processes like casting, injection moulding, sheet metal working, die casting, powder metal process, investment casting and hot forging, design for assembly and automation.

TEXT BOOKS:

1. George E. Dieter, “Engineering Design – A Material Processing Approach”, McGraw Hill International ,2ndEditon, , 2001
2. GeofreyBoothroyd, Peter Dewhurst, “Product Design for Manufacture and Assembly”, CRC Press, 3rd Edition, 2010.

REFERENCE BOOKS:

1. O. Molloy , “Design for Manufacturing and Assembly: Concepts, Architectures and Implementation”,Chapman and Hall, 1998

I M.TECH-I-SEMESTER **(ELECTIVE-II)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
GEAR ENGINEERING							

Course Objectives:

- To know the design of gears like spur, helical, bevel and worm gears against different types of failures.
- To learn the concepts of gear box design along with optimization parameters.

Learning Outcomes:

Student will be able to

- Select and design appropriate gear for the given application and against the failure.
- Design the gear box to an application.
- Optimize the parameters of gear like weight, space etc.

UNIT-I

Introduction: Principles of gear, Nomenclature, types of gear teeth profiles - Cycloid and Involute, gear manufacturing processes and inspection, selection of right kind of gears.

Gear Failures: Gear tooth failure modes - tooth wear, tooth breakage, pitting, scoring, lubrication failures, gear box casing problems.

UNIT-II

Spur Gears - Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of spur gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load, Design of gear shaft and bearings.

UNIT-III

Helical gears- Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of helical gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load, Design of gear shaft and bearings.

UNIT-IV

Bevel gears - Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of bevel gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load, Design of gear shaft and bearings.

Worm gears - Tooth loads, Principles of Geometry, Design considerations and methodology, Complete design of bevel gear teeth considering Lewis beam strength, Buckingham's dynamic load and wear load, Design of gear shaft and bearings.

UNIT-V

Gear trains: Simple, compound and epicyclic gear trains, Ray diagrams, Design of a gear box of an automobile – Constant Mesh and sliding type.

UNIT-VI

Optimal Gear design: Optimization of gear design parameters, Weight minimization, Constraints in gear train design- space, interference, strength, dynamic considerations, rigidity etc., Compact design of gear trains.

TEXT BOOKS:

1. T.V.Sundarajanmurthy, N.Shanmugam,"Machine Deisgn", Anuradha Agencies Pub-Chennai
2. Maleev and Hartman, "Machine Design", C.B.S. Publishers, India.
3. " Design Data Hand Book", International Book House (P).Ltd Delhi
4. " Design Data Hand Book", Anuradha Publications - Chennai

REFERENCE BOOKS:

1. Henry E.Merrit, "Gear engineering" ,Wheeler publishing,Allahabad,1992.
2. Darle W. Dudley ,"Practical Gear design", McGraw-Hill book company.
3. Norton, "Machine Design - An Integrated Approach", 2nd Edition, Pearson Publications, 2000.

Note: Design data book is allowed for the examinations.

I M.TECH-I-SEMESTER **(ELECTIVE-II)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
NON-DESTRUCTIVE EVALUATION							

Course objectives:

- To understand the principles behind various NDT techniques.
- To study about NDT equipment and accessories.
- To learn working procedures of various NDT techniques.

Course Outcomes:

After Completion of this course students will be able to

- Demonstrate good grounding in the area of NDT.
- To select proper NDT Method for his application
- Understand the utilization of test and measurement appropriate to the area of his study/problem

UNIT-I

Ultra Sonic Hardness Testing: Flaw Detection Using Dye Penetrants. Magnetic Particle Inspection introduction to electrical impedance, Principles of Eddy Current testing, Flaw detection using eddy currents.

UNIT-II

Holography: Principles and practices of Optical holography, acoustical, microwave, x-ray and electron beam holography techniques.

UNIT-III

Introduction to X-Ray Radiography: The Radiographic process, X-Ray and Gamma ray Sources, Geometric Principles, Factors Governing Exposure, Radio graphic screens, Scattered Radiation, Arithmetic of exposure, Radiographic image quality and detail visibility, Industrial X-ray films.

UNIT-IV

X-Ray Radiography processes: Fundamentals of processing techniques, Process control, the processing Room, Special Processing techniques, Paper Radiography, Sensitometric characteristics of x-ray films, Film graininess signal to noise ratio in radiographs, the photographic latent image, Radiation Protection

UNIT-V

Introduction to Ultrasonic Testing: Generation of ultrasonic waves, Horizontal and shear waves, Near field and far field acoustic wave description, Ultrasonic probes- straight beam, direct contact type, Angle beam, Transmission/reflection type, and delay line transducers, acoustic coupling and media, Transmission and pulse echo methods, A-scan, B-scan, C-scan, F-scan and P-scan modes.

UNIT-VI

Ultrasonic tests: Flaw sizing in ultrasonic inspection: AVG, Amplitude, Transmission, TOFD, Satellite pulse, Multi-modal transducer, Zonal method using focused beam. Flow location methods, Signal processing in Ultrasonic NDT; Mimics, spurious echos and noise. Ultrasonic flaw evaluation.

Applications

1. NDT in flaw analysis of Pressure vessels, piping
2. NDT in Castings, Welded constructions, etc., Case studies.

TEXT BOOKS:

1. Ultrasonic testing by Krautkramer and Krautkramer
2. Ultrasonic inspection 2 Training for NDT : E. A. Gingel, Prometheus Press.

REFERENCE BOOKS:

1. ASTM Standards, Vol 3.01, Metals and alloys.

	4	-	-	40	60	100	3
MATERIAL TECHNOLOGY							

Course Objectives:

- To gain and understanding of the relationship between the structure, properties, processing, testing and applications of strengthening mechanism, modern metallic, smart, non-metallic, advanced structural ceramic and composite materials so as to identify and select suitable materials for various engineering applications.

Course Outcomes:

After Completion of this course students will be able to

- Students will get knowledge on mechanism of plastic deformation and strengthening mechanism.
- Students will be able to learn the structure, properties and applications of modern metallic materials, smart materials non-metallic materials and advanced structural ceramics.
- Students will be able to understand the importance of advanced composite materials in application to sophisticated machine and structure of components.

UNIT-I

Classification of materials and their properties, Bonds in Solids, Crystallographic planes and directions, Elasticity in metals and polymers, mechanism of plastic deformation, role of dislocations, yield stress, shear strength of perfect and real crystals, strengthening mechanism, work hardening, solid solution, grain boundary strengthening.

UNIT-II

Poly phase mixture, precipitation, particle, fiber and dispersion strengthening, effect of temperature, strain and strain rate on plastic behavior, super plasticity, deformation of non-crystalline material.

UNIT-III

Modern metallic Materials: Iron-Iron Carbide Diagram, TTT Diagram, Dual phase steels, high strength low alloy (HSLA) Steel, transformation induced plasticity (TRIP) Steel, maraging steel, intermetalics, Ni and Ti aluminides.Smart materials Classification, shape memory alloys, metallic glass, quasi crystal and nano crystalline materials.

UNIT-IV

Non-metallic materials: Polymeric materials Classification, properties and applications, production techniques for fibers, foams, adhesives and coatings, structure, properties and applications of engineering polymers.

UNIT-V

Advanced structural ceramics: Ceramic materials Classification, properties and applications, WC, TiC, TaC, Al2O3, SiC, Si3 N4, CBN and diamond-properties, processing and applications.

UNIT-VI

Advanced structural composites: Introduction, types of composite materials, properties, processing and application. Motivation of selection, cost basis and service requirements, selection for mechanical properties, strength, toughness, fatigue and creep.

TEXT BOOKS:

1. Mechanical behavior of materials/Thomas H.Courtney/2nd Edition, McGraw-Hill, 2000
2. Mechanical Metallurgy/George E.Dieter/McGraw Hill, 1998
3. Introduction to Physical Metallurgy, Sidney H. Avner, US, 2nd Edition, 2007 Tata McGrawHill, Noida, 1985.

REFERENCE BOOKS:

1. Selection and use of Engineering Materials 3e/Charles J.A/Butterworth Heiremann.
2. Materials Science and Engineering, William D. Callister, 8th Edition, 2010.
3. Material Science and Metallurgy, kodgire V.D, 12th Edition, Everest Publishing House 2002.

I M.TECH-I-SEMESTER **(ELECTIVE-II)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
ADVANCED COMPUTER AIDED DESIGN							

Course Objectives:

- Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D production drawings, understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program.
- Improve visualization ability of machine components and assemblies before their actual fabrication through modeling, animation, shading, rendering, lighting and coloring.
- Model complex shapes including freeform curves and surfaces.
- Integrate the CAD system and the CAM system by using the CAD system for modeling design Information and converting the CAD model into a CAM model for modeling the manufacturing Information.
- Use full-scale CAD/CAM software systems designed for geometric modeling of machine Components and automatic generation of manufacturing information.

Course Outcomes:

After Completion of this course students will be able to

- Understand the concepts of wireframe, surface and solid modeling.
- Understand part modeling and part data exchange standards (VDA, IGES, and STEP).
- Develop knowledge in 2D-Transformations, 3D Transformations.
- Understand the Assembly Modeling, Assembly tree, and Assembly Methods.
- The Students become experts on Visualization and computer animation Techniques.

UNIT-I

Introduction to CAD: Introduction to CAD, CAD input devices, CAD output devices, CAD Software, Typical Product Cycle, Implementation of CAD process, Application of CAD, Benefits of CAD, Requirements of geometric modeling, Geometric construction methods, Modeling features: Drafting features, modeling features, editing features, annotations, dimensioning, tolerance and hatching features, display control features, analysis and optimization features, programming features, plotting features.

UNIT-II

Modeling Tools: Coordinate system, limits, grid, snap, line type and line weight, basic geometric commands, layers, display control commands, editing commands.Feature based Modeling: Introduction, Feature Entities, Parametric, and Feature Manipulations.

Geometric Modeling: Types of curves and curve manipulations, Types of surfaces and surface manipulations,

Solid modeling: Geometry and Topology, Boundary representation (B-rep), Constructive Solid Geometry (CSG) – Euler – Poincare formula - examples, Sweeping, Solid manipulations.

UNIT-III
Transformations and Mechanical tolerance
Transformations: 2D and 3D Transformations.
Product data Exchange: Evaluation of data – exchange format, IGES data representations and structure, STEP Architecture.

UNIT-IV
Geometric tolerance: Datum's, types of tolerances, tolerance modeling and representation, **tolerance analysis:** worst-case arithmetic method, worst-case statistical method, Monte Carlo simulation method.

UNIT-V
Mass properties and Mechanical assembly
Mass Property Calculations: Mass, centroid, Moment of inertia, second moments and product of inertia, property mapping.
Collaborative Design: Traditional design, Collaborative Design, Principles and Approaches.
Assembly Modeling: Introduction, Assembly Modeling, Assembly Tree, Assembly Planning,
Mating Conditions, Bottom – Up and Top – Down Assembly Approaches with examples

UNIT-VI
Visualization and Computer animations
Visualization: Introduction, Model clean up, Hidden -Line Removal, Hidden Surface Removal, Hidden Solid Removal, Shading, Colors.
Computer Animation: Introduction, Conventional animation, Computer animation, Entertainment animation, Engineering animation, Animation types, Animation techniques.

TEXT BOOKS:
1. Mastering CAD/CAM, Ibrahim Zeid, TMH, New Delhi
2. CAD/CAM Concepts and Applications, Alavala, PHI, New Delhi

REFERENCE BOOKS:
1. CAD/CAM, PN Rao, PHI
2. Computer Graphics, Alavala, PHI, New Delhi
3. Computer integrated Manufacturing, Harrington, Huntington, New York.
4. Computer integrated design and Manufacturing, Bedworth D.D, McGraw Hill, New York.
5. Computer Graphics and Animation, M.C.Trivedi, JAICO
6. Computer aided Design in Manufacturing, Valliere, Prentice Hall, New Jersey.

Course Objectives:

I M.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	6	25	50	75	3
MACHINE DYNAMICS LAB							

- To study the behavior of machine elements experimentally when subjected to dynamic forces.

Learning Outcomes:

Student will be able to

- Determine gyroscopic effect of rotating body.
- Assess the whirling speed of shaft.
- Estimate the natural frequency of undamped torsional vibration of rotor.
- Perform dynamic balancing of rotating and reciprocating masses.

List of Experiments:

1. Natural frequency of simple pendulum.
2. Radius of Gyration compound pendulum.
3. Moment of inertia of bifilar.
4. Moment of inertia of Trifilar.
5. Natural frequency of single rotor system.
6. Natural frequency of double rotor system.
7. Natural frequency of single rotor with damping.
8. Natural frequency of spring mass system.
9. Undamped free vibrations of beam.
10. Damped free vibrations of beam.
11. Force vibrations of beam.
12. Force vibration beam with damped.
13. Journal Bearing Apparatus.
14. Balancing of Reciprocating Masses.
15. Friction and Wear Apparatus.
16. Balancing of Rotating Masses.
17. Motorized Gyroscopic Couple Apparatus.

<table>
<tr><td rowspan="2">I M.TECH-II-SEMESTER</td><td>L</td><td>T</td><td>P</td><td>INTERNAL MARKS</td><td>EXTERNAL MARKS</td><td>TOTAL MARKS</td><td>CREDITS</td></tr>
<tr><td>4</td><td>-</td><td>-</td><td>40</td><td>60</td><td>100</td><td>3</td></tr>
<tr><td colspan="8">FINITE ELEMENT METHODS</td></tr>
</table>

Course Objectives:

- To introduce the concepts of finite element method to solve engineering problems.

Learning Outcomes:

Student will be able to

- Apply variational and weighted residual methods to solve differential equations.
- Analyze 1-D bar and beam problems using finite element method.
- Develop finite element formulations and solve 2-D structural problems using triangular and rectangular elements.
- Analyze vibration problems for frequencies and mode shapes.

UNIT-I

Formulation Techniques: Methodology, engineering problems and governing differential equations, variational methods-potential energy method, Raleigh Ritz method, strong and weak forms, weighted residual methods.

UNIT-II

Finite Element Method*:* Concepts of discretization, types of elements, interpolation function, node numbering scheme, assembly and boundary conditions, application of FEM, advantages and disadvantages of FEM.

UNIT-III

Analysis of 1D Problems: Bar and beam elements - shape functions, stiffness matrix, load vectors, determination of displacements, strains and stresses.

UNIT-IV

Two Dimensional problems: Analysis of 2-D problems using constant strain triangle element, Heat Transfer problems: Conduction and convection, examples: - two dimensional fin. axisymmetric formulations.

UNIT-V

Isoparametric formulations: Sub, iso and superparametric elements, four noded quadrilateral element,numerical integration – Guassian quadrature approach.

UNIT-VI

Dynamic Analysis: Finite element formulation in dynamic problems in structures using Lagragian Method, consistent and lumped mass models, free vibration analysis, longitudinal and transverse vibrations , mode superposition methods and reduction techniques.

TEXT BOOKS:

1. Chandraputla, Ashok and Belegundu , "Introduction to Finite Elements in Engineering ", Prentice – Hall,2011
2. SS Rao , "The Finite Element Methods in Engineering", Pergamon,4^{th} Edition.

REFERENCE BOOKS:

1. JN Reddy , "An introduction to Finite Element Method", McGrawHill,3^{rd} Edition.
2. C. S. Krishnamurthy, "Finite Element Analysis -Theory and Programming",TataMcGraw Hill,2^{nd} Edition.
3. Daryl L Logan, "A first course in finite element method", Cengage Learning.

I M.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
GEOMETRICAL MODELING							

Course Objectives:

- To highlight the importance of geometric modeling in design and manufacturing.

Learning Outcomes:

Student will be able to

- Use various mathematical equation to represent curves.
- Apply the cubic splines in modeling of a product.
- Select appropriate synthetic curves in modeling process.
- Implement the surface modeling for design of various consumer products.

UNIT-I

Introduction: Definition, explicit and implicit equations, parametric equations.

UNIT-II

Cubic Splines-1: Algebraic and geometric form of cubic spline, tangent vectors, parametric space of a curve, blending functions, four point form, reparametrization, truncating and subdividing of curves. Graphic construction and interpretation, composite pc curves.

UNIT-III

Bezier Curves: Bernstein basis, equations of Bezier curves, properties, derivatives.

UNIT IV :

B-Spline Curves: B-Spline basis, equations, knot vectors, properties and derivatives.

UNIT-V

Surfaces: Bicubic surfaces, Coon's surfaces, Bezier surfaces, B-Spline surfaces, surfaces of revolutions, sweep surfaces, ruled surfaces, tabulated cylinder, bilinear surfaces, Gaussian curvature.

UNIT-VI

Solids: Tricubic solid, Algebraic and geometric form.

Solid modeling concepts: Wire frames, boundary representation, half space modeling, spatial cell, cell decomposition, classification problem.

TEXT BOOKS:

1. Ibrahim Zeid , "CAD/CAM – Theory and Practice", Tata McGraw Hill,2009.
2. Roger &Adams , "Mathematical Elements for Computer Graphics" , Tata McGraw Hill,2nd Edition.

REFERENCE BOOKS:

1. Micheal E. Mortenson , "Geometric Modeling", McGraw Hill ,3rd Edition.
2. Computer Aided Design and Manufacturing, K.Lalit Narayan, K.MallikarjunaRao, MMM Sarcar, PHI Publishers, 2nd Edition.

I M.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
EXPERIMENTAL STRESS ANALYSIS							

Course Objectives:

- To understand the relation between the mechanics theory and experimental stress analysis.
- To highlight the new experimental methods to determine stresses and strains.

Learning Outcomes:

Student will be able to

- Measure strains using different types of strain gauges
- Evaluate stresses using modern techniques of experimental methods

UNIT-I

Introduction: stress, strain, plane stress and plane strain conditions, compatibility conditions. Problems using plane stress and plane strain conditions, stress functions, mohrs circle for stress strain, three-dimensional stress strain relations.

UNIT-II

Strain Measurement and Recordings: various types of strain gauges, electrical resistance strain gauges,semi conductor strain gauges, strain gauge circuits. introduction, static recording and data logging, dynamic recording at very low frequencies, dynamic recording at intermediate frequencies, dynamic recording at high frequencies, dynamic recording at very high frequencies.

UNIT-III

Photo elasticity:photo elasticity–polariscope–plane and circularly polarized light, bright and dark field setups, photo elastic materials –isochromatic fringes – isoclinics.

UNIT-IV

Three dimensional Photo elasticity :introduction, locking in model deformation, materials for three-dimensional photo elasticity, machining cementing and slicing three-dimensional models, slicing the model and interpretation of the resulting fringe patterns, effective stresses, the shear-difference method in three dimensions, applications of the frozen stress method, the scattered-light method.

UNIT-V

Brittle coatings: introduction, coating stresses, failure theories, brittle coating crack patterns, crack detection, ceramic based brittle coatings, resin based brittle coatings, test procedures for brittle coatings analysis, calibration procedures, analysis of brittle coating data.

Moire Methods: Introduction, mechanism of formation of moire fringes, the geometrical approach tomoire-fringe analysis, the displacement field approach to moire-fringe analysis, out of plane displacement measurements, out of plane slope measurements, sharpening and multiplication of moire-fringes, experimental procedure and techniques.

UNIT-VI

Birefringent Coatings: Introduction, coating stresses and strains, coating sensitivity, coating materials,application of coatings, effects of coating thickness, fringeorder determinations in coatings, stress separation methods.

TEXT BOOKS:

1. Timoshenke and GoodierJr ,"Theory of Elasticity" McGraw Hill Education (India) Pvt Ltd, 3e

REFERENCE BOOKS:

1. Love .A.H, "A treatise on Mathematical theory of Elasticity vol-1" nabu press,
2. Dally and Riley," Experimental stress analysis", McGraw-Hill

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<tr><td rowspan="2">I M.TECH-II-SEMESTER</td><td>L</td><td>T</td><td>P</td><td>INTERNAL MARKS</td><td>EXTERNAL MARKS</td><td>TOTAL MARKS</td><td>CREDITS</td></tr>
<tr><td>4</td><td>-</td><td>-</td><td>40</td><td>60</td><td>100</td><td>3</td></tr>
<tr><td colspan="8">FRACTURE MECHANICS</td></tr>
</table>

Course Objectives:

- To introduce the concepts of fracture and damage tolerant design using theories of fracture

Learning Outcomes:

Student will be able to

- determine stress intensity factors by applying Linear Elastic and Elastic Plastic fracture mechanics
- apply fatigue concepts in predicting the life of components
- Formulate and solve problems involving the static, fatigue or impact loading of flawed structures.

UNIT-I

Introduction: Prediction of mechanical failure. macroscopic failure modes; brittle and ductile behavior.fracture in brittle and ductile materials – characteristics of fracture surfaces; inter-granular and intragranular failure, cleavage and micro-ductility, growth of fatigue cracks, the ductile/brittle fracture transition temperature for notched and unnotched components. Fracture at elevated temperature.

UNIT-II

Griffith's analysis: Concept of energy release rate, G, and fracture energy, R. modification for ductile materials, loading conditions. Concept of R curves.

UNIT-III

Linear Elastic Fracture Mechanics, (LEFM): Three loading modes and the state of stress ahead of the crack tip, theories of fracture, stress concentration factor, stress intensity factor and the material parameter the critical stress intensity factor, crack tip plasticity, effect of thickness on fracture toughness.

UNIT-IV

Elastic-Plastic Fracture Mechanics; (EPFM): The definition of alternative failure prediction parameters, crack tip opening displacement, and the J integral. measurement of parameters and examples of use.

UNIT-V

Fatigue: definition of terms used to describe fatigue cycles, high cycle fatigue, low cycle Fatigue, mean stress R ratio, strain and load control. S-N curves. Goodman rule and Miners rule. micromechanics of fatigue damage, fatigue limits and initiation and propagation control, leading to a consideration of factors enhancing fatigue resistance. total life and damage tolerant approaches to life prediction.

UNIT-VI

Creep deformation: The evolution of creep damage, primary, secondary and tertiary creep. Micro-mechanisms of creep in materials and the role of diffusion. Ashby creep deformation maps. Stress dependence of creep – power law dependence. Comparison of creep performance under different conditions – extrapolation and the use of Larson-Miller parameters.creep-fatigue interactions. examples.

TEXT BOOKS:

1. T.L. Anderson, “Fracture Mechanics Fundamentals and Applications”, CRC press ,2nd Ed..
2. B. Lawn, “Fracture of Brittle Solids”, Cambridge Solid State Science Series ,2nd ed.
3. J.F. Knott, “Fundamentals of Fracture Mechanics”, Butterworths ,1973.

REFERENCE BOOKS:

1. J.F. Knott, P Withey, “Worked examples in Fracture Mechanics”, Institute of Materials,2^{nd} Edition.
2. S. Suresh, “Fatigue of Materials”, Cambridge University Press, 2^{nd}Edition .
3. L.B. Freund and S. Suresh, “Thin Film Materials”, Cambridge University Press,2003.

I M.TECH-II-SEMESTER (ELECTIVE-III)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
ADVANCED OPTIMIZATION TECHNIQUES							

Course Objectives:

- To impart the knowledge of various solution procedures.
- To introduce different methodologies of designing.

Learning Outcomes:

Student will be able to

- Classify the optimization problems.
- Solve the design issues by using techniques of classical optimization.
- Design various mechanical elements.
- Apply genetic algorithm for solving the design problems.

UNIT-I :

Introduction: Classification of optimization problems, concepts of design vector, design constraints,design space constraints surface, objective function, surface and multilevel optimization, parametric linear programming.

UNIT-II

Classical Optimization Techniques: Single variable optimization, multilevel Optimization without constraints – multilevel optimization with equality and inequality constraints – Lagrange multipliers methods Kuhn – Tucker conditions.

UNIT-III

Non – Linear Optimization: One–dimensional minimization methods–Fibonacci method, Goldensection method,

Unconstrained Optimization methods: Hooke and jeeves methods, Powell's method,gradient of afunction, Cauchy method, Fletcher – Reeves method, Types of penalty methods for handling constraints.

UNIT-IV

Applications of Optimization in Design and Manufacturing Systems: Some typical applications like optimization of path synthesis of a four-bar mechanism, minimization of weight of a cantilever beam, optimization of springs and gears, general optimization model of a machining process, optimization of arc welding parameters, and general procedure in optimizing machining operations sequence.

UNIT-V

Non-Traditional Optimization Techniques: Genetic algorithm (GA) - Differences and similarities between conventional and evolutionary algorithms, working principle, reproduction, crossover, mutation, termination criteria, different reproduction and crossover operators, GA for constrained optimization, draw backs of GA.

UNIT-VI

GENETIC PROGRAMMING (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP.

Concepts of simulated annealing, ANN, optimization of fuzzy systems.

TEXT BOOKS:

1. Kalyanmoy Deb , “Optimization for Engineering Design”, PHI Publishers, 2nd Edition
2. S.S.Rao , “Engineering Optimization”, New Age Publishers,4th Edition.

REFERENCE BOOKS:

1. D.E. Goldberg, Addison , “Genetic algorithms in Search, Optimization, and Machine learning”, Wesley Publishers,2007
2. Kalyanmoy Deb , “Multi objective Genetic algorithms” , PHI Publishers,2nd Edition
3. JasbirArora , “Introduction to Optimum Design”, McGraw Hill (international) Publishers,3rd Edition.
4. CE Ebeling ,”An Introductgion to Reliability and Maintainability Engineering” , Waveland Printgers Inc., 2009
5. I Bazovsky , “Reliability Theory and Practice”, Dover Publications, 2013

I M.TECH-II-SEMESTER **(ELECTIVE-III)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
THEORY OF PLATES AND SHELLS							

Course Objectives:

- Theory of plates and shells provides the knowledge about the bending aspects of plates, Differential analysis of loaded plates.
- Behavior of plate material when it is fabricated into shells, different theories which explain about cylindrical shell loaded symmetrically, investigates on bending of cylindrical shells.

Course Outcomes:

- At the end of the course the students should be able to.
- Explain the bending aspects of plates.
- Understand aspects of Symmetrical Bending of Circular Plates.
- Use different equations for combined lateral and in-plane loading on plates.
- Conceptualize the types of shells.
- Analyze using different theories of cylindrical shells.

UNIT-I

Bending Of Long Rectangular Plates To A Cylindrical Surface: Differential equation for cylindrical bending of plates - Cylindrical bending of uniformly loaded rectangular plates with simply supported edges - Cylindrical bending of uniformly loaded rectangular plates with built-in edges

Pure bending of plates: Slope and curvature of slightly bent plates - Relations between bending moments and curvature in pure bending of plates - Particular cases of pure bending – Strain energy in pure bending of plates.

UNIT-II

SYMMETRICAL BENDING OF CIRCULAR PLATES: Differential equation for symmetrical bending of laterally loaded circular plates - Uniformly loaded circular plates - Circular plate with a circular hole at the center - Circular plate concentrically loaded - Circular plate loaded at the center.

Small deflections of laterally loaded plates: The differential equation of the deflection surface - Boundary conditions - Alternate method of derivation of the boundary condition - Reduction of the problem of bending of a plate to that of deflection of a membrane

UNIT-III

SIMPLY SUPPORTED RECTANGULAR PLATES: Simply supported rectangular plates under sinusoidal load - Navier solution for simply supported rectangular plates.

Rectangular plates with various edge conditions: Bending of rectangular plates by moments distributed along the edges - Rectangular plates with two opposite edges simply supported and the other two edges clamped.

UNIT-IV

Continuous Rectangular Plates: Simply supported continuous plates – Approximate design of continuous plates with equal spans - Bending symmetrical with respect to a center.

UNIT-V

Deformation of shells without bending: Definition and notation - Shells in the form of a surface of revolution and loaded symmetrically with respect to their axis - Particular cases of shells in the form of surfaces of revolution - Shells of constant strength.

UNIT-VI

General Theory Of Cylindrical Shells: A circular cylindrical shell loadedsymmetrically with respect to its axis - Particular cases of symmetrical deformation of circular cylindrical shells - Pressure vessels.

TEXT BOOKS:

1.Theory of plates and Shells - Timoshenko, Woinowsky and Krieger, McGraw Hill, Newyork.
2. Stresses in plates and shells—Ansel C Ugral
3. Thin Plates and Shells: Theory: Analysis, and Applications, Eduard Ventsel, Theodor Krauthammer, Marcell Dekker Inc, New York.

REFERENCE BOOKS:

1. Theory of plates--Bairagi
2 .Theory of Elastic Thin Shells - Goldnvizer, Pergamon Press, New York.
3 .Stresses in Shells - Flugge, Springer Verlag, Berlin.

<table>
<tr><td rowspan="2">I M.TECH-II-SEMESTER
(ELECTIVE-III)</td><td>L</td><td>T</td><td>P</td><td>INTERNAL MARKS</td><td>EXTERNAL MARKS</td><td>TOTAL MARKS</td><td>CREDITS</td></tr>
<tr><td>4</td><td>-</td><td>-</td><td>40</td><td>60</td><td>100</td><td>3</td></tr>
<tr><td colspan="8">CONDITION MONITORING</td></tr>
</table>

Course Objectives:

- To understand the maintenance scheme, their scope and limitations – apply the maintenance strategies to various problems in the industrial sectors.

Learning Outcomes:

Student will be able to

- Develop an appreciation for the need of modern technological approach for plant maintenance to reduce the maintenance expenditure.
- Carry out lubrication oil analysis and temperature analysis in vibrating systems.
- Analyze for machinery condition monitoring and explain how this compliments monitoring the condition.
- Emphasizes on case studies that require gathering information using the modern testing equipment and processing it to identify the malfunction in that system.

UNIT-I

Maintenance strategies, Introduction to condition monitoring, Criticality index, Various techniques for fault detection, Introduction to Non-destructive testing, role of non-destructive testing in condition monitoring.

UNIT-II

Wear debris analysis: Wear mechanisms, wear particles, wear process monitoring techniques -Spectrometric oil analysis program (SOAP), Ferrography, Applications, Adavntages and limitations.

UNIT-III

Temperature monitoring: Need for temperature monitoring, Thermography, Active and passive thermography, IR thermography, applications, advantages and limitations.

UNIT-IV

Corrosion monitoring: Causes and effects of corrosion, Methods of corrosion prevention–reactive coating, applied coatings and corrosion inhibitors, Cathodic protection.

Flaw detection: Discontinuity–Origin and classification, Ultrasonic testing and Magnetic particle inspection.

UNIT-V

Rotating machinery, Identification of machine faults and frequency range of symptoms, localized & distributed faults, ISO Standards for vibration monitoring and analysis, types and benefits of vibration analysis, Vibration signature analysis, Vibration transducers – Proximity probes, velocity transducers, accelerometers, laser Vibrometer.

UNIT-VI
Fault detection in Rolling Element Bearings, Orbit Analysis static & Dynamic Balancing. **Case studies**: Induction Motors, Gear Box vibration, Reciprocating engines & Compressors.

TEXT BOOKS:

1. R.A. Collacot ,"Vibration Monitoring & Diagnosis",
2. Isermann R., "Fault Diagnosis Applications", Springer-Verlag, Berlin, 2011.

REFERENCE BOOKS:

1. Rao, J S., "Vibration Condition Monitoring", Narosa Publishing House, 2nd Edition, 2000.
2. Hand book of Condition Monitoring by B.K.N. Rao.
3. Allan Davies,"Handbook of Condition Monitoring", Chapman and Hall, 2000.
4. Hand book of Non Destructive Application by B.J. Boeing

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<tr><td rowspan="2">I M.TECH-II-SEMESTER
(ELECTIVE-III)</td><td>L</td><td>T</td><td>P</td><td>INTERNAL MARKS</td><td>EXTERNAL MARKS</td><td>TOTAL MARKS</td><td>CREDITS</td></tr>
<tr><td>4</td><td>-</td><td>-</td><td>40</td><td>60</td><td>100</td><td>3</td></tr>
<tr><td colspan="8" align="center">RAPID TOOLING AND PROTOTYPING</td></tr>
</table>

Course Objectives:

- To introduce Rapid Prototype tools and techniques for design and Manufacturing.

Learning Outcomes:

Student will be able to

- Assess the need of RPT in Product development.
- Use appropriate RT Software for development of Prototype model.
- Judge the correct RP Process for Product/Prototype development.
- Predict the technical challenges in 3D printing.
- List the applications of RPT.

UNIT-I

Introduction to Rapid Prototyping: Introduction to prototyping, traditional prototyping Vs. rapid prototyping (RP), need for time compression in product development, usage of RP parts, generic RP process, distinction between RP and CNC, other related technologies, classification of RP.

UNIT-II

RP Software: Need for RP software, MIMICS, magics, surgiGuide, 3D-doctor, simplant, velocity2,voxim, solidView, 3Dview, etc., software.

Software Issues of RP: Preparation of CAD models, problems with STI, files, STL file manipulation, RP data formats: SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP.

UNIT-III

Photo polymerization RP Processes: Sterolighography (SL), SL resin curing process, SL scan patterns, microstereolithography, applications of photo polymerization processes.

UNIT-IV

Powder Bed Fusion RP Processes: Selective laser sintering (SLS), powder fusion mechanism and powder handling, SLS metal and ceramic part creation, electron beam melting (EBM), applications of powder bed fusion processes.

Extrusion-Based RP Systems: Fused deposition modelling (FDM), principles, plotting and path control, applications of extrusion-based processes.

UNIT-V

Printing RP Processes: 3D printing (3DP), research achievements in printing deposition, technical challenges in printing, printing process modeling, applications of printing processes.

Sheet Lamination RP Processes: Laminated Object Manufacturing (LOM), ultrasonic consolidation(UC), gluing, thermal bonding, LOM and UC applications.

Beam Deposition RP Processes: Laser Engineered Net Shaping (LENS), Direct Metal

Deposition(DMD), processing – structure - properties, relationships, benefits and drawbacks.
UNIT-VI
Rapid Tooling: Conventional Tooling Vs. Rapid Tooling, classification of rapid tooling, direct and indirect tooling methods, soft and hard tooling methods.
Errors in RP Processes: Pre-processing, processing, post-processing errors, part building errors in SLA,SLS, etc.,
RP Applications: Design, engineering analysis and planning applications, rapid tooling, reverse engineering, medical applications of RP.

TEXT BOOKS:

1. Chua Chee Kai., Leong KahFai., Chu Sing Lim, "Rapid Prototyping: Principles and Applications in Manufacturing", World Scientific, 2010.
2. Ian Gibsn., David W Rosen., Brent Stucker., "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", Springer, 2010

REFERENCE BOOKS:

1. Pham, D.T, Dimov, S.S, Rapid Manufacturing, Springer, 2001

I M.TECH-II-SEMESTER (ELECTIVE-IV)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
INDUSTRIAL ROBOTICS							

Course objectives:

- To be familiar with the automation and brief history of robot and applications.
- To give the student familiarities with the kinematics of robots, Knowledge about
- Autonomous Mobile Robots and their design.
- Mobile Robot Maneuverability. Knowledge about Mobile Robot Planning & Navigation.

Course Outcomes:

- Define and Classify Robots and Structures of Robotic Systems
- Define Drives & Control Systems of Robots. Explain Hydraulic Power supply, Hydraulic Motor, Direct Current Servomotors
- Define Kinematic Analysis, Direct Kinematic Problem in Robotics. Describe Three dimensional Homogeneous Transformations, Denavit-Hartenberg Convention, Applications of DH method
- Define and Classify Autonomous Mobile Robots. Describe Mobile Robot Kinematics
- Describe Mobile Robot Maneuverability- Degree of mobility, Degree of steerability, Motion Control. Explain Mobile Robot Planning & Navigation.

UNIT-I

Introduction: Automation and Robotics, Robot anatomy, robot configuration, motions joint notation work volume, robot drive system, control system and dynamic performance, precision of movement.

Control System And Components: basic concept and modais controllers control system analysis, robot activation and feedback components. Positions sensors, velocity sensors, actuators sensors, power transmission system.

UNIT-II

Motion Analysis And Control: Manipulator kinematics, position representation forward transformation, homogeneous transformation, manipulator path control, robot dynamics, configuration of robot controller.

UNIT-III

End Effectors: Grippers-types, operation, mechanism, force analysis, tools as end effectors consideration in gripper selection and design. SENSORS: Desirable features, tactile, proximity and range sensors, uses sensors in robotics.

UNIT-IV

Machine Vision: Functions, Sensing and Digitizing-imaging, Devices, Lighting techniques, Analog to digital single conversion, image storage, Image processing and Analysis-image data reduction, Segmentation feature extraction. Object recognition, training the vision system, Robotics application.

UNIT-V

Robot Programming: Lead through programming, Robot programming as a path in space, Motion interpolation, WAIT, SINONAL AND DELAY commands, Branching capabilities and Limitations.

Robot Languages: Textual robot Languages, Generation, Robot language structures, Elements in function.

UNIT-VI

Robot Cell : Design And Control: Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work design, Work and control, Inter locks, Error detect ion, Work wheel controller.

Robot Application: Material transfer, Machine loading/unloading. Processing operation, Assembly and Inspection, Feature Application.

REFERENCE BOOKS:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Introduction to Robotic Mechanics and Control / J J Craig/ Pearson / 3rd edition.
3. Robotics / Fu K S/ McGraw Hill.
4. Robotic Engineering / Richard D. Klafter, Prentice Hall
5. Robot Analysis and Intelligence / Asada and Slotine / Wiley Inter-Science.
6. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / John Wiley & Sons (ASIA) Pte Ltd.
7. Robotics and Control / Mittal R K &Nagrath I J / TMH

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<tr><td rowspan="2">I M.TECH-II SEMESTER
(ELECTIVE-IV)</td><td>L</td><td>T</td><td>P</td><td>INTERNAL MARKS</td><td>EXTERNAL MARKS</td><td>TOTAL MARKS</td><td>CREDITS</td></tr>
<tr><td>4</td><td>-</td><td>-</td><td>40</td><td>60</td><td>100</td><td>3</td></tr>
<tr><td colspan="8">**MECHANICS OF COMPOSITE MATERIALS**</td></tr>
</table>

Course Objectives:

- The course aims at enhancing the capacity of the students to analyze structural characteristics of composite structures.

Course Outcomes:

- Apply stress-strain relationships in fiber reinforced composite materials.
- Explain failure theories related to composite materials
- Explain stress-strain characteristics of laminates
- Explain elastic properties of laminates
- Explain strength characteristics of laminates

UNIT-I

Introduction to Composites: Introduction, Classification, matrix materials, reinforced matrix of composites

UNIT-II

Hooke's Law for a Two-Dimensional Angle Lamina, Engineering Constants of an Angle Lamina, Invariant Form of Stiffness and Compliance Matrices for an Angle Lamina Strength Failure Theories of an Angle Lamina : Maximum Stress Failure Theory Strength Ratio, Failure Envelopes, Maximum Strain Failure Theory ,Tsai–Hill Failure Theory, Tsai–Wu Failure Theory, Comparison of Experimental Results with Failure Theories. Hygro thermal Stresses and Strains in a Lamina: Hygrothermal Stress–Strain Relationships for a Unidirectional Lamina, Hygrothermal Stress–Strain Relationships for an Angle Lamina

UNIT-III

Macromechanical Analysis of a Lamina: Introduction, Definitions: Stress, Strain, Elastic Moduli, Strain Energy. Hooke's Law for Different Types of Materials, Hooke's Law for a Two-Dimensional Unidirectional Lamina, Plane Stress Assumption, Reduction of Hooke's Law in Three Dimensions to Two Dimensions, Relationship of Compliance and Stiffness Matrix to Engineering Elastic Constants of a Lamina

UNIT-IV

Micromechanical Analysis of a Lamina :Introduction, Volume and Mass Fractions, Density, and Void Content, Evaluation of the Four Elastic Moduli, Strength of Materials Approach, Semi-Empirical Models ,Elasticity Approach, Elastic Moduli of Lamina with Transversely Isotropic Fibers, Ultimate Strengths of a Unidirectional Lamina, Coefficients of Thermal Expansion, Coefficients of Moisture Expansion

UNIT-V

Macromechanical Analysis of Laminates: Introduction ,LaminateCode , Stress–Strain Relations for a Laminate, In-Plane and Flexural Modulus of a Laminate , Hygrothermal Effects in a Laminate, Warpage of Laminates,hybrid laminates

UNIT-VI

Failure, Analysis, and Design of Laminates : Introduction , Special Cases of Laminates, Failure Criterion for a Laminate, Design of a Laminated Composite, static analysis of laminated plates

TEXT BOOKS:

1. Engineering Mechanics of Composite Materials by Isaac and M Daniel, Oxford University Press, 1994.
2. B. D. Agarwal and L. J. Broutman, Analysis and performance of fibre Composites, Wiley-Interscience, New York, 1980.
3. Mechanics of Composite Materials, Second Edition (Mechanical Engineering), By Autar K. Kaw, Publisher: CRC

REFERENCE BOOKS:

1. R. M. Jones, Mechanics of Composite Materials, McGraw Hill Company, New York, 1975.
2. L. R. Calcote, Analysis of Laminated Composite Structures, Van NostrandRainfold, New York, 1969.

I M.TECH-II-SEMESTER (ELECTIVE-IV)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
COMPUTER INTEGRATED MANUFACTURING							

Course Objectives:

- To use computers in the area of manufacturing to reduce manual processing and linking computers to all the manufacturing machines and increase the productivity, reduce the unnecessary costs.
- To study about group technology, Robotics, Flexible manufacturing systems, Automated material Handling Systems and storage Systems, Automated Inspection and Testing.

Course Outcomes:

- Understand the use ofcomputers in the area of manufacturing.
- Understand group technology, Robotics, Flexible manufacturing systems.
- Design automated material handling and storage systems for a typical production system.
- Understand the Automated Inspection & Testing.

UNIT-I

Introduction: Definition of Automation, Need for Automation, Advantages and Disadvantages of Automation, Types of Production, Functions in manufacturing, Automation Strategies, Introduction to CAD, Applications of Computers in Design, Introduction to CAM, Manufacturing Planning and control, Fundamentals of computer Integrated Manufacturing.

UNIT-II

Group Technology: Introduction, Part families, Parts classification and coding (OPITZ &MULTI CLASS), Production flow analysis, Machine cell design, Types of cell design, Benefits of Group Technology.

Robotics: Robot anatomy, Robot Configuration, Basic Robot motions, Types of drivers, End effectors.

UNIT-III

Flexible Machine Systems: What is FMS, FMS Workstations, Materials Handling and storage system, Computer Control System, Planning the FMS, Applications and Benefits.

UNIT-IV

Automated Material Handling: Introduction, Types of material handling equipment, automated guided vehicle system (AGVS), Applications, Vehicle guidance and routing, Traffic control and safety, System management.

UNIT-V

Automated Storage Systems (As): Storage systems performance, Automated storage /Retrieval systems (AS / RS), Basic components of AS /RS, AS / RS controls, Special features, applications.

UNIT-VI

Automated Inspection & Testing: Automated inspection principles and methods, sensor technologies for automated inspection, Co-ordinate measuring machines (CMM),construction, operation & programming, CMM benefits and trends. Introduction to machine vision &non contact inspection methods.

TEXT BOOKS:

1. Automation, Production and Computer Integrated Manufacturing – by M.P.Groover (PHI), 1996.

REFERENCE BOOKS:

1. CAD/CAM - MikellP.Groover, and Emory W.Zimmers.Jr. PHI Publishers, 1984.
2. Computer Aided Design and Manufacturing, K.Lalit Narayan, K.MallikarjunaRao,MMMSarcar, PHI Publishers, 2008.
3. CAD/CAM/CIM, Radhakrishnan and Subramanian, New Age Publishers, 2008.

I M.TECH-II-SEMESTER **(ELECTIVE-IV)**	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
PRESSURE VESSEL DESIGN							

Course Objectives:

- To introduce the principles of design of pressure vessels and their components subjected to various loads

Learning Outcomes:

Student will be able to

- design pressure vessels and various parts of vessels
- select the suitable material for the pressure vessel

UNIT-I

Introduction: Materials-shapes of vessels-stresses in cylindrical, spherical and arbitrary, shaped shells, cylindrical vessels subjected to internal pressure, wind load, bending and torque for computation of pressure vessels-conical and tetrahedral vessels.

UNIT-II

Theory of thick cylinders: Shrink fit stresses in built up cylinders auto frettage of thick cylinders, thermal stresses in pressure vessels.

UNIT-III

Theory of rectangular plates: Pure bending-different edge conditions.

UNIT-IV

Theory circular plates: Simple supported and clamped ends subjected to concentrated and uniformly distributed loads-stresses from local loads, design of dome bends, shell connections, flat heads and cone openings.

UNIT-V

Discontinuity stresses in pressure vessels: Introduction, beam on an elastic foundation, infinitely long beam, semi infinite beam, cylindrical vessel under axially symmetrical loading, extent and significance of load deformations on pressure vessels, discontinuity stresses in vessels, stresses in a bimetallic joints, deformation and stresses in flanges.

UNIT-VI

Pressure vessel materials and their environment: Introduction, ductile material tensile tests, structure and strength of steel, Leuder's lines, determination of stress patterns from plastic flow observations, behaviour of steel beyond the yield point, effect of cold work or strain hardening on the physical properties of pressure vessel steels, fracture types in tension, toughness of materials, effect of neutron irradiation of steels, fatigue of metals, fatigue crack growth, fatigue life prediction, cumulative fatigue damage, stress theory of failure of vessels subject to steady state and fatigue conditions.

TEXT BOOKS:

1. John F.Harvey, Van nostrandReihold Company, "Theory and design of modern Pressure

REFERENCE BOOKS:

1. Beowll&YoundEtt," Process Equipment Design", WILEY INDIA PVT. LTD.-NEW DELHI.
2. Indian standard code for unfired Pressure vessels IS:2825.
3. Henry H.Bednar, P.E "Pressure Vessel Design Hand Book", C.B.S.Publishers, New Delhi.
4. Timoshenko &Woinosky," Theory of plates and shells" McGraw Hill Education (India) Pvt Ltd, New York.

<table>
<tr><td rowspan="2">I M.TECH-II-SEMESTER</td><td>L</td><td>T</td><td>P</td><td>INTERNAL MARKS</td><td>EXTERNAL MARKS</td><td>TOTAL MARKS</td><td>CREDITS</td></tr>
<tr><td>-</td><td>-</td><td>6</td><td>25</td><td>50</td><td>75</td><td>3</td></tr>
<tr><td colspan="8">ADVANCED COMPUTER AIDED DESIGN & ANALYSIS LAB</td></tr>
</table>

Course Objectives:

- To impart training on Ansys software for analyzing engineering problems.

Learning Outcomes:

Student will be able to

- analyze different engineering problems using ansys software.

I. Modeling

1. Surface modeling
2. Solid modeling
3. Drafting
4. Assembling

II LIST OF EXPERIMENTS USING ANSYS SOFTWARE:

1. 2- D truss analysis
2. 3-D truss analysis
3. Stress analysis of a beam
4. Stress analysis of simple 3-D structure
5. Analysis of Plane stress and plane strain problems
6. Evaluation of stress intensity factors in a cracked plate
7. Free vibration analysis of beam / plate
8. Forced vibration analysis of beam / plate
9. Buckling analysis of column / sheet metal
10. Coupled field analysis of solid
11. Optimization of a beam
12. Steady state thermal analysis
13. Transient thermal analysis

I B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
ENGINEERING MATHEMATICS (Common to All Branches)							

Course Objectives:

- The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

Course Outcomes:

Upon successful completion of the course, the students should be able to

- Solve ordinary differential equations of first, second and higher order.
- Learn basic concept of partial differentiation.

UNIT- I: ORDINARY DIFFERENTIAL EQUATIONS

Linear equations of first order, Bernoulli differential equation, exact equations, equations reducible to exact equations. Newton's Law of cooling, natural growth and decay, orthogonal trajectories.

UNIT-II: LINEAR DIFFERENTIAL EQUATIONS OF HIGHER ORDER

Definitions, Operator D, Rules for finding the complementary functions,
Inverse operator, Rules for finding the particular integrals, Method of variation of parameters, Equations reducible to linear equations with constant coefficients. R-L-C circuits, Simple Harmonic motion.

UNIT – III: MEAN VALUE THEOREMS

Review on limits and continuity, Mean Value theorems (without proofs) Rolle's theorem, Lagrange's theorem, Cauchy's theorem, increasing and decreasing functions, Maxima and minima of function of single variable.

UNIT- IV: PARTIAL DIFFERENTION:

Function of two or more variables, Partial derivatives, Total derivatives, change of variables, Jacobian - functional dependence, Tailor's for Two variables. Maxima and Minima of functions of two variables, Lagrange method of undetermined multipliers.

UNIT- V: FIRST ORDER PARTIAL DIFFERENTIAL EQUATIONS

Formation of partial differential equation by elimination of arbitrary constants and arbitrary functions, solutions of first order linear (Lagrange's) equations.

UNIT- VI: HIGHER ORDER PARTIAL DIFFERENTIAL EQUATIONS

Solutions of Linear Partial differential equations with constant coefficients, Method of separations of Variables, One dimensional wave equation, One Heat equations.

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TEXT BOOK:

1. Dr. B.S. Grewal "*Higher Engineering Mathematics*", 42nd Edition, Khanna Publishers, 2012.

REFERENCES:

1. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar. "*Engineering Mathematics*", University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012
2. Keryszig E, "*Advanced Engineering Mathematics*", 8th Edition, John Wiley, Singapore, 2001.
3. Ravish R Singh, Mukul Bhatt, "*Engineering Mathematics*" Fourth reprint, McGraw Hill Education Pvt., Lim.,
4. Greenberg M D, "*Advanced Engineering Mathematics*", 2nd Edition, Pearson Education, Singapore, Indian Print, 2003.
5. Peter V. O'Neil, "*Advanced Engineering Mathematics*", 7th Edition, Cengage Learning, 2011.
6. Srimanta Pal and Suboth C. bhunia, "*Engineering Mathematics*", oxford University Press, 2015.

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I B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3

MATHEMATICAL METHODS
(Common to All Branches)

Course Objectives:

- The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering student.
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

Course Outcomes:

Upon successful completion of the course, the students should be able to

- Solve simultaneous linear equations using matrix methods.
- Calculate Eigen values and Eigen vectors of matrices that are essential for vibration / design analysis.
- Understand the concept of Double and Triple integrals and their applications to calculations of areas, volumes.
- Understand the most basic numerical methods to solve simultaneous linear equations.

UNIT-I: LINEAR SYSTEMS OF EQUATIONS

Rank of a matrix - Echelon form, Normal form, Solution of linear systems, Direct Methods, Gauss elimination, Gauss Jordon and Gauss Seidal Methods. Solutions of linear simultaneous equations: LU decomposition.

Application: Finding the current in a electrical circuit

UNIT – II: EIGENVALUES AND EIGENVECTORS

Eigenvalues, Eigenvectors, Properties, Cayley - Hamilton Theorem, Quadratic forms, Reduction of quadratic form to canonical form, Rank, Positive negative definite, semi definite, index, signature.

Application: Finding powers and inverse of a square matrix using Cayley – Hamilton's Theorem.

UNIT-III: APPLICATION OF INTEGRATION AND MULTIPLE INTEGRALS:

Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian and Polar Coordinates. Multiple Integrals- double and triple integrals, Change of Variables, Change of order of Integration.

UNIT – IV: SOLUTION OF TRANSCENDENTAL EQUATIONS:

Introduction - Bisection Method – Method of False Position – Iteration Method – Newton-Raphson Method (One variable and Simultaneous Equations), Secant method.

UNIT – V: INTERPOLATION:

Introduction – Errors in Polynomial Interpolation – Finite differences – Forward Differences – central differences – Symbolic relations and separation of symbols. Differences of Polynomial – Newton's formulae for Interpolation – Interpolation with unevenly spaced points – Lagrange's Interpolation formula – Newton's Divided difference formula.

UNIT-VI: NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS
Solution by Taylor's series, Euler's Method, modified Euler's Method, Runge – kutta Method (fourth order only), R-K method for simultaneous differential equations, Trepezoidal rule, Simpon's $(1/3)^{rd}$ rule, Simpons's $(3/8)^{th}$ rule.

TEXT BOOK:

1. B.S.Grewal, *"Higher Engineering Mathematics"*, 42nd Edition, Khanna Publisher.

REFERENCES:

1. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, *"Engineering Mathematics"*, University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.
2. V. Ravindranath and P. Vijayalaxmi, *"Mathematical Methods"*, Himalaya Publishing House.
3. Dean G Duffy, *"Advanced Engineering Mathematics with MATLAB"*, CRC Press.
4. Erwyn Kreyszig, *"Advanced Engineering Mathematics"*, 9th Edition, Wiley-India.
5. Srimanta Pal and Suboth C. bhunia, *"Engineering Mathematics"*, oxford University Press, 2015.
6. Steven C.Chapra, Raymond P.Canale *"Numerical Methods for Engineers"*, Tata Mc-Graw Hill.

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<table>
<tr><td rowspan="2">I B.TECH-I-SEMESTER</td><td>L</td><td>T</td><td>P</td><td>INTERNAL MARKS</td><td>EXTERNAL MARKS</td><td>TOTAL MARKS</td><td>CREDITS</td></tr>
<tr><td>1</td><td>0</td><td>4</td><td>40</td><td>60</td><td>100</td><td>3</td></tr>
<tr><td colspan="8">ENGINEERING GRAPHICS
(Common to CSE, ECE & EEE)</td></tr>
</table>

Course objectives:

- Impart basic knowledge and skills required to prepare engineering drawing which is an universal language of engineers for communication, designing and production
- Get enhanced imagination capacity, visualize and communicate geometrical elements
- Understand the fundamentals of geometry like engineering curves, planes, solids, sections, developments & isometric views and its applications in design and manufacturing of various engineering components

Course Outcomes:

Upon successful completion of the course, the students should be able to

- Apply principles of drawing to represent dimensions of an object and use the different types of scales for drawing of various sizes of engineering curves
- Draw various polygons and Ellipse
- Draw Orthographic projections in 1^{st} and 3^{rd} angle projections
- Draw different orientations of points, lines, planes and solids with reference to principal planes.
- Draw orthographic views (2D) from the given isometric view (3D) and vice versa

UNIT-I

Introduction to engineering drawing: Importance, Drawing Instruments and their uses. Basics of Geometric construction.

Polygons: Construct the regular polygons using given length of a side, inscription of polygons and circumscription of polygons.

Ellipse- Arcs of circles Method and Oblong Method

Scales: Representation fraction-Construction of plain, diagonal and vernier scale.

UNIT-II

Orthographic projections: Principle of orthographic projections, first and third angle projections, projections of points.

Projection of Straight lines: parallel to both the planes, parallel to one plane and inclined to the other plane.

UNIT-III

Projection of Straight lines inclined to both the planes, determination of true length, angles of inclination and Traces.

UNIT-IV

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT-V

Projections of solids-prisms, pyramids, cones and cylinders with the axis inclined to one of the planes

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UNIT-VI

Conversion of isometric views to orthographic views; Conversion orthographic views to isometric views

TEXT BOOKS:

1. N.D. Butt. "*Engineering Drawing*", Chariot Publications.
2. K.L.Narayana and P. Kannaiah, "*Engineering Drawing*", Scitech Publishers.
3. PI Varghese. "*Engineering Graphics*", McGrawHill Publishers.

REFERENCES:

1. K.C. John, "*Engineering Graphics for Degree*", PHI Publishers.
2. Agarwal and Agarwal, "*Engineering Drawing*", Tata McGraw Hill Publishers.

I B.TECH - I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ENVIRONMENTAL STUDIES (Common to all Branches)							

COURSE OBJECTIVES:

- To make the students aware about the environment and it's inter–disciplinary, Basic understanding of the ecosystem and its diversity.
- Human development and societal development is inevitable. This development is entirely depends on science and Technological advancement through using resource assets of nature. In order to reduce the impacts of the technological development, the environmental studies creating awareness among the engineering graduates. So that we can have a healthy environment present and future.
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
- The course covers the aspects like general awareness, Resources, Utilization and conservation, Healthy sustenance of life, pollution control, social aspects, etc. All these areas will provide and habituate the students towards conservation and sustainable development.
- Overall understanding of the natural resources.

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to

- The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.
- The knowledge about environmental studies is applicable as and when required like implementing any developmental activity can overcome the hurdles? In relation to environmental aspects.
- Students can develop eco-friendly technologies for a healthy growth, and development of anation which can prevent the environmental hazards by appropriate decisions and alternate remedies.
- To make the students understand the adverse effects of environmental pollution, its causes and measures to control it.
- The biodiversity of India and the threats to biodiversity and conservation practices to protect the biodiversity.
- About environmental assessment and the stages involved in EIA and the environmental audit.

UNIT–I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES

Definition, Scope and importance–Need for public awareness–Institutions and people in environment.

Ecosystems: Definitions and concepts–Characteristics of ecosystem–Structural and functional features–Producers, consumers, decomposers and food webs–Types of ecosystems–Forests, grassland, desert, crop land, pond, lake, river and marine ecosystems–Energy flow in the ecosystem–Ecological pyramids–Ecological successions.

UNIT–II: NATURAL RESOURCES

Forest resources: Use and over–exploitation–Deforestation–Water resources–Use and over utilization of surface and natural resourced ground water–Floods and droughts–Conflicts over water–Dams, benefits and problems on tribal population & Environment.

Mineral resources: Use and exploitation–Environmental effects of extracting and using mineral resources.

Food resources: World food problems–Changes caused by agriculture and overgrazing–Effects of modern agriculture–Fertilizer and pesticide problems–Water logging, salinity–Concept of sustainable agricultural methods.

Land resources: Land as a resource–Land degradation, man induced landslides–Soil erosion and desertification.

UNIT–III: BIODIVERSITY AND ITS CONSERVATION

Levels and Values of biodiversity–India as a mega diversity nation–Hotspots–Threat and conservation of biodiversity–Assessment of biodiversity and its impact on Environment.

UNIT–IV: ENVIRONMENTAL POLLUTION AND CONTROL

Definition, Cause, effects and control measures of

a. Air pollution
b. Water pollution
c. Soil pollution
d. Noise pollution

UNIT–V: GLOBAL ENVIRONMENTAL PROBLEMS AND GLOBAL EFFORTS

Climate change–Global warming–Acid rain–Ozone layer depletion–Nuclear accidents and holocaust–Rain water harvesting–Traditional and modern techniques–Environmental legislation–Wasteland reclamation–Consumerism and waste products.

UNIT–VI: ENVIRONMENTAL MANAGEMENT

Impact Assessment and its significance–various stages of EIA–Preparation of EMP and EIS–Environmental audit–Ecotourism. The student should submit a report individually on any issues related to environmental studies course and make a power point presentation.

TEXT BOOKS:

1. B. Sudhakara Reddy, T. Sivaji Rao, U. Tataji & K. Purushottam Reddy, *"An Introduction to Environmental Studies"*, Maruti Publications.
2. Anubha Kaushik and C.P. Kaushik., "*Environmental Studies*", Fourth edition, New Age International (P) Ltd., New Delhi, 2014.

REFERENCES:

1. Deekshita Dave & P. Udaya Bhaskar, *"Text Book of Environmental Studies"*, Cengage Learning.
2. K.V.S.G. Murali Krishna, "*Environmental Studies*", VGS Publishers, Vijayawada.
3. M. Anji Reddy, *"Text Book of Environmental Sciences and Technology"*, BS Publications.
4. Bharucha, E., *"Text book of Environmental Studies"*, First edition, Universities Press (India) Pvt., Ltd., Hyderabad, 2005.

5. Dr. S. Keerthinarayana & Dr. C. Daniel Yesudian. "*Principles of Environmental Scienceand Engineering*", First edition, Anuradha Publications (P) Ltd., Kumbakonam, 2004.
6. P. Anandan & R. Kumaravelan., "*Environmental Science and Engineering*", Sixth reprint, Scitech Publications (India) (P) Ltd., Chennai, 2010.
7. Dr. Surinder Deswal & Dr. Anupama Deswal., "A *Basic Course in Environmental Studies*", Second revised edition, Dhanpat Rai & Co (P) Ltd., New Delhi, 2008-09.

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I B.TECH - I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2
ELECTRONIC WORKSHOP AND IT WORKSHOP							

COURSE OBJECTIVE:

- Enabling the student to understand basic electronic components, measuring instruments, and computer hardware and software tools through practical exposure.

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to

- Knowledge on different passive components and active devices used in laboratory.
- Knowledge on soldering of components and measuring instruments used in laboratory.
- Knowledge on computer system such as system unit, input devices, output devices connected to the computer and to understand the booting process and loading of the operating system, and getting it ready for use.
- Knowledge to understand the working of the internet that includes the use of protocols, domains, IP addresses, URLs, web browsers, web servers, mail-servers, etc., and familiarize with parts of Word window, Excel window and PowerPoint.

PART A: ELECTRONIC WORKSHOP

1. Identification, Specifications, Testing of R, L, C Components (Colour Codes), Potentiometers, Coils, Gang Condensers, Relays, Bread Boards.
2. Identification, Specifications and Testing of active devices, Diodes, BJTs, JFETs, LEDs, LCDs, SCR, UJT.
3. Soldering Practice- Simple circuits using active and passive components.
4. Study and operation of Ammeters, Voltmeters, Transformers, Analog and Digital Multimeter, Function Generator, Regulated Power Supply and CRO.

PART B: IT WORKSHOP

PC HARDWARE:

Identification of basic peripherals, assembling a PC, installation of system software like MS Windows, device drivers. Trouble shooting Hardware and Software some tips and tricks.

INTERNET & WORLD WIDE WEB:

Different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet, web browsers, email, newsgroups and discussion forums. Awareness of cyber hygiene (protecting the personal computer from getting infected with the viruses), worms and other cyber-attacks.

PRODUCTIVITY TOOLS: Crafting professional word documents; excel spread sheets, power point presentations and personal websites using the Microsoft suite of office tools.

PC HARDWARE

TASK 1: IDENTIFICATION OF THE PERIPHERALS OF A COMPUTER.

To prepare a report containing the block diagram of the CPU along with the configuration of each peripheral and its functions. Description of various I/O Devices.

TASK 2: (Optional): A Practice on disassembling the components of a PC and assembling them to back to working condition.

TASK 3: Examples of Operating Systems- DOS, MS Windows, Installation of MS windows on a PC

TASK 4: Introduction to Memory and Storage Devices, I/O Port, Device Drivers, Assemblers, Compilers, Interpreters, Linkers, Loaders.

TASK 5: HARDWARE TROUBLESHOOTING (Demonstration): Identification of a problem and fixing a defective PC (improper assembly or defective peripherals).

SOFTWARE TROUBLESHOOTING (Demonstration): Identification of problem and fixing the PC for any software issues.

INTERNET & NETWORKING INFRASTRUCTURE

TASK 6: Demonstrating Importance of Networking, Transmission Media, Networking Devices- Gateway, Routers, Hub, Bridge, NIC, Bluetooth technology, Wireless Technology, Modem, DSL, and Dialup Connection.

ORIENTATION & CONNECTIVITY BOOT CAMP AND WEB BROWSING: Students are trained to configure the network settings to connect to the Internet. They are trained to demonstrate the same through web browsing (including all tool bar options) and email access.

TASK 7: SEARCH ENGINES & NETIQUETTE

Students are enabled to use search engines for simple search, academic search and any other context based search (Bing, Google etc).Students are acquainted to the principles of micro-blogging, wiki, collaboration using social networks, participating in online technology forums.

TASK 8: CYBER HYGIENE (Demonstration) : Awareness of various threats on the internet. Importance of Security patch updates and Anti-Virus solution Ethical Hacking, Firewalls, Multi-factors authentication techniques including Smart card Biometrics and also practiced

WORD

TASK 9: MS Word Orientation:

Accessing, overview of toolbars, saving files, Using help and resources, rulers, formatting, Drop Cap, Applying Text effects, Using Character Spacing, OLE in Word, using templates, Borders and Colors, Inserting Header and Footer, Using Date and Time option, security features in word, converting documents while saving.

TASK 10 : CREATING PROJECT : Abstract Features to be covered:-Formatting Styles, Inserting Table, Bullets and Numbering, Changing Text Direction, Cell alignment, footnote, Hyperlink, Symbols, Spell Check, Track Changes, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes and Paragraphs.

Excel

TASK 11: Using spread sheet features of EXCEL including the macros, formulae, pivot tables, graphical representations.

CREATING SCHEDULER - Features to be covered:-Gridlines, Format Cells, Summation, auto fill, Formatting Text.

LOOKUP/VLOOKUP

TASK 12: PERFORMANCE ANALYSIS: Features to be covered:-Split cells, freeze panes, group and outline, Sorting, Boolean and Logical operators, Conditional Formatting.

Power Point

TASK 13: Students will be working on basic power point utilities and tools which help them create basic power point presentation. Topic covered during this week includes:- PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows, Hyperlinks, Inserting –Images, Clip Art, Tables and Charts in PowerPoint.

TASK 14: Focusing on the power and potential of Microsoft power point Helps them learn best practices in designing and preparing power point presentation. Topic covered during this week includes:- Master Layouts (slide, template and notes), Types of views (basic, presentation, slide slotter, notes etc), Inserting – Background , textures, Design Templates, Hidden slides, OLE in PPT.

TEXT BOOKS:

1. Anita Goel," *Computer Fundamentals*", Pearson.
2. Scott. Mueller QUE, *"Scott Mueller's Upgrading and Repairing PCs"*, 18/e, Pearson, 2008.

REFERENCES:

1. Dr. N.B. Venkateswarlu, "*Essential Computer and IT Fundamentals for Engineering and Science Students*".
2. G Praveen Babu, M V Narayana, *"Information Technology Workshop"*, 3e, BS Publications.
3. Vikas Gupta, "*Comdex Information Technology* ", Dreamtech.

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I B.TECH – II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3

INTEGRAL TRANSFORMS AND VECTOR CALCULUS
(Common to All Branches)

Course Objectives:

- The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering student.
- The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

Course Outcomes:

Upon successful completion of the course, the students should be able to

- Learn the technique of Laplace transform and apply it to solve differential equations.
- Learn the technique of Z-transform and apply it to solve difference equations.
- Extend the concept of integration to vector functions, understand the significance of the operators, gradient, divergence and curl.
- Understand Fourier series, integral, transforms and they are provided with practice in their application and interpretation in a range of situations.
- Find surface areas and Volumes of certain solids using Green, Stokes and Gauss divergence theorems.

UNIT –I: LAPLACE TRANSFORMATIONS

Laplace transform and its properties, Unit step function and unit impulse function, Transform of periodic functions, Transform of derivatives and integrals, Multiplication by t^n, division by t, evolutions of integrals by Laplace Transforms. Inverse Laplace Transformations. Introduction, Finding inverse transforms by the method of partial fractions, other methods of finding inverse Laplace Transforms, Convolution theorem(without proof), Solutions Initial and Boundary Value Problems.

UNIT –II: Z – TRANSFORMS

Introduction, properties, Damping rule, Shifting rule, Initial and Final value theorems, Inverse z-transform, Convolution theorem, Solutions of difference equations.

UNIT – III: FOURIER SERIES

Introduction, Euler's Formulae, Conditions for a Fourier expansion, Functions having points of Discontinuity, change of interval, even and odd functions, Half – range sine and cosine series.

UNIT – IV: FOURIER TRANSFORMS

Introduction, Definition, Fourier Integrals, Fourier Sine and Cosine Integral, Fourier Transforms, Fourier sine and cosine transforms, Finite Fourier transforms.

UNIT-V: VECTOR DIFFERENTIATION

Gradient, Divergence, Curl, Laplacian and second order operators, vector identities, Equation of continuity, potential surfaces.

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UNIT-VI: VECTOR INTEGRATION

Line integral, work done, potential function, area surface and volume integrals, vector integral theorems: Green's, Stoke's and Gauss Divergence theorems (without proof) and related Problems.

TEXT BOOK:

1. B.S.Grewal, "*Higher Engineering Mathematics*", 42nd Edition, Khanna Publisher.

REFERENCES:

1. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, "*Engineering Mathematics*", University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.
2. B.V. Ramana, "*Higher Engineering Mathematics*", Tata Mc Graw Hill.
3. Erwyn Kreyszig, "*Advanced Engineering Mathematics*", 9thEditi on, Wiley-India.
4. Peter V. O'Neil, "*Advanced Engineering Mathematics*", 7th Edition, Cengage Learning, 2011.
5. Srimanta Pal and Suboth C. Bhunia, "*Engineering Mathematics*", Oxford University Press, 2015.

I B.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3

PROGRAMMING WITH C
(Common to ECE, EEE, Civil and Mechanical)

COURSE OBJECTIVES:

- To gain experience about structured programming
- To help students to understand the implementation of C language
- To understand various features in C

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to

- Study and Understand basics of computer Hardware and Software.
- Study, Analyze and Understand logical structure of computer programming and different constructs to develop programs in C language.
- Understand and Analyze simple data structures and use of pointers and dynamic memory allocation technique.
- Create files and apply file I/O operations.

UNIT I:

Introduction: Computer systems, Hardware and Software Concepts,
Problem Solving: Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and high-level languages, Creating and Running Programs: Writing, Editing(vi/emacs editor), Compiling(gcc), Linking and Executing in under Linux.
BASICS OF C: Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arthmetic , relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

UNIT II:

SELECTION – MAKING DECISION: TWO WAY SELECTION: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples.
ITERATIVE: loops- while, do-while and for statements, break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.
ARRAYS: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix.
STRINGS: concepts, c strings.

UNIT III:

FUNCTIONS- MODULAR PROGRAMMING: functions, basics, parameter passing, storage classes extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, Recursive solutions for fibonacci series, towers of Hanoi, header files, C Preprocessor, example c programs, Passing 1-D arrays, 2-D arrays to functions.

UNIT IV:
POINTERS: pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and functions, pointers to pointers, pointers and multi-dimensional arrays, dynamic memory management functions, command line arguments

UNIT V:
ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields, program applications

UNIT VI:
FILE HANDLING: Input and output- concept of a file, text files and binary files, Formatted I/O, File I/O operations, example programs

TEXT BOOKS:
1. Reema Thareja, *"Programming in C"*, Oxford.
2. Dennis Richie and Brian Kernighan, *"The C programming Language"*, 2nd ed.

REFERENCES:
1. Dr. E. Balaguruswamy, *"Programming in ANSI C"*, Tata McGraw Hill Education.
2. Hanly, Koffman, *"Problem Solving and Program Design in C"*, 7th ed, Pearson.
3. Forouzan, Gilberg, Prasad, *"C Programming, A Problem Solving Approach"*, Cengage.
4. Ashok N.Kamthane, *"Programming in C"*, Second Edition, Pearson.

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I B.TECH- II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	3

NETWORK ANALYSIS

COURSE OBJECTIVES:

- To learn the basics of the D.C. and A.C. electrical circuits
- To learn the concepts of mesh, node analysis, and star delta transformation.
- To impart knowledge on solving circuits using network theorems
- To introduce the phenomenon of resonance in coupled circuits.
- To learn the graphical representation of a network , transient analysis and application of
- Laplace transforms to RLC circuits.
- To learn the concepts of two port network parameters and different types of networks

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to

- Analyse the D.C., A.C. electrical circuits and magnetic circuits by using mesh current and node voltage equations.
- Analyse transient behaviour of circuits comprises various passive components when subjected to different inputs.
- Compute the two port network parameters.
- Apply circuit theorem concepts to various circuits and analyse the magnetic circuits.
- Analyze the frequency response of AC circuits.

UNIT – I: INTRODUCTION TO ELECTRICAL CIRCUITS

Network elements classification, Electric charge and current, Electric energy and potential, Series and parallel connection of circuit elements. Energy sources: Ideal, Non-ideal, Independent and dependent sources, Source transformation, Kirchhoff's laws, Mesh analysis and Nodal analysis.

UNIT – II: A.C. FUNDAMENTALS

Definitions of terms associated with periodic functions: Time period, Angular velocity and frequency, RMS value, Average value, Form factor and peak factor, Phase angle, Phasor representation, Addition and subtraction of phasors, mathematical representation of sinusoidal quantities, and explanation with relevant theory. Principal of Duality.

Network Topology: Definitions of branch, node, tree, planar, non-planar graph, incidence matrix, basic tie set schedule, basic cut set schedule.

UNIT – III: STEADY STATE ANALYSIS OF A.C. CIRCUITS

Response to sinusoidal excitation - pure resistance, pure inductance, pure capacitance, impedance concept, phase angle, series R-L, R-C, R-L-C circuits problem solving. Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, Star-Delta conversion, problem solving

RESONANCE: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, Condition for maximum impedance, current in anti-resonance, Bandwidth of parallel resonance.

UNIT – IV: NETWORK THEOREMS

Thevinin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens Theorems, problem solving for using dependent sources also .

UNIT – V: TWO-PORT NETWORKS

Z-parameters, Y parameters, Transmission line parameters, h-parameters, Inverse h parameters, Inverse Transmission line parameters, Relationship between parameter sets, Parallel connection of two port networks, Cascading of two port networks, series connection of two port networks.

COUPLED CIRCUITS:

Coupled Circuits: Self-inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Natural current, Dot rule of coupled circuits, Conductively coupled equivalent circuits- problem solving.

UNIT – VI: TRANSIENTS

First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, Evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous, problem solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots. Solutions using Laplace transform method.

TEXT BOOKS:

1. M E Van Valkenburg, *"Network Analysis "*, 3rd Edition, Prentice Hall of India, 2000.
2. K. Satya Prasad and S Sivanagaraju, *"Network Analysis"*, Cengage Learning
3. William Hayt and Jack E.Kimmarle, *"Engineering Circuit Analysis"*, 6th Edition , TMH.

REFERENCES:

1. John. D. Ryder,"*Network Lines and Fields*", 2nd edition, Asia publishing house.
2. DR Cunninghan, *"Basic Circuit Analysis"*, Jaico Publishers.
3. Chadha, *"Network Analysis and Filter Design"*, Umesh Publications.

I B.TECH - IISEMESTER	L	T	P	INTERNALMARKS	EXTERNALMARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3

PROFESSIONAL ETHICS, VALUES AND PAPTENTS
(Common to all branches)

COURSE OBJECTIVES:

- To equip the student with the basic knowledge relating to the ethical behaviour in engineering discipline.
- To make the students understand the rules and regulation relating to intellectual property rights (Patents, copyrights, trademarks etc.,)

COURSE OUTCOME:

Upon successful completion of the course, the students should be able to

- The outcome of this program is that the student learns necessary behavioural skills relating to the Ethics at industrial sector and to gain fundamental knowledge relating to IPR's.

Unit-I

Human Values: Ethics, Morals, Values, Integrity, Work Ethics- Service Learning – Civic Virtue- Respect for Others- Living Peacefully- Caring- Sharing- Honesty- Courage- Value Time- Cooperation- Commitment – Empathy- Self-Confidence- Spirituality- Character.

Unit-II

Engineering Ethics: Professional Roles to Be Played By Engineer- Engineers Role As Managers, Consultants And Leaders- Ethical Theories And its Uses.

Unit-III

Engineers Responsibilities and Rights: Professional Rights And Responsibilities, Whistle Blowing, Cross Cultural Issues And Occupational Crimes- Industrial Espionage.

Unit-IV

Introduction to Intellectual Property Law – The Evolutionary Past - The IPR Tool Kit- Legal Tasks in Intellectual Property Law – Ethical obligations in Intellectual Property Law - Introduction to Cyber Law – Innovations and Inventions Trade related Intellectual Property Right.

Unit-V

Intellectual property Rights : Basics, Types of Intellectual Property- Copy Rights – Principles- Subject Matter of Copy Rights- Copy Right Formalities and Registration- Patent Law – Rights and Limitations – Patent Requirements – Patent Registration Process.

Unit-VI

Trademark: Trademark Registration Process- Post Registration Process – Transfer of Rights- Trade Secrets – Maintaining Trade Secrets- Physical Security- Employee Confidentiality Agreement- Cyber Law and Cybercrimes.

TEXT BOOKS:

1. Prof. A.R.Arasri, Dharanikota Suyodhana, *"Professional Ethics and Morals"*, Maruthi

Publications.

REFERENCES:

1. Deborah e. Bouchoux, *"Intellectual property"*, Cengage learning, New Delhi.
2. Kompal Bansal and Parishit Bansal,*"Fundamentals of IPR for Engineers"*, BS Publications.
3. *Cyber Law:Texts & Cases*, South- Western's special topics collections.
4. M. Ashok kumar and Mohd. Iqbal Ali, *"Intellectual property right"*, serials pub.
5. M. Govindarajan, S. Natarajan and V.S. Senthil Kumar, *"Engineering Ethics and Human Values"*, PHI Learning PVT. Ltd, 2009

I B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2

ENHANCING COMMUNICATION SKILLS LAB
(Common to All Branches)

COURSE OBJECTIVES:

- To train the students to use language effectively in professional situations like group discussions, public speaking, presentations and interviews.
- To make the students understand the importance of body language.
- To develop positive attitude and soft skills to improve their employability quotient.
- To expose the students to variety of a self-instructional, learner friendly, electronic media and stimulate intellectual faculties/resources

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to

- Give presentations and attend job interviews confidently.
- Speak confidently in challenging situations.
- Know the importance of Non-verbal communication and interpret nonverbal symbols
- Face computer based competitive exams like GRE, TOFEL, and IELTS.

Unit-1: Body Language

Unit-2: Dialogues

Unit-3: Presentation Skills

Unit-4: Group Discussion

Unit-5: Interviews and Telephonic Interviews

Unit-6: Debates

TEXT BOOK:

"Strengthen your Communication Skills", Maruthi Publications, 2013.

REFERENCE:

1. *"Personality Development and Soft Skills"*, Oxford University Press, New Delhi.
2. M Ashraf Rizvi, *"Effective Technical Communication skills"*, McGraw-Hill, 2005.
3. Barun K Mitra, *"Personality Development and Soft Skills"*, Oxford University Press, 2011.
4. Konar N, *"Communication Skills for Professionals"*, PHI Learning Private Limited, 2011.

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I B.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2
COMPUTER PROGRAMMING LAB (Common to ECE, EEE, Civil and Mechanical)							

COURSE OBJECTIVE:

- The purpose of this course is to introduce to students to the field of language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to

- Study, analyse and understand logical structure of computer programming and different constructs to develop programs in C Language.
- Know how to write, compile and debug programs in C Language.
- Understand and analyse data types, typecasting and operator precedence.
- Analyse the use of conditional and looping statements to solve problems associated with conditions and repetitions.
- Explain and analyse simple data structures, use of pointers and dynamic memory allocation techniques.
- Summarize the role of functions involving the idea of modularity, know how to create files and apply file I/O operations.

Exercise l

a) Write an Algorithm, Flowchart and Program to calculate the area of triangle using the formula Area = (s (s-a) (s-b) (s-c)) 1/2 where s= (a+b+c)/2.

b) Write an Algorithm, Flowchart and Program to find the largest of three numbers using ternary operator.

c) Write an Algorithm, Flowchart and Program to swap two numbers without using a temporary variable.

Exercise 2

a) Write a C program to find the roots of a quadratic equation.

b) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement).

Exercise 3

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.

b) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 4

a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.

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b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.
c) Write a C Program to check whether the given number is Armstrong number or not.

Exercise 5
a) Write a C program to interchange the largest and smallest numbers in the array.
b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them.

Exercise 6
a) Write a C Program to find both the largest and smallest number of an array of integers
b) Write a C Program to find transpose of a matrix.

Exercise 7
Write C programs that use both recursive and non-recursive functions for the following
i) To find the factorial of a given integer.
ii) To find the GCD (greatest common divisor) of two given integers.

Exercise 8
Write a C Program for the following.
i) To find Fibonacci sequence
ii) Write C programs illustrating call by value and call by reference concepts.

Exercise 9
Write C Programs for the following string operations without using the built in functions - to concatenate two strings
a) To append a string to another string
b) To compare two strings

Exercise 10
Write C Programs for the following string operations without using the built in functions
a) To find the length of a string
b) To find whether a given string is palindrome or not

Exercise 11
Write a C program that uses functions to perform the following operations:
i. To insert a sub-string in to given main string from a given position.
ii. To delete n Characters from a given position in a given string.
iii. To replace a character of string either from beginning or ending or at a specified location

Exercise 12
a) Write a C program to implement a linear search.
b) Write a C program to implement binary search
c) Write a C program to implement sorting of an array of elements.

Exercise 13
a) Write C Program to reverse a string using pointers
b) Write a C Program to compare two arrays using pointers
c) Write a C program to swap two numbers using pointers

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Exercise 14

Examples which explores the use of structures, union and other user defined variables

Exercise 15

a) Write a C program which copies one file to another.

b) Write a C program to count the number of characters and number of lines in a file.

c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

TEXT BOOKS:

1. Reema Thareja, "*Programming in C*", Oxford.
2. Dennis Richie and Brian Kernighan, "*The C programming Language*", 2nd ed.

REFERENCES:

1 Dr. E. Balaguruswamy, "*Programming in ANSI C*", Tata McGraw-Hill Education.
2. Hanly, Koffman, "*Problem Solving and Program Design in C*", 7th ed, Pearson.
3. Forouzan, Gilberg, Prasad, "*C Programming, A Problem Solving Approach*", Cengage.
4. Ashok N.Kamthane, "*Programming in C*", Second Edition, Pearson.

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II Year – I SEMESTER

	T	P	C
	3+1	0	3

ELECTRONIC DEVICES AND CIRCUITS

UNIT-I

Semi Conductor Physics : Insulators, Semi conductors and Metals classification using energy band diagrams, mobility and conductivity, electrons and holes in intrinsic semi conductors, extrinsic semi conductors, drift and diffusion, charge densities in semiconductors, Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors

UNIT- II

Junction Diode Characteristics : Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance, energy band diagram of PN junction Diode.

Special Semiconductor Devices: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, LCD, Photo diode, Varactor diode, Tunnel Diode, DIAC, TRIAC, SCR, UJT. Construction, operation and characteristics of all the diodes is required to be considered.

UNIT- III

Rectifiers and Filters: Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms; Filters; Inductor filter, Capacitor filter, L- section filter, Π- section filter, Multiple L- section and Multiple Π section filter ,comparison of various filter circuits in terms of ripple factors.

UNIT- IV

Transistor Characteristics:

BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.

FET: FET types, construction, operation, characteristics, parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT- V

Transistor Biasing and Thermal Stabilization : Need for biasing, operating point, load line analysis, BJT biasing- methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in V_{BE}, Ic, and β, Stability factors, (S, S', S''), Bias compensation, Thermal runaway, Thermal stability. FET Biasing- methods and stabilization.

UNIT- VI

Small Signal Low Frequency Transistor Amplifier Models:

BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

FET: Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

TEXT BOOKS:

1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, Second Edition.
2. Electronic Devices and Circuits-B.P.Singh, Rekha Singh,Pearson Publications,Second Edition.
3. Electronic Devices and Circuits-David A.Bell, Oxford University Press, Fifth Edition.

REFERENCES:

1. Electronic Devices and Circuits- K. Satya Prasad,
2. Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, Second Edition
3. Electronic Devices and Circuit Theory-R.L. Boylestad and Louis Nashelsky,Pearson Publications,Tenth Edition.
4. Electronic Devices and Circuits -BV Rao, KBR Murty, K Raja Rajeswari, PCR Pantulu, Pearson, 2^{nd} edition.
5. Integrated Electronics- Jacob Millman, C. Halkies, C.D.Parikh, Tata Mc-Graw Hill, 2009.

II Year – I SEMESTER

3+1 0 3

SIGNALS AND SYSTEMS

UNIT I

SIGNAL ANALYSIS & FOURIER SERIES : Analogy between vectors and signals, Orthogonal signal space, Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions, Exponential and sinusoidal signals, Concepts of Impulse function, Unit step function, Signum function.Representation of Fourier series, Continuous time periodic signals, properties of Fourier series, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Complex Fourier spectrum

UNIT II

FOURIER TRANSFORMS & SAMPLING: Deriving Fourier transform from Fourier series, Fourier transform of arbitrary signal, Fourier transform of standard signals, Fourier transform of periodic signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Introduction to Hilbert Transform. Sampling theorem – Graphical and analytical proof for Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, effect of under sampling – Aliasing, Introduction to Band Pass sampling.

UNIT III

SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS : Linear system, impulse response, Response of a linear system, Linear time invariant (LTI) system, Linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, system bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Poly-Wiener criterion for physical realization, relationship between bandwidth and rise time.

UNIT IV

CONVOLUTION AND CORRELATION OF SIGNALS : Concept of convolution in time domain and frequency domain, Graphical representation of convolution, Convolution property of Fourier transforms. Cross correlation and auto correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between auto correlation function and energy/power spectral density function. Relation between convolution and correlation, Detection of periodic signals in the presence of noise by correlation, Extraction of signal from noise by filtering.

UNIT V

LAPLACE TRANSFORMS :Review of Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT VI

Z–TRANSFORMS : Fundamental difference between continuous and discrete time signals, discrete time signal representation using complex exponential and sinusoidal components, Periodicity of discrete time using complex exponential signal, Concept of Z- Transform of a discrete sequence. Distinction between Laplace, Fourier and Z transforms. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Z-transform, properties of Z-transforms.

TEXT BOOKS :

1. Signals, Systems & Communications - B.P. Lathi, BS Publications, 2003.
2. Signals and Systems - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, PHI, 2nd Edn.
3. Signals & Systems- Narayan Iyer and K Satya Prasad , Cenage Pub.

REFERENCES :

1. Signals & Systems - Simon Haykin and Van Veen,Wiley, 2nd Edition.
2. Signals and Systems – K R Rajeswari
3. Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008.
4. Signals and Systems –

II Year – I SEMESTER

	T	P	C
	3+1	0	3

DATA STRUCTURES

Objectives: Comprehensive knowledge of data structures and ability to implement the same in software applications

UNIT I:

Objective: exposure to algorithmic complexities, recursive algorithms, searching and sorting techniques

Preliminaries of algorithm, Algorithm analysis and complexity,

Data structure- Definition, types of data structures

Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi, Tail recursion

List Searches using Linear Search, Binary Search, Fibonacci Search

Sorting Techniques: Basic concepts, Sorting by : insertion (Insertion sort), selection (heap sort), exchange (bubble sort, quick sort), distribution (radix sort) and merging (merge sort) Algorithms.

UNIT II:

Objectives: Applying stack and queue techniques for logical operations

Stacks and Queues: Basic Stack Operations, Representation of a Stack using Arrays, Stack Applications: Reversing list, Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions.

Queues: Basic Queues Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack, Applications of Queues- Round robin Algorithm, Circular Queues, Priority Queues.

UNIT III:

Objectives: Exposure to list representation models in various types of applications

Linked Lists: Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, Reversing a single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, Advantages and disadvantages of single linked list, Circular linked list, Double linked list

UNIT IV:

Objectives: Implementation of tree implementation in various forms

Trees: Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree , Binary Tree Traversals (recursive), Creation of binary tree from in, pre and post order traversals

UNIT-V:

Objectives: Advanced understanding of other variants of trees and their operations

Advanced concepts of Trees: Tree Travels using stack (non recursive), Threaded Binary Trees. Binary search tree, Basic concepts, BST operations: insertion, deletion, Balanced binary trees – need, basics and applications in computer science (No operations)

UNIT VI:

Objectives: orientation on graphs, representation of graphs, graph traversals, spanning trees

Graphs: Basic concepts, Representations of Graphs: using Linked list and adjacency matrix, Graph algorithms

Graph Traversals (BFS & DFS), applications: Dijkstra's shortest path, Transitive closure, Minimum Spanning Tree using Prim's Algorithm, warshall's Algorithm(**Algorithemic Concepts Only, No Programs required**).

TEXT BOOKS:

1. Data Structure with C, Seymour Lipschutz, TMH
2. Data Structures using C,Reema Thareja, Oxford
3. Data Structures, 2/e, Richard F, Gilberg , Forouzan, Cengage
4. Data structures and algorithm analysis in C, 2^{nd} ed, mark allen weiss

REFERENCE BOOKS:

1. Data Structures and Algorithms, 2008,G.A.V.Pai, TMH
2. Classic Data Structures, 2/e, Debasis ,Samanta,PHI,2009
3. Fundamentals of Data Structure in C, 2/e, Horowitz,Sahni, Anderson Freed,University Prees

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II Year – II SEMESTER

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SWITCHING THEORY AND LOGIC DESIGN

UNIT – I

REVIEW OF NUMBER SYSTEMS & CODES:

i) Representation of numbers of different radix, conversation from one radix to another radix, r-1's compliments and r's compliments of signed members, problem solving.

ii) 4 bit codes, BCD, Excess-3, 2421, 84-2-1 9's compliment code etc.,

iii) Logic operations and error detection & correction codes; Basic logic operations -NOT, OR, AND, Universal building blocks, EX-OR, EX-NOR - Gates, Standard SOP and POS, Forms, Gray code, error detection, error correction codes (parity checking, even parity, odd parity, Hamming code) NAND-NAND and NOR-NOR realizations.

UNIT – II

MINIMIZATION TECHNIQUES:

Boolean theorems, principle of complementation & duality, De-morgan theorems, minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 6 variables, tabular minimization, problem solving (code-converters using K-Map etc..).

UNIT – III

COMBINATIONAL LOGIC CIRCUITS DESIGN :

Design of Half adder, full adder, half subtractor, full subtractor, applications of full adders, 4-bit binary subtractor, adder-subtractor circuit, BCD adder circuit, Excess 3 adder circuit, look-a-head adder circuit, Design of decoder, demultiplexer, 7 segment decoder, higher order demultiplexing, encoder, multiplexer, higher order multiplexing, realization of Boolean functions using decoders and multiplexers, priority encoder, 4-bit digital comparator.

UNIT – IV

INTRODUCTION OF PLD's :

PROM, PAL, PLA-Basics structures, realization of Boolean function with PLDs, programming tables of PLDs, merits & demerits of PROM, PAL, PLA comparison, realization of Boolean functions using PROM, PAL, PLA, programming tables of PROM, PAL, PLA.

UNIT – V

SEQUENTIAL CIRCUITS I:

Classification of sequential circuits (synchronous and asynchronous); basic flip-flops, truth tables and excitation tables (nand RS latch, nor RS latch, RS flip-flop, JK flip-flop, T flip-flop, D flip-flop with reset and clear terminals). Conversion from one flip-flop to flip-flop. Design of ripple counters, design of synchronous counters, Johnson counter, ring counter. Design of registers - Buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

UNIT – VI

SEQUENTIAL CIRCUITS II :

Finite state machine; Analysis of clocked sequential circuits, state diagrams, state tables, reduction of state tables and state assignment, design procedures. Realization of circuits using various flip-flops. Meelay to Moore conversion and vice-versa.

TEXT BOOKS:

1. Switching Theory and Logic Design by Hill and Peterson Mc-Graw Hill TMH edition.
2. Switching Theory and Logic Design by A. Anand Kumar
3. Digital Design by Mano PHI.

REFERENCE BOOKS:

1. Modern Digital Electronics by RP Jain, TMH
2. Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers
3. Micro electronics by Milliman MH edition.

II Year – II SEMESTER

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EM WAVES AND TRANSMISSION LINES

UNIT I

Electrostatics: Coulomb's Law, Electric Field Intensity Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

Magneto Statics : Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law, Inductances and Magnetic Energy. Illustrative Problems

UNIT II

Maxwell's Equations (Time Varying Fields): Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements. Conditions at a Boundary Surface : Dielectric-Dielectric and Dielectric-Conductor Interfaces. Illustrative Problems.

UNIT III

EM Wave Characteristics - I: Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H. Sinusoidal Variations. Wave Propagation in Lossless and Conducting Media. Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics. Polarization. Illustrative Problems.

UNIT IV

EM Wave Characteristics – II: Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance. Poynting Vector and Poynting Theorem – Applications, Power Loss in a Plane Conductor. Illustrative Problems.

UNIT VI

Transmission Lines - I : Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Losslessness/Low Loss Characterization, Distortion – Condition for Distortionlessness and Minimum Attenuation, Loading - Types of Loading. Illustrative Problems.

UNIT VI

Transmission Lines – II : Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR. UHF Lines as Circuit Elements; $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines – Impedance Transformations. Smith Chart – Configuration and Applications, Single and Double Stub Matching. Illustrative Problems.

TEXT BOOKS :

1. Elements of Electromagnetic – Matthew N.O. Sadiku, Oxford Univ. Press, 3rd ed., 2001.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.

REFERENCES :

1. Electromagnetic Fields and Wave Theory –GSN Raju, Pearson Education 2006
2. Engineering Electromagnetics – Nathan Ida, Springer (India) Pvt. Ltd., New Delhi, 2nd ed., 2005.
3. Engineering Electromagnetics – William H. Hayt Jr. and John A. Buck, TMH, 7th ed., 2006.
4. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan (Tech. India Publications), New Delhi, 2001.

II Year – II SEMESTER

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ANALOG COMMUNICATIONS

UNIT I

AMPLITUDE MODULATION : Introduction to communication system, Need for modulation, Frequency Division Multiplexing , Amplitude Modulation, Definition, Time domain and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves; Square law detector, Envelope detector.

UNIT II

DSB & SSB MODULATION : Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop. Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves, Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

UNIT III

ANGLE MODULATION : Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Generation of FM Waves, Direct FM, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Comparison of FM & AM.

UNIT IV

NOISE : Noise in Analog communication System, Noise in DSB& SSB System, Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis

UNIT V

TRANSMITTERS & RECEIVERS: Radio Transmitter - Classification of Transmitter, AM Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter – Variable reactance type and phase modulated FM Transmitter, frequency stability in FM Transmitter. **Radio Receiver** - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting.

UNIT VI

PULSE MODULATION : Time Division Multiplexing,, Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM, TDM Vs FDM

TEXT BOOKS:

1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe, TMH, 2007 3rd Edition.
2. Communication Systems – B.P. Lathi, BS Publication, 2006.

REFERENCES:

1. Principles of Communication Systems - Simon Haykin, John Wiley, 2nd Ed.,.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
3. Communication Systems– R.P. Singh, SP Sapre, Second Edition TMH, 2007.
4. Fundamentals of Communication Systems - John G. Proakis, Masond, Salehi PEA, 2006.

II Year – II SEMESTER

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ELECTRONIC CIRCUIT ANALYSIS LAB

Note : The students are required to design the electronic circuit and they have to perform the simulation using Multisim/ Pspice/Equivalent Licensed simulation software tool. Further they are required to verify the result using necessary hardware in the hardware laboratory.

PART A: List of Experiments :(Minimum of Ten Experiments has to be performed)

1. Determination of f_T of a given transistor.
2. Voltage-Series Feedback Amplifier
3. Current-Shunt Feedback Amplifier
4. RC Phase Shift/Wien Bridge Oscillator
5. Hartley/Colpitt's Oscillator
6. Two Stage RC Coupled Amplifier
7. Darlington Pair Amplifier
8. Bootstrapped Emitter Follower
9. Class A Series-fed Power Amplifier
10. Transformer-coupled Class A Power Amplifier
11. Class B Push-Pull Power Amplifier
12. Complementary Symmetry Class B Push-Pull Power Amplifier
13. Single Tuned Voltage Amplifier
14. Double Tuned Voltage Amplifier

PART B: Equipment required for Laboratory

Software:

- **i.** Multisim/ Pspice/Equivalent Licensed simulation software tool
- **ii.** Computer Systems with required specifications

Hardware:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Résistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)

Active & Passive Electronic Components

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ANALOG COMMUNICATIONS LAB

List of Experiments (Twelve experiments to be done) - (a. Hardware, b. MATLAB Simulink, c. MATLAB Communication tool box)

A. Amplitude Modulation - Mod. & Demod.
B. AM - DSB SC - Mod. & Demod.
C. Spectrum Analysis of Modulated signal using Spectrum Analyser
D. Diode Detector
E. Pre-emphasis & De-emphasis
F. Frequency Modulation - Mod. & Demod.
G. AGC Circuits
H. Sampling Theorem
I. Pulse Amplitude Modulation - Mod. & Demod.
J. PWM , PPM - Mod. & Demod.
K. PLL

Equipments & Software required:

Software :

i.) Computer Systems with latest specifications
ii) Connected in Lan (Optional)
iii) Operating system (Windows XP)
iv) Simulations software (Simulink & MATLAB)

Equipment:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. Components
5. Multimeters
6. Spectrum Analyser

III Year – I SEMESTER

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PULSE AND DIGITAL CIRCUITS

OBJECTIVES

The student will be made

- To understand the concept of wave shaping circuits, Switching Characteristics of diode and transistor.
- To analyze different types of Multi vibrators and their design procedures.
- To Introduce to Time-base Generators and Principles of Synchronization and Frequency division.
- To Understand Sampling Gates and to Design NAND and NOR gates using various logic families.

UNIT I

LINEAR WAVE SHAPING: High pass, low pass RC circuits, their response for sinusoidal, step, pulse, square and ramp inputs. RC network as differentiator and integrator, attenuators, its applications in CRO probe, RL and RLC circuits and their response for step input, Ringing circuit.

UNIT II

NON-LINEAR WAVE SHAPING : Diode clippers, Transistor clippers, clipping at two independent levels, Transfer characteristics of clippers, Emitter coupled clipper, Comparators, applications of voltage comparators, clamping operation, clamping circuits using diode with different inputs, Clamping circuit theorem, practical clamping circuits, effect of diode characteristics on clamping voltage, Transfer characteristics of clampers.

UNIT III

SWITCHING CHARACTERISTICS OF DEVICES : Diode as a switch, piecewise linear diode characteristics, Transistor as a switch, Break down voltage consideration of transistor, saturation parameters of Transistor and their variation with temperature, Design of transistor switch, transistor-switching times.

Digital Logic gate circuits: Realization of Logic Gates using DTL, TTL, ECL and CMOS logic circuits, Comparison of logic families.

UNIT IV

MULTIVIBRATORS :

Bistable Multi Vibrator: Analysis and Design of Fixed Bias, Self Bias Bistable Multi Vibrator, Collector catching Diodes, Commutating Capacitors, Methods of Triggering using RC network & Diode, Emitter Coupled Bistable Multi Vibrator (Schmitt trigger)

Monostable Multi Vibrator: Analysis and Design of Collector Coupled Monostable Multi Vibrator, Triggering method of a Monostable Multi Vibrator, Application of Monostable Multi Vibrator as a Voltage to Time Converter,

Astable Multi Vibrator: Analysis and Design of Collector Coupled Astable Multi vibrator , Application of Astable Multi Vibrator as a Voltage to Frequency Converter. All circuits are transistor version

UNIT V

VOLTAGE TIME BASE GENERATORS : General features of a time base signal, methods of generating time base waveform, Miller and Bootstrap time base generators – basic principles, Transistor miller time base generator, Transistor Bootstrap time base generator.

UNIT VI

SYNCHRONIZATION AND FREQUENCY DIVISION & SAMPLING GATES : Principles of Synchronization, Frequency division in sweep circuit, Astable relaxation circuits, Monostable relaxation circuits, Synchronization of a sweep circuit with symmetrical signals,
Basic operating principles of sampling gates, Unidirectional and Bi-directional sampling gates, Reduction of pedestal in gate circuits, Applications of sampling gates.

TEXT BOOKS :

1. Pulse, Digital and Switching Waveforms - J. Millman and H. Taub, McGraw-Hill, 1991.
2. Solid State Pulse circuits - David A. Bell, PHI, 4th Edn., 2002 .

REFERENCES :

1. Pulse and Digital Circuits – A. Anand Kumar, PHI, 2005.
2. Wave Generation and Shaping - L. Strauss.
3. Pulse, Digital Circuits and Computer Fundamentals - R.Venkataraman.

OUTCOMES

After going through this course the student will be able to

- Design linear and non-linear wave shaping circuits.
- Apply the fundamental concepts of wave shaping for various switching and signal generating circuits.
- Design different multivibrators and time base generators.

III Year – I SEMESTER

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LINEAR IC APPLICATIONS

OBJECTIVES

The student will

- Study characteristics, realize circuits, design for signal analysis using Op-amp ICs.
- Study the linear and non-linear applications of operational amplifiers.
- Study IC 555 timer, PLL and VCO with their applications.
- Study and understand different types of ADCs and DACs
- Acquire skills required for designing and testing integrated circuits

UNIT I

INTEGRATED CIRCUITS: Differential Amplifier- DC and AC analysis of Dual input Balanced output Configuration, Properties of other differential amplifier configuration (Dual Input Unbalanced Output, Single Ended Input – Balanced/ Unbalanced Output), DC Coupling and Cascade Differential Amplifier Stages, Level translator.

UNIT II

Characteristics of OP-Amps, Integrated circuits-Types, Classification, Package Types and Temperature ranges, Power supplies, Op-amp Block Diagram, ideal and practical Op-amp Specifications, DC and AC characteristics, 741 op-amp & its features, FET input. Op-Amps, Op-Amp parameters & Measurement, Input & Out put Off set voltages & currents, slew rates, CMRR, PSRR, drift, Frequency Compensation technique.

UNIT III

LINEAR and NON-LINEAR APPLICATIONS OF OP- AMPS:

Inverting and Non-inverting amplifier, Integrator and differentiator, Difference amplifier, Instrumentation amplifier, AC amplifier, V to I, I to V converters, Buffers. Non- Linear function generation, Comparators, Multivibrators, Triangular and Square wave generators, Log and Anti log Amplifiers, Precision rectifiers.

UNIT IV

ACTIVE FILTERS, ANALOG MULTIPLIERS AND MODULATORS:

Introduction, Butter worth filters – 1st order, 2nd order LPF, HPF filters. Band pass, Band reject and All pass filters.

Four Quadrant multiplier, balanced modulator, IC1496,Applications of analog switches and Multiplexers, Sample & Hold amplifiers.

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UNIT V

TIMERS & PHASE LOCKED LOOPS: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger. PLL - introduction, block schematic, principles and description of individual blocks, 565 PLL, Applications of PLL – frequency multiplication, frequency translation, AM, FM & FSK demodulators. Applications of VCO (566).

UNIT VI

DIGITAL TO ANALOG AND ANALOG TO DIGITAL CONVERTERS : Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, and IC 1408 DAC, Different types of ADCs – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC.DAC and ADC Specifications, Specifications AD 574 (12 bit ADC).

TEXT BOOKS :

1. Linear Integrated Circuits – D. Roy Chowdhury, New Age International (p) Ltd, 2nd Edition,2003.
2. Op-Amps & Linear ICs - Ramakanth A. Gayakwad, PHI,1987.

REFERENCES :

1. Design with Operational Amplifiers & Analog Integrated Circuits - Sergio Franco, McGraw Hill, 1988.
2. OP AMPS and Linear Integrated Circuits concepts and Applications, James M Fiore, Cenage Learning India Ltd.
3. Operational Amplifiers & Linear Integrated Circuits–R.F.Coughlin & Fredrick Driscoll, PHI, 6th Edition.
4. Operational Amplifiers – C.G. Clayton, Butterworth & Company Publ.Ltd./ Elsevier, 1971.
5. Operational Amplifiers & Linear ICs – David A Bell, Oxford Uni. Press, 3rd Edition

OUTCOMES

After going through this course the student will be able to

Design circuits using operational amplifiers for various applications.

Analyze and design amplifiers and active filters using Op-amp.

Acquire skills required for designing and testing integrated circuits

Understand the gain-bandwidth concept and frequency response of the three basic amplifiers. Understand thoroughly the operational amplifiers with linear integrated circuits.

Design combinational logic circuits for different applications.

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CONTROL SYSTEMS

OBJECTIVES

The student will

- Learn the fundamental concepts of Control systems and mathematical modelling of the system
- Study the concepts of time response and frequency response of the system
- Understand the basics of stability analysis of the system

UNIT I

INTRODUCTION

Concepts of Control Systems- Open Loop and closed loop control systems and their differences- Different examples of control systems- Classification of control systems, Feed-Back Characteristics, Effects of feedback.
Mathematical models – Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems

UNIT II

TRANSFER FUNCTION REPRESENTATION

Transfer Function of DC Servo motor - AC Servo motor- Synchro transmitter and Receiver, Block diagram representation of systems considering electrical systems as examples -Block diagram algebra – Representation by Signal flow graph - Reduction using mason's gain formula.

UNIT III

TIME RESPONSE ANALYSIS

Standard test signals - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants – Effects of proportional derivative, proportional integral systems.

UNIT IV

STABILITY ANALYSIS IN S-DOMAIN

The concept of stability – Routh's stability criterion – qualitative stability and conditional stability – limitations of Routh's stability.

Root Locus Technique:
The root locus concept - construction of root loci-effects of adding poles and zeros to G(s)H(s) on the root loci.

UNIT V
FREQUENCY RESPONSE ANALYSIS
Introduction. Frequency domain specifications-Bode diagrams-Determination of Frequency domain specifications and transfer function from the Bode Diagram-Phase margin and Gain margin-Stability Analysis from Bode Plots.

STABILITY ANALYSIS IN FREQUENCY DOMAIN:
Polar Plots. Nyquist Plots Stability Analysis.

UNIT VI
CLASSICAL CONTROL DESIGN TECHNIQUES
Compensation techniques – Lag, Lead, Lead-Lag Controllers design in frequency Domain, PID Controllers. State Space Analysis of Continuous Systems Concepts of state, state variables and state model, derivation of state models from block diagrams, Diagonalization- Solving the Time invariant state Equations- State Transition Matrix and it's Properties – Concepts of Controllability and Observability

TEXT BOOKS:

1. Automatic Control Systems 8th edition– by B. C. Kuo 2003– John wiley and son's.,
2. Control Systems Engineering – by I. J. Nagrath and M. Gopal, New Age International (P) Limited, Publishers, 2nd edition.

REFERENCE BOOKS:

1. Modern Control Engineering – by Katsuhiko Ogata – Prentice Hall of India Pvt. Ltd., 3rd edition, 1998.
2. Control Systems by N.K.Sinha, New Age International (P) Limited Publishers, 3rd Edition, 1998.

OUTCOMES

After going through this course the student will be able to

- Represent the mathematical model of a system
- Determine the response of different order systems for various step inputs
- Analyse the stability of the system

III Year – I SEMESTER

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DIGITAL SYSTEM DESIGN & DIGITAL IC APPLICATIONS

OBJECTIVES

The student will be introduced to

The electrical behavior of CMOS both in static and dynamic conditions and before that study the diode/transistor-transistor logic and Emitter coupled logic.

In this course, students can study Integrated circuits for all digital operational designs like adder, subtractor, multipliers, multiplexers, registers, counters, flip flops, encoders, decoders and memory elements like RAM and ROM.

Design and to develop the internal circuits for different digital operations and simulate them using hardware languages using integrated circuits.

Understand the concepts of SSI Latches and Flip-Flops and Design of Counters using Digital ICs, modeling of sequential logic integrated circuits using VHDL

Unit-I:

Digital Design Using HDL: Design flow, program structure, History of VHDL, VHDL requirements, Levels of Abstraction, Elements of VHDL, Concurrent and Sequential Statements, Packages, Libraries and Bindings, Objects and Classes, Subprograms, Comparison of VHDL and Verilog HDL.

Unit-II:

VHDL Modelling : Simulation, Logic Synthesis, Inside a logic Synthesizer, Constraints, Technology Libraries, VHDL and Logic Synthesis, Functional Gate-Level verification, Place and Route, Post Layout Timing Simulation, Static Timing, Major Netlist formats for design representation, VHDL Synthesis-Programming Approach.

Unit-III:

Programmable Logic Devices (PLDs) & Memories: Programmable Read Only Memory, Programmable Logic Array, Programmable Array Logic Devices, ROM: Internal structure, 2D-Decoding, Commercial ROM types, timing and applications,. Static RAM: Internal structure, SRAM timing, standard, synchronous SRAMS, Dynamic RAM: Internal structure, timing, synchronous DRAMs. Design considerations of PLDs with relevant Digital ICs.

Unit-IV:

Digital Logic Families and Interfacing: Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS

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logic families.bipolar logic, transistor-transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic.

Unit-V:

Combinational Logic Design: Adders & Subtractors, Ripple Adder, Look Ahead Carry Generator, Binary Parallel Adder, Binary Adder-Subtractor, ALU, Decoders, encoders, three state devices, multiplexers and demultiplexers, Code Converters, parity circuits, comparators, multipliers, Barrel Shifter, Simple Floating-Point Encoder, Cascading Comparators, Dual Priority Encoder, Design considerations with relevant Digital ICs, modeling of Circuits by using VHDL.

Unit-VI:

Sequential Logic Design: SSI Latches and Flip-Flops, Counters, Design of Counters using Digital ICs, Ring Counter, Johnson Counter, Modulus N Synchronous Counters, MSI Registers, Shift Registers, Modes of Operation of Shift Registers, Universal Shift Registers, MSI Shift Registers, Design considerations with relevant Digital ICs, modeling of circuits by using VHDL.

TEXT BOOKS:

1. Digital Design Principles & Practices – John F.Wakerly, PHI/ Pearson Education Asia, 3rd Edition, 2005.
2. Designing with TTL Integrated Circuits: Robert L. / John R. Morris & Miller.

REFERENCES:

1. "Fundamentals of Digital logic design with VHDL". Stephen Brown & Zvonko Vranesic, Tata McGraw Hill, 2nd edition.
2. VHDL Primer – J. Bhasker, Pearson Education/ PHI, 3rd Edition.

OUTCOMES:

After going through this course the student will be able to

- Understand the concepts of different logics and implementations using Integrated circuits.
- Design and analyze any Digital design in real time applications.
- Extend the digital operations to any width by connecting the ICs and can also design, simulate their results using hardware description language.
- Understand the concepts of MSI Registers and Modes of Operation of Shift Registers, Universal Shift Registers.

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ANTENNAS AND WAVE PROPAGATION

OBJECTIVES

The student will be able to

- understand the applications of the electromagnetic waves in free space.
- introduce the working principles of various types of antennas
- discuss the major applications of antennas with an emphasis on how antennas are employed to meet electronic system requirements.
- understand the concepts of radio wave propagation in the atmosphere.

UNIT I

ANTENNA FUNDAMENTALS: Introduction, Radiation Mechanism – single wire, 2 wire, dipoles, Current Distribution on a thin wire antenna. Antenna Parameters - Radiation Patterns, Patterns in Principal Planes, Main Lobe and Side Lobes, Beamwidths, Polarization, Beam Area, Radiation Intensity, Beam Efficiency, Directivity, Gain and Resolution, Antenna Apertures, Aperture Efficiency, Effective Height, illustrated Problems.

UNIT II

THIN LINEAR WIRE ANTENNAS: Retarded Potentials, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Field Components, Power Radiated, Radiation Resistance, Beamwidths, Directivity, Effective Area and Effective Height. Natural current distributions, fields and patterns of Thin Linear Center-fed Antennas of different lengths, Radiation Resistance at a point which is not current maximum. Antenna Theorems – Applicability and Proofs for equivalence of directional characteristics, Loop Antennas: Small Loops - Field Components, Comparison of far fields of small loop and short dipole, Concept of short magnetic dipole, D and R_r relations for small loops.

UNIT III

ANTENNA ARRAYS : 2 element arrays – different cases, Principle of Pattern Multiplication, N element Uniform Linear Arrays – Broadside, End-fire Arrays, EFA with Increased Directivity, Derivation of their characteristics and comparison; Concept of Scanning Arrays. Directivity

Relations (no derivations). Related Problems. Binomial Arrays. Effects of Uniform and Non-uniform Amplitude Distributions. Design Relations. Arrays with Parasitic Elements. Yagi-Uda Arrays. Folded Dipoles and their characteristics.

UNIT IV

NON-RESONANT RADIATORS : Introduction. Traveling wave radiators – basic concepts. Long wire antennas – field strength calculations and patterns. Microstrip Antennas-Introduction, Features, Advantages and Limitations. Rectangular Patch Antennas –Geometry and Parameters. Impact of different parameters on characteristics. Broadband Antennas: Helical Antennas – Significance, Geometry, basic properties; Design considerations for monofilar helical antennas in Axial Mode and Normal Modes (Qualitative Treatment).

UNIT V

VHF, UHF AND MICROWAVE ANTENNAS : Reflector Antennas : Flat Sheet and Corner Reflectors. Paraboloidal Reflectors – Geometry, characteristics, types of feeds, F/D Ratio, Spill Over, Back Lobes, Aperture Blocking, Off-set Feeds, Cassegrain Feeds.

Horn Antennas – Types, Optimum Horns, Design Characteristics of Pyramidal Horns; Lens Antennas – Geometry, Features, Dielectric Lenses and Zoning, Applications, Antenna Measurements – Patterns Required, Set Up, Distance Criterion, Directivity and Gain Measurements (Comparison, Absolute and 3-Antenna Methods).

UNIT VI

WAVE PROPAGATION : Concepts of Propagation – frequency ranges and types of propagations. Ground Wave Propagation–Characteristics, Parameters, Wave Tilt, Flat and Spherical Earth Considerations. Sky Wave Propagation – Formation of Ionospheric Layers and their Characteristics, Mechanism of Reflection and Refraction, Critical Frequency, MUF and Skip Distance – Calculations for flat and spherical earth cases, Optimum Frequency, LUHF, Virtual Height, Ionospheric Abnormalities, Ionospheric Absorption.

Fundamental Equation for Free-Space Propagation, Basic Transmission Loss Calculations. Space Wave Propagation – Mechanism, LOS and Radio Horizon. Tropospheric Wave Propagation – Radius of Curvature of path, Effective Earth's Radius, Effect of Earth's Curvature, Field Strength Calculations, M-curves and Duct Propagation, Tropospheric Scattering.

TEXT BOOKS

1. Antennas for All Applications – John D. Kraus and Ronald J. Marhefka, 3rd Edition, TMH, 2003.
2. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, 2nd Edition, 2000.

REFERENCES

1. Antenna Theory - C.A. Balanis, John Wiley and Sons, 2nd Edition, 2001.
2. Antennas and Wave Propagation – K.D. Prasad, Satya Prakashan, Tech India Publications, New Delhi, 2001.
3. Transmission and Propagation – E.V.D. Glazier and H.R.L. Lamont, The Services Text Book of Radio, vol. 5, Standard Publishers Distributors, Delhi.
4. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th Edition, 1955.
5. Antennas – John D. Kraus, McGraw-Hill, 2nd Edition, 1988.

OUTCOMES

After going through this course the student will be able to

Identify basic antenna parameters.

Design and analyze wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and microstrip antennas

Quantify the fields radiated by various types of antennas

Design and analyze antenna arrays

Analyze antenna measurements to assess antenna's performance

Identify the characteristics of radio wave propagation

III Year – I SEMESTER

T P C 0 3
2

Pulse & Digital Circuits Lab

1. Linear wave shaping.
2. Non Linear wave shaping – Clippers.
3. Non Linear wave shaping – Clampers.
4. Transistor as a switch.
5. Study of Logic Gates & Some applications.
6. Study of Flip-Flops & some applications.
7. Sampling Gates.
8. Astable Multivibrator.
9. Monostable Multivibrator.
10. Bistable Multivibrator.
11. Schmitt Trigger.
12. UJT Relaxation Oscillator.
13. Bootstrap sweep circuit.

EQUIPMENT REQUIRED FOR LABORATORY:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. Components
5. Multi Meters

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III Year – I SEMESTER

T	P	C
0	3	2

LIC APPLICATIONS LAB

Minimum Twelve Experiments to be conducted :

1. Study of ICs – IC 741, IC 555, IC 565, IC 566, IC 1496 – functioning, parameters and Specifications.
2. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
3. Integrator and Differentiator Circuits using IC 741.
4. Active Filter Applications – LPF, HPF (first order)
5. Active Filter Applications – BPF, Band Reject (Wideband) and Notch Filters.
6. IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators.
7. Function Generator using OP AMPs.
8. IC 555 Timer – Monostable Operation Circuit.
9. IC 555 Timer – Astable Operation Circuit.
10. Schmitt Trigger Circuits – using IC 741 and IC 555.
11. IC 565 – PLL Applications.
12. IC 566 – VCO Applications.
13. Voltage Regulator using IC 723.
14. Three Terminal Voltage Regulators – 7805, 7809, 7912.
15. 4 bit DAC using OP AMP.

EQUIPMENT REQUIRED FOR LABORATORIES:

1. RPS
2. CRO
3. Function Generator
4. Multi Meters
5. IC Trainer Kits (Optional)
6. Bread Boards
7. Components:- IC741, IC555, IC565, IC1496, IC723, 7805, 7809, 7912 and other essential components.
8. Analog IC Tester

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III Year – I SEMESTER

T	P	C
0	3	2

Digital System Design & DICA Laboratory

The students are required to design and draw the internal structure of the following Digital Integrated Circuits and to develop VHDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer. Further, it is required to verify the logic with necessary hardware.

List of Experiments:

1. Realization of Logic Gates
2. 3 to 8 Decoder- 74138
3. 8*1 Multiplexer-74151 and 2*1 De-multiplexer-74155
4. 4-Bit Comparator-7485.
5. D Flip-Flop- 7474
6. Decade Counter- 7490
7. 4 Bit Counter-7493
8. Shift Register-7495
9. Universal shift register-74194/195
10. Ram (16*4)-74189 (read and write operations)
11. ALU

Equipment Required:

1. Xilinix ISE software-latest version
2. Personal computer with necessary pheripherals
3. Hardware kits- Various FPGA families.

III Year – I SEMESTER

T	P	C
3	0	2

INTELLECTUAL PROPERTY RIGHTS AND PATENTS

Unit I

Introduction to Intellectual Property Law – Evolutionary past – Intellectual Property Law Basics - Types of Intellectual Property - Innovations and Inventions of Trade related Intellectual Property Rights – Agencies Responsible for Intellectual Property Registration – Infringement - Regulatory – Over use or Misuse of Intellectual Property Rights - Compliance and Liability Issues.

Unit II

Introduction to Copyrights – Principles of Copyright – Subject Matters of Copyright – Rights Afforded by Copyright Law –Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of performers – Copyright Formalities and Registration – Limitations – Infringement of Copyright – International Copyright Law-Semiconductor Chip Protection Act.

Unit III

Introduction to Patent Law – Rights and Limitations – Rights under Patent Law – Patent Requirements – Ownership and Transfer – Patent Application Process and Granting of Patent – Patent Infringement and Litigation – International Patent Law – Double Patenting – Patent Searching – Patent Cooperation Treaty – New developments in Patent Law- Invention Developers and Promoters.

Unit IV

Introduction to Trade Mark – Trade Mark Registration Process – Post registration procedures – Trade Mark maintenance – Transfer of rights – Inter parties Proceedings – Infringement – Dilution of Ownership of Trade Mark – Likelihood of confusion – Trade Mark claims – Trade Marks Litigation – International Trade Mark Law

Unit V

Introduction to Trade Secrets – Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreement –

Trade Secret Law – Unfair Competition – Trade Secret Litigation – Breach of Contract – Applying State Law.

Unit VI

Introduction to Cyber Law – Information Technology Act - Cyber Crime and E-commerce – Data Security – Confidentiality – Privacy - International aspects of Computer and Online Crime.

REFERENCE BOOKS:

1. Deborah E.Bouchoux: "Intellectual Property". Cengage learning , New Delhi
2. Kompal Bansal & Parishit Bansal "Fundamentals of IPR for Engineers", BS Publications (Press)
3. Cyber Law. Texts & Cases, South-Western's Special Topics Collections
4. Prabhuddha Ganguli: ' Intellectual Property Rights" Tata Mc-Graw – Hill, New Delhi
5. Richard Stim: "Intellectual Property", Cengage Learning, New Delhi.
6. R. Radha Krishnan, S. Balasubramanian: "Intellectual Property Rights",Excel Books. New Delhi.
7. M. Ashok Kumar and Mohd.Iqbal Ali: "Intellectual Property Right" Serials Pub.

III Year – II SEMESTER

	T	P	C
	3+1	0	3

MICRO PROCESSORS AND MICRO CONTROLLERS

OBJECTIVES : The student will

- learn concepts of microprocessor, different addressing modes and programming of 8086.
- understand interfacing of 8086, with memory and other peripherals.
- learn concept of DMA, USART RS-232 and PIC controller.
- study the features of advanced processors and Pentium processors.
- study the features of 8051 Microcontroller, its instruction set and also other controllers.

UNIT-I: 8086/8088 MICROPROCESSORS

Register organization of 8086, Architecture, signal description of 8086, physical memory organization, general bus operation, I/O addressing capability, special purpose activities, Minimum mode, maximum mode of 8086 system and timings, the processor 8088, machine language instruction formats, addressing mode of 8086, instruction set off 8086,assembler directives and operators.

UNIT-II: PROGRAMMING WITH 8086 MICROPROCESSOR

Machine level programs, programming with an assembler, Assembly language programs, introduction to stack, stack structure of 8086/8088, interrupts and interrupt service routines, interrupt cycle of 8086, non-mask able interrupt and mask able interrupts, interrupt programming.

UNIT-III: BASIC AND SPECIAL PURPOSE PROGRAMMABLE PERIPHERALS AND THEIR INTERFACING WITH 8086/88

Semiconductor memory interfacing, dynamic RAM interfacing, interfacing i/o ports, PIO 8255 modes of operation of 8255,interfacing to D/A and A/D converters, stepper motor interfacing, control of high power devices using 8255.Programmable interrupt controller 8259A, the keyboard /display controller8279, programmable communication interface 8251 USART, DMA Controller 8257.

UNIT-IV: ADVANCED MICRO PROCESSORS

Salient features of 0386DX, architecture and signal description of 80386, register organization of 80386 and addressing modes, data types of 80386,

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real address mode of 80386, protected mode of 80386, segmentation and Paging, virtual 8086 mode and enhanced mode. Instruction set of 80386.The coprocessor 80387.

UNIT-V: 8051 MICROCONTROLLER

Introduction to microcontrollers, 8051Microcontrollers, 8051pin description, connections, I/O ports and memory organization, MCS51addressing modes and instructions, assembly language programming tools.

UNIT-VI: PIC MICROCONTROLLERS AND ARM 32-BIT MICROCONTROLLER

Overview and features, PIC16Cx/7X instructions, interrupts in PIC 16C61/71, PIC 16F8XX Flash controllers, I/O ports and timers. Introduction to 16/32 Bit processors, ARM architecture and organization, ARM / Thumb programming model, ARM / Thumb instruction set.

TEXT BOOKS:

1. A.K.Ray, K.M.Bhurchandi ,"Advanced Microprocessors and Peripherals", Tata McGraw Hill Publications,2000.
2. N.Sentil Kumar, M.Saravanan, S.Jeevananthan, "Microprocessors and Microcontrollers", Oxford University Press,2010.

REFERENCES:

1. Ajay V Deshmukh, "Microcontrollers", TATA McGraw Hill publications, 2012.
2. Krishna Kant, "Microprocessors and Microcontrollers", PHI Publications, 2010.

OUTCOMES

After going through this course the student will be able to

- develop programs for different addressing modes.
- perform 8086 interfacing with different peripherals and implement programs
- describe the key features of serial and parallel communication and able to
- Design a microcontroller for simple applications.

III Year – II SEMESTER

	T	P	C
	3+1	0	3

DIGITAL SIGNAL PROCESSING

OBJECTIVES

The student will be able to

- Define and use Discrete Fourier Transforms (DFTs)
- Use Z - transforms and discrete time Fourier transforms to analyze a digital system.
- Understand simple finite impulse response filters
- Learn the design procedures used for filter bank
- Learn to program a DSP processor to filter signals

UNIT I

INTRODUCTION: Introduction to Digital Signal Processing: Discrete time signals & sequences, linear shift invariant systems, stability, and causality. Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems.

UNIT II

DISCRETE FOURIER SERIES & FOURIER TRANSFORMS: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear convolution of sequences using DFT,Computation of DFT, Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

UNIT III

REALIZATION OF DIGITAL FILTERS: Review of Z-transforms, Applications of Z – transforms, solution of difference equations - digital filters, Block diagram representation of linear constant-coefficient difference equations, Basic structures of IIR systems, Transposed forms, Basic structures of FIR systems, System function,

UNIT IV

IIR & FIR DIGITAL FILTERS: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples: Analog-Digital transformations Characteristics of FIR Digital Filters, frequency response. Design of FIR Digital Filters using Window Techniques, Frequency Sampling technique, Comparison of IIR & FIR filters.

UNIT V

MULTIRATE DIGITAL SIGNAL PROCESSING: Decimation, interpolation, sampling rate conversion, Implementation of sampling rate conversion.

UNIT VI

INTRODUCTION TO DSP PROCESSORS: Introduction to programmable DSPs: Multiplier and Multiplier Accumulator (MAC). Modified Bus Structures and Memory Access schemes in DSPs Multiple access memory .multiport memory, VLSI architecture, Pipelining, Special addressing modes, On-Chip Peripherals. Architecture of TMS 320C5X-Introduction. Bus Structure, Central Arithmetic Logic Unit, Auxiliary Register, Index Register, Block Move Address Register, Parallel Logic Unit, Memory mapped registers, program controller, Some flags in the status registers, On- chip registers, On-chip peripherals

TEXT BOOKS:

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G.Manolakis,Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A.V.Oppenheim and R.W. Schaffer, PHI
3. Digital Signal Processors – Architecture, Programming and Applications,, B.Venkataramani, M.Bhaskar, TATA McGraw Hill, 2002
4. Digital Signal Processing – K Raja Rajeswari, I.K. International Publishing House

Reference Books:

1. Digital Signal Processing: Andreas Antoniou, TATA McGraw Hill , 2006
2. Digital Signal Processing: MH Hayes, Schaum's Outlines, TATA Mc-Graw Hill, 2007.
3. DSP Primer - C. Britton Rorabaugh, Tata McGraw Hill, 2005.
4. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra

L. Harris,Thomson, 2007.

5. Digital Signal Processing – Alan V. Oppenheim, Ronald W. Schafer, PHI Ed., 2006

OUTCOMES

After going through this course the student will be able to

Estimate the spectra of signals that are to be processed by a discrete time filter, and to verify the performance of a variety of modern and classical spectrum estimation techniques.

Design and simulate a digital filter

Design new digital signal processing systems.

Design and realize FIR, IIR filters

Program a DSP processor to filter signals

III Year – II SEMESTER

	T	P	C
	3+1	0	3

DIGITAL COMMUNICATIONS

OBJECTIVES

The student will be able to

- understand pulse digital modulation systems such as PCM,DPCM and DM
- understand various digital modulation techniques and able to analyze various systems for their performance in terms of probability of error
- study the concept of entropy and need for source coding
- study Block codes, cyclic codes and convolution codes

UNIT I

PULSE DIGITAL MODULATION: Elements of digital communication systems, advantages of digital communication systems, Elements of PCM: Sampling, Quantization & Coding, Quantization error, Companding in PCM systems. Differential PCM systems (DPCM). Delta modulation, its draw backs, adaptive delta modulation, comparison of PCM and DM systems, noise in PCM and DM systems.

UNIT II

DIGITAL MODULATION TECHNIQUES: Introduction, ASK, FSK, PSK, DPSK, DEPSK, QPSK, M-ary PSK, ASK, FSK, similarity of BFSK and BPSK.

UNIT III

DATA TRANSMISSION : Base band signal receiver, probability of error, the optimum filter, matched filter, probability of error using matched filter, coherent reception, non-coherent detection of FSK, calculation of error probability of ASK, BPSK, BFSK,QPSK.

UNIT IV

INFORMATION THEORY: Discrete messages, concept of amount of information and its properties. Average information, Entropy and its properties. Information rate, Mutual information and its properties.

UNIT V

SOURCE CODING: Introductions, Advantages, Shannon's theorem, Shanon-Fano coding, Huffman coding, efficiency calculations, channel capacity of discrete and analog Channels. capacity of a Gaussian channel. bandwidth –S/N trade off.

UNIT VI

LINEAR BLOCK CODES: Introduction, Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes. Hamming codes, Binary cyclic codes. Algebraic structure, encoding, syndrome calculation, BCH Codes.

CONVOLUTION CODES: Introduction, encoding of convolution codes, time domain approach, transform domain approach. Graphical approach: state, tree and trellis diagram decoding using Viterbi algorithm.

TEXT BOOKS:

1. Digital communications - Simon Haykin, John Wiley, 2005
2. Principles of Communication Systems – H. Taub and D. Schilling, TMH, 2003

REFERENCES:

1. Digital and Analog Communication Systems - Sam Shanmugam, John Wiley, 2005.
2. Digital Communications – John Proakis, TMH, 1983. Communication Systems Analog & Digital – Singh & Sapre, TMH, 2004.
3. Modern Analog and Digital Communication – B.P.Lathi, Oxford reprint, 3rd edition, 2004.

OUTCOMES

After going through this course the student will be able to

analyze the performance of a Digital Communication System for probability of error and are able to design a digital communication system

analyze various source coding techniques

Compute and analyze Block codes, cyclic codes and convolution codes

Design a coded communication system

III Year – II SEMESTER

	T	P	C
	3+1	0	3

MICROWAVE ENGINEERING

OBJECTIVES

The student will

- Understand fundamental electrical characteristics of waveguides and transmission lines through electromagnetic field analysis.
- Understand the basic properties of Polarization and Ferrite materials composition in the case of waveguide components.
- Understand the multiport junction concept for splitting the microwave energy in a desired direction.
- Understand the function, design, and integration of the major microwave components like oscillator, modulator, power amplifier, filter, and mixer in building a Microwave test bench setup for measurements.

UNIT I

MICROWAVE TRANSMISSION LINES: Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides – TE/TM mode analysis, Expressions for Fields, Characteristic Equation and Cut-off Frequencies, Filter Characteristics, Dominant and Degenerate Modes, Sketches of TE and TM mode fields in the cross-section, Mode Characteristics – Phase and Group Velocities, Wavelengths and Impedance Relations; Power Transmission and Power Losses in Rectangular Guide, Impossibility of TEM mode. Related Problems.

UNIT II

CIRCULAR WAVEGUIDES: Introduction, Nature of Fields, Characteristic Equation, Dominant and Degenerate Modes. Microstrip Lines– Introduction, Zo Relations, Effective Dielectric Constant, Losses, Q factor.

Cavity Resonators– Introduction, Rectangular and Cylindrical Cavities, Dominant Modes and Resonant Frequencies, Q factor and Coupling Coefficients, Excitation techniques- waveguides and cavities, Related Problems.

UNIT III

WAVEGUIDE COMPONENTS AND APPLICATIONS - I :Coupling Mechanisms – Probe, Loop, Aperture types. Waveguide Discontinuities –

Waveguide irises, Tuning Screws and Posts, Matched Loads. Waveguide Attenuators – Resistive Card, Rotary Vane types; Waveguide Phase Shifters – Dielectric, Rotary Vane types. Scattering Matrix– Significance, Formulation and Properties. S-Matrix Calculations for – 2 port Junction, E-plane and H-plane Tees, Magic Tee, Hybrid Ring; Directional Couplers – 2Hole, Bethe Hole types, Ferrite Components– Faraday Rotation, S-Matrix Calculations for Gyrator, Isolator, Circulator, Related Problems.

UNIT - IV

MICROWAVE TUBES : Limitations and Losses of conventional tubes at microwave frequencies.

Microwave tubes – O type and M type classifications. O-type tubes : 2 Cavity Klystrons – Structure, Reentrant Cavities, Velocity Modulation Process and Applegate Diagram, Bunching Process and Small Signal Theory – Expressions for o/p Power and Efficiency. Reflex Klystrons – Structure, Applegate Diagram and Principle of working, Mathematical Theory of Bunching, Power Output, Efficiency, Electronic Admittance; Oscillating Modes and o/p Characteristics, Electronic and Mechanical Tuning, Related Problems.

UNIT V

HELIX TWTS: Significance, Types and Characteristics of Slow Wave Structures; Structure of TWT and

Suppression of Oscillations, Nature of the four Propagation Constants.

M-type Tubes

Introduction, Cross-field effects, Magnetrons – Different Types, 8-Cavity Cylindrical Travelling Wave

Magnetron – Hull Cut-off and Hartree Conditions, Modes of Resonance and PI-Mode Operation, Separation of PI-Mode, o/p characteristics.

UNIT VI

MICROWAVE SOLID STATE DEVICES: Introduction, Classification, Applications. TEDs – Introduction, Gunn Diode – Principle, RWH Theory, Characteristics, Basic Modes of Operation, Oscillation Modes. Avalanche Transit Time Devices – Introduction, IMPATT and TRAPATT Diodes – Principle of Operation and Characteristics.

MICROWAVE MEASUREMENTS: Description of Microwave Bench – Different Blocks and their Features, Precautions; Microwave Power Measurement – Bolometer Method. Measurement of Attenuation, Frequency, VSWR, Cavity Q. Impedance Measurements.

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TEXT BOOKS :

1. Microwave Devices and Circuits – Samuel Y. Liao, PHI, 3rd Edition,1994.
2. Microwave Principles – Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, CBS Publishers and Distributors, New Delhi, 2004.

REFERENCES :

1. Foundations for Microwave Engineering – R.E. Collin, IEEE Press, John Wiley, 2nd Edition, 2002.
2. Microwave Circuits and Passive Devices – M.L. Sisodia and G.S.Raghuvanshi, Wiley Eastern Ltd., New Age International Publishers Ltd., 1995.
3. Microwave Engineering Passive Circuits – Peter A. Rizzi, PHI, 1999.
4. Microwave Engineering – G S N Raju , I K International
5. Microwave and Radar Engineering – G Sasibhushana Rao Pearson
6. Electronic and Radio Engineering – F.E. Terman, McGraw-Hill, 4th ed., 1955.

OUTCOMES : After going through this course the student will

Gain knowledge of transmissionlines and waveguide structures and how they are used as elements in impedance matching and filter circuits.

Apply analysis methods to determine circuit properties of passive or active microwave devices.

Gain knowledge and understanding of microwave analysis methods.

Distinguish between M-type and O-type tubes

Analyze and measure various microwave parameters using a Microwave test bench

III Year – II SEMESTER

	T	P	C
	0	3	2

MICROPROCESSORS AND MICROCONTROLLERS LAB

The students are required to develop the necessary Algorithm, Flowchart and Assembly Language Program Source Code for executing the following functions using MASM/TASM software and to verify the results with necessary Hardware Kits.

PART-I: MICROPROCESSOR 8086

1. Introduction to MASM/TASM.
2. Arithmetic operation- Multi byte Addition and Subtraction, Multiplication and Division- Signed and unsigned Arithmetic operation, ASCII- Arithmetic operation.
3. Logic operations-Shift and rotate- Converting packed BCD to unpacked BCD, BCD to ASCII conversion.
4. By using string operation and Instruction prefix: Move Block, Reverse string, Sorting, Inserting, Deleting, Length of the string, String comparison.
5. DOS/BIOS programming : Reading keyboard (Buffered with and without echo) - Display characters, Strings.

PART-II: INTERFACING WITH MICROPROCESSOR

1. 8259 – Interrupt Controller-Generate an interrupt using 8259 timer.
2. 8279 – Keyboard Display- Write a program to display a string of characters.
3. 8255 – PPI-Write ALP to generate sinusoidal wave using PPI.
4. 8251 – USART-Write a program in ALP to establish Communication between two processors.

PART-III: MICROCONTROLLER 8051

1. Reading and Writing on a parallel port.
2. Timer in different modes.
3. Serial communication implementation.

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PART-IV: INTERFACING WITH MICROCONTROLLER

Write C programs to interface 8051 chip to Interfacing modules to Develop single chip solutions.

1. Simple Calculator using 6 digit seven segment display and Hex Keyboard interface to 8051.
2. Alphanumeric LCD panel and Hex keypad input interface to 8051.
3. External ADC and Temperature control interface to 8051.
4. Generate different waveforms Sine, Square, Triangular, and Rampetc. using DAC interface to 8051; change the frequency and Amplitude.

EQUIPMENT REQUIRED FOR LABORATORY

1. MASM/TASM software
2. 8086 Microprocessor Kits
1. 8051 Micro Controller kits
2. Interfaces/peripheral subsystems
   i) 8259 PIC
   ii) 8279-KB/Display
   iii) 8255 PPI
   iv) 8251 USART
5. A/D and D/AC Interface

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III Year – II SEMESTER **T P C 0 3 2**

DIGITAL COMMUNICATIONS LAB

1. Time division multiplexing.
2. Pulse code modulation.
3. Differential pulse code modulation.
4. Delta modulation.
5. Frequency shift keying.
6. Phase shift keying .
7. Differential phase shift keying.
8. Companding
9. Source Encoder and Decoder
10. Linear Block Code-Encoder and Decoder
11. Binary Cyclic Code - Encoder and Decoder
12. Convolution Code - Encoder and Decoder

Equipment required for Laboratories:

1. RPS - 0 – 30 V
2. CRO - 0 – 20 M Hz.
3. Function Generators - 0 – 1 M Hz
4. RF Generators - 0 – 1000 M Hz./0 – 100 M Hz.
5. Multimeters
6. Lab Experimental kits for Digital Communication
7. Components
8. Radio Receiver/TV Receiver Demo kits or Trainees.

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III Year – II SEMESTER

T	P	C
0	3	2

DIGITAL SIGNAL PROCESSING LAB

LIST OF EXPERIMENTS:

1. To study the architecture of DSP chips – TMS 320C 5X/6X Instructions.
2. To verify linear convolution.
3. To verify the circular convolution.
4. To design FIR filter (LP/HP) using windowing technique
   a) Using rectangular window
   b) Using triangular window
   c) Using Kaiser window
5. To Implement IIR filter (LP/HP) on DSP Processors
6. N-point FFT algorithm.
7. MATLAB program to generate sum of sinusoidal signals.
8. MATLAB program to find frequency response of analog LP/HP filters.
9. To compute power density spectrum of a sequence.
10. To find the FFT of given 1-D signal and plot.

III Year – II SEMESTER

T	P	C
0	2	1

Seminar

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IV Year – I SEMESTER

T P C
3+1 0 3

VLSI DESIGN

OBJECTIVES

The student will be introduced to

- Use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnects.
- Learn the various fabrication steps of IC and come across basic electrical properties of MOSFET.
- Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect and to verify the functionality, timing, power and parasitic effects.
- The concepts and techniques of modern integrated circuit design and testing (CMOS VLSI).
- Design static CMOS combinational and sequential logic at the transistor level, including mask layout.

Unit-I:

Introduction : Introduction to IC Technology, MOS and related VLSI Technology, Basic MOS Transistors, Enhancement and Depletion modes of transistor action, IC production process, MOS and CMOS Fabrication processes, BiCMOS Technology, Comparison between CMOS and Bipolar technologies.

Basic Electrical Properties Of MOS and Bi-CMOS Circuits: I_{ds} versus V_{ds} Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Trans, Output Conductance and Figure of Merit. The Pass transistor, NMOS Inverter, Pull-up to Pull-down Ratio for NMOS inverter driven by another NMOS inverter. Alternative forms of pull-up, The CMOS Inverter, MOS transistor circuit model, Bi-CMOS Inverter, Latch-up in CMOS circuits and BiCMOS Latch-up Susceptibility.

Unit-II:

MOS and Bi-CMOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design

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rules, 2μm Double Metal, Double Poly, CMOS/BiCMOS rules, 1.2μm Double Metal, Double Poly CMOS rules, Layout Diagrams of NAND and NOR gates and CMOS inverter, Symbolic Diagrams-Translation to Mask Form.

Unit-III:

Basic Circuit Concepts: Sheet Resistance, Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, Standard unit of capacitance, The Delay Unit, Inverter Delays, Propagation Delays, Wiring Capacitances, Fan-in and fan-out characteristics, Choice of layers, Transistor switches, Realization of gates using NMOS, PMOS and CMOS technologies.

Scaling Of MOS Circuits: Scaling models, Scaling factors for device parameters, Limits due to sub threshold currents, current density limits on logic levels and supply voltage due to noise.

Unit-IV:

Subsystem Design: Architectural issues, switch logic, Gate logic, examples of structured design, clocked sequential circuits, system considerations, general considerations of subsystem design processes, an illustration of design processes.

Unit-V:

VlSI Design Issues: VLSI Design issues and design trends, design process, design for testability, technology options, power calculations, package selection, clock mechanisms, mixed signal design, ASIC design flow, FPGA design flow, introduction to SoC design.

Unit-VI:

FPGA Design: Basic FPGA architecture, , FPGA configuration, configuration modes, FPGA design process- FPGA design flow, FPGA families, FPGA design examples-stack, queue and shift register implementation using VHDL, step-by-step approach of FPGA design process on Xilinx environment.

Text Books:

1. Essentials of VLSI Circuits and Systems By Kamran Eshraghian, Douglas and A. Pucknell and Sholeh Eshraghian, Prentice-Hall of India Private Limited,2005 Edition.
2. VLSI Design-Black Book By Dr. K.V.K.K. Prasad, Kattula Shyamala, Kogent Learning Solutions Inc.2012 Edition.

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References:

1. VLSI Design By A.Albert Raj & T.Latha,PHI Learning Private Limited,2010.
2. VLSI Design-A.Shanthi and A.Kavita, New Age International Private Limited, 2006 First Edition.

OUTCOMES

After going through this course the student will be able to

Apply the Concept of design rules during the layout of a circuit.

Model and simulate digital VLSI systems using hardware design language.

Synthesize digital VLSI systems from register-transfer or higher level descriptions

Understand current trends in semiconductor technology, and how it impacts scaling and performance.

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IV Year – I SEMESTER

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	3+1	0	3

COMPUTER NETWORKS

Objectives

The aim of this course is to introduce key concepts and principles of computer networks. The course will use a top-down approach to study the Internet and its protocol stack. Architecture, protocol, application-examples will include email, web and media-streaming. We will cover communications services (e.g., TCP/IP) required to support such network applications. The implementation and deployment of communications services in practical networks: including wired and wireless LAN environments, will be followed by a discussion of issues of network-security and network-management. Internet's architecture and protocols will be used as the primary examples to illustrate the fundamental principles of computer networking.

UNIT I

INTRODUCTION

OSI, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT II PHYSICAL LAYER

Transmission media copper, twisted pair wireless, switching and encoding asynchronous communications; Narrow band, broad band ISDN and ATM.

UNIT III

DATA LINK LAYER

Design issues, framing, error detection and correction, CRC, Elementary Protocol-stop and wait, Sliding Window. Medium Access Sub Layer: ALOHA, MAC addresses, Carrier sense multiple access, IEEE 802.X Standard Ethernet, wireless LANS, Bridges.

UNIT IV NETWORK LAYER

Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing. **DYNAMIC ROUTING:** Broadcast routing. Rotary for mobility, Congestion, Control Algorithms – General Principles of Congestion prevention policies. Internetworking: The Network layer in the internet and in the ATM Networks.

UNIT V TRANSPORT
LAYER

Transport Services, Connection management, TCP and UDP protocols; ATM AAL Layer Protocol.

UNIT VI
APPLICATION LAYER

Network Security, Domain name system, SNMP, Electronic Mail; the World WEB, Multi Media.

TEXT BOOKS

1. Computer Networks — Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. Data Communications and Networking – Behrouz A. Forouzan.Third Edition TMH.

REFERENCES

1. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition,Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

Outcomes:

The student will be able to

Analyze a communication system by separating out the different functions provided by the network; and some example networks

Understand various network topologies required for communication

Understand that there are fundamental limits to any communications system;

Understand the general principles behind addressing, routing, reliable transmission and other stateful protocols as well as specific examples of each;

Have an informed view of both the internal workings of the Internet and of a number of common Internet applications and protocols.

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IV Year – I SEMESTER

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DIGITAL IMAGE PROCESSING

OBJECTIVES

The student will

- Learn the fundamental concepts and applications of Digital Image Processing.
- Learn the concepts of and how to perform Intensity transformations and spatial filtering.
- Understand the relationship between Filtering in spatial and frequency domains.
- Understand the concepts of and how to perform Image restoration and reconstruction.
- Understand the concepts of different color models and Color image processing.
- Learn the concepts of Wavelets and multi-resolution processing, Image compression and Watermarking, Morphological image processing, Image segmentation, Representation and description.

UNIT-1

Introduction: Origins of digital image processing, uses digital image processing, fundamental steps in digital image processing, components of an image processing system, digital image fundamentals, Elements of visual perception, light and electromagnetic spectrum, imaging sensing and acquisition, image sampling and quantization. Some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing

Image Transforms: Need for image transforms, Spatial Frequencies in image processing, introduction to Fourier transform, discrete Fourier transform, fast Fourier transform and its algorithm, properties of Fourier transform. Discrete sine transforms. Walsh Transform. Hadamard transform, Haar Transform. Slant transforms, SVD and KL Transforms or Hotelling Transform

UNIT-2

Intensity Transformations and Spatial Filtering: Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters , sharpening spatial filters,

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Combining spatial enhancement methods, using fuzzy techniques for intensity transformations and spatial filtering

Filtering in the frequency domain: Preliminary concepts, Sampling and the Fourier transform of sampled functions, the discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform. The Basic of filtering in the frequency domain, image smoothing using frequency domain filters, Selective filtering, Implementation

UNIT-3

Image restoration and Reconstruction: A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimation the degradation function, Inverse filtering, Minimum mean square error(Wiener) filtering ,constrained least squares filtering ,geometric mean filtering ,image reconstruction from projections.

Unit-4

Color image processing: color fundamentals, color models, pseudo color image processing, basic of full color image processing, color transformations, smoothing and sharpening, Image segmentation based on color, noise in color images, color image compression

Unit-5

Wavelets and Multi-resolution Processing: image pyramids, sub band coding & Haar transforms multi resolution expressions, wavelet transforms in one dimensions, The fast wavelets transform, wavelet transforms in two dimensions, wavelet packets.

Image compression: Fundamentals, various compression methods-coding techniques, digital image water marking

Unit-6

Morphological image processing: preliminaries Erosion and dilation, opening and closing, the Hit-or-miss transformation, some Basic Morphological algorithms, grey –scale morphology

Image segmentation: Fundamentals, point, line, edge detection thresholding, region –based segmentation, segmentation using Morphological watersheds, the use of motion in segmentation

TEXT BOOKS :

1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall , 2008.

2. R. C. Gonzalez, R. E. Woods and Steven L. Eddins , Digital Image Processing Using MATLAB , 2rd edition, Prentice Hall, 2009.

3. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9th Edition, Indian Reprint, 2002
4. Jayaraman, S. Esakkirajan, and T. Veerakumar, Digital Image Processing, Tata McGraw-Hill Education, 2011

Reference : Missing

OUTCOMES

After going through this course the student will be able to

- Perform different transforms on image useful for image processing applications
- Perform spatial and frequency domain filtering on image and can implement all smoothing and sharpening operations on images
- Perform image restoration operations/techniques on images
- Operate effectively on color images and different color conversions on images and can code images to achieve good compression
- Do wavelet based image processing and image compression using wavelets
- Perform all morphological operations on images and can be able to do image segmentation also.
- Develop simple algorithms for image processing and use the various techniques involved in Bio Medical applications, etc.

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IV Year – I SEMESTER

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COMPUTER ARCHITECTURE AND ORGANIZATION

Objectives

The student will

- Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.
- Understand the principles and the implementation of computer arithmetic and ALU.
- Understand the memory system, I/O organization
- Understand the operation of modern CPUs including interfacing, pipelining, memory systems and busses.
- Understand the principles of operation of multiprocessor systems

UNIT-I

BASIC STRUCTURE OF COMPUTERS: Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers. Data types, Complements, Data Representation. Fixed Point Representation. Floating – Point Representation. Error Detection codes.

COMPUTER ARITHMETIC: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT-II

REGISTER TRANSFER LANGUAGE AND MICRO-OPERATIONS:

Register Transfer language. Register Transfer, Bus and memory transfer, Arithmetic Micro-operations, logic micro operations, shift micro-operations, Arithmetic logic shift unit. Instruction codes. Computer Registers Computer instructions –Instruction cycle. Memory Reference Instructions. Input Onput and Interrupt. **CENTRAL PROCESSING UNIT** - Stack organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer

UNIT-III

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, micro program example, Design of control unit-Hard wired control. Micro programmed control

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UNIT-IV

THE MEMORY SYSTEM: Memory Hierarchy, Main memory, Auxiliary memory, Associative memory, Cache memory, Virtual memory, Memory management hardware

UNIT-V

INPUT-OUTPUT ORGANIZATION : Peripheral Devices, Input-Output Interface, Asynchronous data transfer Modes of Transfer, Priority Interrupt, Direct memory Access, Input –Output Processor (IOP), Serial communication;

UNIT-VI

PIPELINE AND VECTOR PROCESSING: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline Vector Processing, Array Processors. **Multi processors:** Characteristics of Multiprocessors, Interconnection Structures, Interprocessor Arbitration. Interprocessor Communication and Synchronization, Cache Coherence.

TEXT BOOKS:

1. Computer System Architecture – M.Moris Mano, IIIrd Edition, PHI / Pearson, 2006.
2. Computer Organization – Car Hamacher, ZvonksVranesic, SafwatZaky, V Edition, McGraw Hill, 2002.

REFERENCES:

1. Computer Organization and Architecture – William Stallings Seventh Edition, PHI/Pearson, 2006.
2. Computer Architecture and Organization – John P. Hayes, Mc Graw Hill International editions, 1998.

Objectives :

Understand the fundamentals of different instruction set architectures and their relationship to the CPU design.
Understand the principles and the implementation of computer arithmetic and ALU.
Understand the memory system, I/O organization
Understand the operation of modern CPUs including interfacing, pipelining, memory systems and busses.
Understand the principles of operation of multiprocessor systems.
Demonstrate the relationship between the software and the hardware and focuses on the foundational concepts that are the basis for current computer design.

IV Year – I SEMESTER

	T	P	C
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Elective I

ELECTRONIC SWITCHING SYSTEMS

Objectives :

The student will

Understand the means of measuring traffic.

Understand the implication of the traffic level on system design.

UNIT -I:

Introduction: Evolution of Telecommunications, Simple Telephone Communication, Basics of Switching System, Manual Switching System, Major Telecommunication Networks.

Crossbar Switching: Principles of Common Control, Touch Tone Dial Telephone, Principles of Crossbar Switching, Crossbar Switch Configurations, Cross point Technology, Crossbar Exchange Organization.

UNIT -II:

Electronic Space Division Switching: Stored Program Control, Centralized SPC, Distributed SPC, Software Architecture, Application Software, Enhanced Services, Two-Stage Networks, Three-Stage Networks, n- Stage Networks.

Time Division Switching: Basic Time Division Space Switching, Basic Time Division Time Switching, Time Multiplexed Space Switching, Time Multiplexed Time Switching, Combination Switching, Three-Stage Combination Switching, n- Stage Combination Switching.

UNIT -III:

Telephone Networks: Subscriber Loop System, Switching Hierarchy and Routing, Transmission Plan, Transmission Systems, Numbering Plan, Charging Plan, Signaling Techniques, In-channel Signaling, Common Channel Signaling, Cellular Mobile Telephony

Signaling: Customer Line Signaling, Audio- Frequency Junctions and Trunk Circuits, FDM Carrier Systems, PCM Signaling, Inter- Register Signaling, Common- Channel Signaling Principles, CCITT Signaling System no.6, CCITT Signaling System no.7, Digital Customer Line Signaling.

UNIT -IV:

Packet Switching: Statistical Multiplexing, Local- Area and Wide- Area Networks, Large-scale Networks, Broadband Networks.

Telecommunications Traffic: The Unit of Traffic. Congestion. Traffic Measurement. A Mathematical Model. Lost-call Systems. Queuing Systems.

UNIT -V:

Switching Networks: Single- Stage Networks. Grading. Link Systems, Grades of service of link systems, Application of Graph Theory to link Systems, Use of Expansion, Call Packing, Rearrange-able Networks, Strict- Sense non-blocking Networks, Sectionalized Switching Networks

UNIT -VI:

Integrated Services Digital Network: Motivation for ISDN, New Services, Network and Protocol Architecture, Transmission Channels, User-Network Interfaces, Signaling, Numbering and Addressing, Service Characterization, Interworking, ISDN Standards, Expert Systems in ISDN, Broadband ISDN, Voice Data Integration.

TEXT BOOKS:

1. Telecommunication Switching Systems and Networks- Thiagarajan Viswanathan, 2000, PHI.
2. Telecommunications Switching, Traffic and Networks- J. E. Flood, 2006, Pearson Education.

REFERENCES:

1. Digital Telephony- J. Bellamy, 2nd Edition, 2001, John Wiley.
2. Data Communications and Networks- Achyut S. Godbole, 2004, TMH.
3. Principles of Communication Ststems- H. Taub & D. Schilling, 2nd Edition, 2003, TMH.
4. Data Communication & Networking- B. A. Forouzan, 3rd Edition, 2004, TMH.
5. Telecommunication System Engineering – Roger L. Freeman, 4th Ed., Wiley-Inter Science, John Wiley & Sons, 2004.

Outcomes

The student will be able to

- Evaluate the time and space parameters of a switched signal
- Establish the digital signal path in time and space, between two terminals
- Evaluate the inherent facilities within the system to test some of the SLIC, CODEC and digital switch functions.
- Investigate the traffic capacity of the system.
- Evaluate methods of collecting traffic data.
- Evaluate the method of interconnecting two separate digital switches.

ANALOG IC DESIGN

(Elective I)

OBJECTIVES

The student will be introduced to

The student will be able to understand the behavior of MOS Devices and Small-Signal & Large-Signal Modeling of MOS Transistor and Analog Sub-Circuits.

In this course, students can study CMOS Amplifiers like Differential Amplifiers, Cascode Amplifiers, Output Amplifiers, and Operational Amplifiers.

Another main object of this course is to motivate the graduate students to design and to develop the Analog CMOS Circuits for different Analog operations.

The concepts of Open-Loop Comparators and Different Types of Oscillators like Ring Oscillator, LC Oscillator etc.

UNIT -I:

MOS Devices and Modeling: The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

UNIT -II:

Analog CMOS Sub-Circuits: MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT -III:

CMOS Amplifiers: Inverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.

UNIT -IV:

CMOS Operational Amplifiers: Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps, Cascode Op Amps, Measurement Techniques of OP Amp.

UNIT -V:

Comparators: Characterization of Comparator, Two-Stage, Open-Loop Comparators, Other Open-Loop Comparators, Improving the Performance of Open-Loop Comparators, Discrete-Time Comparators.

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UNIT -VI:

Oscillators & Phase-Locked Loops: General Considerations. Ring Oscillators. LC Oscillators, Voltage Controlled Oscillators. Simple PLL. Charge Pump PLLs. Non-Ideal Effects in PLLs. Delay Locked Loops. Applications.

Text Books:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi. TMH Edition.
2. CMOS Analog Circuit Design - Philip E. Allen and Douglas R. Holberg. Oxford University Press. International Second Edition/Indian Edition, 2010.

References:

1. Analysis and Design of Analog Integrated Circuits- Paul R. Gray. Paul J. Hurst. S. Lewis and R. G. Meyer. Wiley India, Fifth Edition, 2010.
2. Analog Integrated Circuit Design- David A.Johns, Ken Martin. Wiley Student Edn, 2013.

OUTCOMES

After going through this course the student will be able to

Understand the concepts of MOS Devices and Modeling.

Design and analyze any Analog Circuits in real time applications.

Extend the Analog Circuit Design to Different Applications in Real Time.

Understand of Open-Loop Comparators and Different Types of Oscillators.

OBJECT ORIENTED PROGRAMMING & OPERATING SYSTEM

(Elective I)

Course Objectives:

By the end of the course student will

- Describe the general architecture of computers
- Describe object oriented concepts
- Describe, contrast and compare differing structures for operating Systems
- Understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files

UNIT-I:

Introduction to OOP

Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP

UNIT-II:

Computer System and Operating System Overview: Overview of computer operating systems, operating systems functions, protection and security, distributed systems, special purpose systems, operating systems structures and systems calls, operating systems generation.

UNIT-III:

Process Management – Process concept- process scheduling, operations, Inter process communication. Multi Thread programming models. Process scheduling criteria and algorithms, and their evaluation.

UNIT-IV:

Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation

UNIT-V:

Virtual Memory Management:

virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing

UNIT-VI:

File system Interface- the concept of a file. Access Methods, Directory structure. File system mounting, file sharing, protection.

TEXT BOOKS:

1. The Complete Reference Java, 8ed, Herbert Schildt, TMH
2. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
3. Operating Systems' – Internal and Design Principles Stallings, Sixth Edition–2005, Pearson education

REFERENCES:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/ Operating%20Systems/New_index1.html
2. Operating systems- A Concept based Approach-D.M.Dhamdhere, 2nd Edition, TMH
3. Operating System A Design Approach-Crowley, TMH.
4. Modern Operating Systems, Andrew S Tanenbaum 3rd edition PHI.

Course Outcomes:

By the end of the course student will be able to

- describe the general architecture of computers
- describe object oriented concepts
- describe, contrast and compare differing structures for operating Systems
- understand and analyze theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files

RADAR SYSTEMS

(Elective-I)

OBJECTIVES

The student will be introduced to

- the knowledge of different Antennas systems and communication equipment required for the operation of RADAR.
- different parameters of Transmitter and Receiver of RADAR
- the concept of Doppler Effect to measure parameters of RADAR.
- different types of RADARS and applications based on the type of Transmitters, Receivers, and their functions.

Pre requisites: Antennas and wave propagation; Electromagnetics and Communications

UNIT – I

Introduction: Nature of Radar. Maximum Unambiguous Range. Radar Waveforms, Simple form of Radar Equation, Radar Block Diagram and Operation, Radar Frequencies and Applications. Related Problems. Radar Equation: Prediction of Range Performance, Minimum Detectable Signal, Receiver Noise and SNR, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets-sphere, cone-sphere). Transmitter power.

UNIT – II

PRF and Range Ambiguities, System Losses (Qualitative treatment). Related Problems. CW and Frequency Modulated Radar: Doppler effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Receiver Bandwidth Requirement, Applications of CW radar. FM-CW Radar, Range and Doppler Measurement, Block Diagram and Characteristics (Approaching/ Receding Targets), FM-CW altimeter, Measurement Errors, Multiple Frequency CW Radar.

UNIT – III

MTI and Pulse Doppler Radar: Introduction, Principle, MTIR Radar with-Power Amplifier Transmitter and Power Oscillator Transmitter, Delay Line Cancellers – Filter Characteristics, Blind Speeds, Double Cancellation staggered PRFs. Range Gated Doppler Filters. MTI Radar Parameters, Limitations to MTI Performance. Non-coherent MTI, MTI versus Pulse Doppler Radar. Tracking Rader : Tracking with Rader, Sequential Lobing, Conical Scan, Mono-pulse Tracking.

UNIT – IV

Rader Amplitude Comparison Mono-pulse (one – and two –coordinates). Phase Comparison Mono-pulse. Target Reflection Characteristics and Angular Accuracy. Tracking in Range Acquisition and Scanning Patterns. Comparison of Trackers. Radar Antennas – Antenna Parameters. Reflector Antennas. Lens Antennas. Lens Antennas Cosecant- Squared Antenna Pattern. Radomes.

UNIT- V

Electronically Steered Phased Array Antennas. Phase Shifters. Frequency – scan Arrays. Radiation for Phased Array. Architecture for Phased Arrays. Detection of Radar Signals in Noise: Introduction. Matched Filter Receiver – Response Characteristics and Derivation. Correlation detection. Detection criteria. Detector Characteristics. Automatic Detection. Constant False Alarm Rate Receiver

UNIT – VI

Radar Receivers – Noise Figure and Noise Temperature. Displays – types. Duplexer – Branch type and Balanced type, Circulators as Duplexers. Introduction to Phased Array Antennas- Basic Concepts, Radiation Pattern. Beam Steering and Beam Width changes, Series versus Parallel Feeds. Applications, Advantages and Limitations.

TEXT BOOKS:

1. Introduction to Radar Systems – Merrill I. Skolnik, SECOND EDITION, McGraw – Hill, 1981.
2. Radar Engineering and fundamentals of Navigational Aids-G.S.N.Raju, I.K International, 2008.

REFERENCES:

1. Introduction to Radar Systems – Merrill I. Skolnik, THIRD EDITION, Tata McGraw – Hill, 2001.
2. Radar: Principles, Technologies, Applications- Byron Edde, Pearson Education.

OUTCOMES

After going through this course the student will be able to

Acquire the knowledge to apply and to design required parameters for a RADAR system.

Apply the techniques learned, to choose suitable RADAR from the available, for the required application.

ADVANCED COMPUTER ARCHITECTURE

(Elective I)

UNIT -I:

Fundamentals of Computer Design:

Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, Measuring and reporting performance, Quantitative principles of computer design, Amdahl's law.

Instruction set principles and examples- Introduction, Classifying instruction set- MEmory addressing- type and size of operands, Operations in the instruction set.

UNIT –II:

Pipelines:

Introduction, Basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties.

Memory Hierarchy Design:

Introduction, Review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT -III:

Instruction Level Parallelism the Hardware Approach:

Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, high performance instruction delivery- hardware based speculation.

UNIT-IV

ILP Software Approach

Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues -Hardware verses Software.

UNIT –V:

Multi Processors and Thread Level Parallelism:

Multi Processors and Thread level Parallelism- Introduction, Characteristics of application domain, Systematic shared memory architecture, Distributed shared – memory architecture, Synchronization.

UNIT –VI:

Inter Connection and Networks:

Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters.

Intel Architecture: Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

TEXT BOOKS:

1. John L. Hennessy, David A. Patterson - Computer Architecture: A Quantitative Approach, 3rd Edition, An Imprint of Elsevier.

REFERENCES:

1. John P. Shen and Miikko H. Lipasti - Modern Processor Design : Fundamentals of Super Scalar Processors
2. Computer Architecture and Parallel Processing - Kai Hwang, Faye A.Brigs., MC Graw Hill.
3. Advanced Computer Architecture - A Design Space Approach - Dezso Sima, Terence Fountain, Peter Kacsuk , Pearson Ed.

IV Year – I SEMESTER

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Elective II

OPTICAL COMMUNICATIONS

OBJECTIVES

The student will be introduced to

the functionality of each of the components that comprise a fiber-optic communication system

the properties of optical fiber that affect the performance of a communication link and types of fiber materials with their properties and the losses occur in fibers.

the principles of single and multi-mode optical fibers and their characteristics

working of semiconductor lasers, and differentiate between direct modulation and external electro-optic modulation.

Analyze the operation of LEDs, laser diodes, and PIN photo detectors (spectral

properties, bandwidth, and circuits) and apply in optical systems.

Analyze and design optical communication and fiber optic sensor systems.

the models of analog and digital receivers.

UNIT I

Overview of optical fiber communication - Historical development, The general system, advantages of optical fiber communications. Optical fiber wave guides- Introduction, Ray theory transmission, Total Internal Reflection, Acceptance angle, Numerical Aperture, Skew rays, Cylindrical fibers- Modes, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers- Cut off wavelength, Mode Field Diameter, Effective Refractive Index, Related problems.

UNIT II

Fiber materials:- Glass, Halide, Active glass, Chalgenide glass, Plastic optical fibers. Signal distortion in optical fibers-Attenuation, Absorption, Scattering and Bending losses, Core and Cladding losses, Information capacity determination. Group delay. Types of Dispersion:- Material dispersion. Wave-guide dispersion. Polarization-Mode dispersion. Intermodal dispersion. Pulse broadening in Graded index fiber. Related problems.

UNIT III

Optical fiber Connectors-Connector types. Single mode fiber connectors. Connector return loss. Fiber Splicing- Splicing techniques. Splicing single mode fibers. Fiber alignment and joint loss- Multimode fiber joints. single mode fiber joints.

UNIT IV

Optical sources- LEDs. Structures. Materials. Quantum efficiency. Power. Modulation. Power bandwidth product. Injection Laser Diodes- Modes. Threshold conditions. External quantum efficiency. Laser diode rate equations, Resonant frequencies, Reliability of LED&ILD, Optical detectors- Physical principles of PIN and APD, Detector response time, Temperature effect on Avalanche gain, Comparison of Photo detectors, Related problems.

UNIT V

Source to fiber power launching - Output patterns, Power coupling, Power launching, Equilibrium Numerical Aperture, Laser diode to fiber coupling, Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, Receiver configuration, Digital receiver performance, Probability of Error, Quantum limit, Analog receivers.

UNIT VI

Optical system design - Point-to- point links- Component choice and considerations, Link power budget, Rise time budget with examples, Line coding in Optical links, WDM, Necessity, Principles, Measurement of Attenuation and Dispersion, Eye pattern.

TEXT BOOKS :

1. Optical Fiber Communications – Gerd Keiser, Mc Graw-Hill International edition, 3rd Edition, 2000.
2. Optical Fiber Communications – John M. Senior, PHI, 2nd Edition, 2002.

RERFERENCES :

1. Fiber Optic Communications – D.K. Mynbaev , S.C. Gupta and Lowell L. Scheiner, Pearson Education,2005.
2. Text Book on Optical Fiber Communication and its Applications – S.C.Gupta, PHI, 2005.

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3. Fiber Optic Communication Systems – Govind P. Agarwal , John Wiley, 3rd Ediition, 2004.

4. Fiber Optic Communications – Joseph C. Palais, 4th Edition, Pearson Education, 2004.

OUTCOMES

After going through this course the student will be able to

Choose necessary components required in modern optical communications systems .

Design and build optical fiber experiments in the laboratory, and learn how to calculate electromagnetic modes in waveguides, the amount of light lost going through an optical system, dispersion of optical fibers.

Use different types of photo detectors and optical test equipment to analyze optical fiber and light wave systems.

Choose the optical cables for better communication with minimum losses

Design, build, and demonstrate optical fiber experiments in the laboratory.

DIGITAL IC DESIGN

(Elective II)

OBJECTIVES

The student will be able to understand the MOS Design.

In this course, students can study Combinational MOS Logic Circuits and Sequential MOS Logic Circuits.

Another main object of this course is to motivate the graduate students to design and to develop the Digital Integreated Circuits for different Applications.

The concepts of Semiconductor Memories, Flash Memory, RAM array organization.

UNIT-I:

MOS Design: Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II:

Combinational MOS Logic Circuits: MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates, AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III:

Sequential MOS Logic Circuits: Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT-IV:

Dynamic Logic Circuits: Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

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UNIT-V:

Interconnect: Capacitive Parasitics, Resistive Parasitics, Inductive Parasitics, Advanced Interconnect Techniques.

UNIT-VI:

Semiconductor Memories: Memory Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory-NOR flash and NAND flash.

Text Books:

1. Digital Integrated Circuits – A Design Perspective, Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, 2nd Ed., PHI.
2. Digital Integrated Circuit Design – Ken Martin, Oxford University Press, 2011.

References:

1. CMOS Digital Integrated Circuits Analysis and Design – Sung-Mo Kang, Yusuf Leblebici, TMH, 3rd Ed., 2011.
2. CMOS VLSI Design – Neil H.E Weste, David harris, Ayan Banerjee 3rd Edition, Pearson

OUTCOMES

After going through this course the student will be able to

Understand the concepts of MOS Design.

Design and analysis of Combinational and Sequential MOS Circuits.

Extend the Digital IC Design to Different Applications.

Understand the Concepts of Semiconductor Memories, Flash Memory, RAM array organization.

SPEECH PROCESSING

(ELECTIVE – II)

UNIT –I:

Fundamentals of Digital Speech Processing:

Anatomy & Physiology of Speech Organs, The process of Speech Production, Acoustic Phonetics, Articulatory Phonetics, The Acoustic Theory of Speech Production- Uniform lossless tube model, effect of losses in vocal tract, effect of radiation at lips, Digital models for speech signals.

UNIT –II:

Time Domain Models for Speech Processing:

Introduction- Window considerations, Short time energy and average magnitude Short time average zero crossing rate, Speech Vs Silence discrimination using energy and zero crossing, Pitch period estimation using a parallel processing approach, The short time autocorrelation function, The short time average magnitude difference function, Pitch period estimation using the autocorrelation function.

UNIT –III:

Linear Predictive Coding (LPC) Analysis:

Basic principles of Linear Predictive Analysis: The Autocorrelation Method, The Covariance Method, Solution of LPC Equations: Cholesky Decomposition Solution for Covariance Method, Durbin's Recursive Solution for the Autocorrelation Equations, Comparison between the Methods of Solution of the LPC Analysis Equations, Applications of LPC Parameters: Pitch Detection using LPC Parameters, Formant Analysis using LPC Parameters.

UNIT –IV:

Homomorphic Speech Processing:

Introduction, Homomorphic Systems for Convolution: Properties of the Complex Cepstrum, Computational Considerations, The Complex Cepstrum of Speech, Pitch Detection, Formant Estimation, The Homomorphic Vocoder.

UNIT-V

Speech Enhancement:

Nature of interfering sounds, Speech enhancement techniques: Single Microphone Approach : spectral subtraction, Enhancement by re-synthesis, Comb filter, Wiener filter, Multi microphone Approach.

UNIT-VI:

Automatic Speech & Speaker Recognition:

Basic pattern recognition approaches, Parametric representation of speech, Evaluating the similarity of speech patterns, Isolated digit Recognition System, Continuous digit Recognition System

Hidden Markov Model (HMM) for Speech:

Hidden Markov Model (HMM) for speech recognition, Viterbi algorithm, Training and testing using HMMS,

Speaker Recognition:

Recognition techniques, Features that distinguish speakers, Speaker Recognition Systems: Speaker Verification System, Speaker Identification System.

TEXT BOOKS:

1. Digital Processing of Speech Signals - L.R. Rabiner and S. W. Schafer. Pearson Education.
2. Speech Communications: Human & Machine - Douglas O'Shaughnessy, 2nd Ed., Wiley India, 2000.
3. Digital Processing of Speech Signals. L.R Rabinar and R W Jhaung, 1978, Pearson Education.

REFERENCE BOOKS:

1. Discrete Time Speech Signal Processing: Principles and Practice - Thomas F. Quateri, 1st Ed., PE.
2. Speech & Audio Signal Processing- Ben Gold & Nelson Morgan, 1st Ed., Wiley.

Artificial Neural Networks and Fuzzy Logic

(Elective II)

1. Introduction to Neural Networks

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Potential Applications of ANN.

Essentials of Artificial Neural Networks

Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN-Connectivity, Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules, Types of Application.

2. Feed Forward Neural Networks

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training

Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence

theorem, Limitations of the Perceptron Model, Applications.

Multilayer Feed Forward Neural Networks

Credit Assignment Problem, Generalized Delta Rule, Derivation of Back-propagation (BP)

Training, Summary of Back-propagation Algorithm, Kolmogorov Theorem, Learning

Difficulties and Improvements.

3. Associative Memories

Paradigms of Associative Memory, Pattern Mathematics, Hebbian Learning, General Concepts of Associative Memory Associative Matrix, Association Rules, Hamming Distance, The Linear Associator, Matrix Memories, Content Addressable Memory, Bidirectional Associative Memory (BAM) Architecture, BAM Training Algorithms: Storage and Recall Algorithm, BAM Energy Function, Proof of BAM Stability Theorem. Architecture of

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Hopfield Network: Discrete and Continuous versions. Storage and Recall Algorithm. Stability Analysis. Capacity of the Hopfield Network.

4. **Self-Organizing Maps (SOM) and Adaptive Resonance Theory (ART)**

Introduction. Competitive Learning. Vector Quantization. Self-Organized Learning Networks. Kohonen Networks. Training Algorithms. Linear Vector Quantization. Stability- Plasticity Dilemma. Feed forward competition. Feedback Competition. Instar. Outstar. ART1. ART2. Applications.

5. **Classical & Fuzzy Sets**

Introduction to classical sets – properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, Properties, fuzzy relations, cardinalities, membership functions.

6. **Fuzzy Logic System Components**

Fuzzification, Membership Value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

Applications :

Neural network applications: Process identification, Fraction Approximation, Control and Process Monitoring, Fault diagnosis and Load forecasting.

Fuzzy logic applications: Fuzzy logic control and Fuzzy classification.

Text Books:

1. Neural Netwroks, Fuzy logic , Gnenetic algorithms: synthesis and applications by Rajasekharan and Rai- PHI Publication.
2. Introduction to Artificial Neural Systems- Jacek M.Zurada, Jaico Publishing House, 1997.

Reference Books:

1. Neural and Fuzzy Systems: Foundation, Architectures and Applications, - N. Yadaiah and S. Bapi Raju, Pearson Education
2. Neural Netwroks – James A Freeman and Davis Skapura, Pearson, 2002
3. Neural Netwroks – Simon Hykins, Pearson Education.
4. Neural Engineering by C. Eliasmith and CH. Anderson, PHI.

   Neural Netwroks and Fuzzy Logic System by Brok Kosko, PHI Publications.

NETWORK SECURITY & CRYPTOGRAPHY

(Elective-II)

Course objectives:

The main objective of this course is to teach students to understand and how to address various software security problems in a secure and controlled environment. During this course the students will gain knowledge (both theoretical and practical) in various kinds of software security problems, and techniques that could be used to protect the software from security threats. The students will also learn to understand the "modus operandi" of adversaries; which could be used for increasing software dependability.

Course outcomes:

1. be able to individually reason about software security problems and protection techniques on both an abstract and a more technically advanced level.
2. be able to individually explain how software exploitation techniques, used by adversaries, function and how to protect against them.

Syllabus:

UNIT I : Classical Encryption Techniques

Objectives: *The Objectives of this unit is to present an overview of the main concepts of cryptography, understand the threats & attacks, understand ethical hacking.*

Introduction: Security attacks, services & mechanisms, Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Cyber threats and their defense (Phishing Defensive measures, web based attacks, SQL injection & Defense techniques) TEXT BOOK 2), Buffer overflow & format string vulnerabilities, TCP session hijacking (ARP attacks, route table modification) UDP hijacking (man-in-the-middle attacks) (TEXT BOOK3).

UNIT II: Block Ciphers & Symmetric Key Cryptography

Objectives: *The Objectives of this unit is to understand the difference between stream ciphers & block ciphers, present an overview of the Feistel Cipher and explain the encryption and decryption, present an overview of DES, Triple DES, Blowfish, IDEA.*

Traditional Block Cipher Structure, DES, Block Cipher Design Principles, AES-Structure, Transformation functions, Key Expansion, Blowfish, CAST-

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128, IDEA, Block Cipher Modes of Operations

UNIT III: Number Theory & Asymmetric Key Cryptography
Objectives: *Presents the basic principles of public key cryptography, Distinct uses of public key cryptosystems*

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms.

Public Key Cryptography: Principles, p u b l i c k e y c r y p t o g r a p h y a l g o r i t h m s , RSA Algorithms, Diffie Hellman Key Exchange, Elgamal encryption & decryption, Elliptic Curve Cryptography.

UNIT IV : Cryptographic Hash Functions & Digital Signatures
Objectives: *Present overview of the basic structure of cryptographic functions, Message Authentication Codes, Understand the operation of SHA-512, HMAC, Digital Signature*

Application of Cryptographic hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC & CMAC. Digital Signatures, NIST Digital Signature Algorithm. Key management & distribution.

UNIT V: User Authentication, Transport Layer Security & Email Security
Objectives: *Present an overview of techniques for remote user authentication, Kerberos, Summarize Web Security threats and Web traffic security approaches, overview of SSL & TLS. Present an overview of electronic mail security.*

User Authentication: Remote user authentication principles, Kerberos
Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell(SSH)
Electronic Mail Security: Pretty Good Privacy (PGP) and S/MIME.

UNIT VI: IP Security & Intrusion Detection Systems
Objectives: *Provide an overview of IP Security, concept of security association, Intrusion Detection Techniques*

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining

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Security Associations and Key Management.

Intrusion detection: Overview, Approaches for IDS/IPS, Signature based IDS, Host based IDS/IPS. (TEXT BOOK 2)

TEXT BOOKS:

1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC press
3. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

REFERENCE BOOKS:

1. Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford
2. Network Security & Cryptography, Bernard Menezes, Cengage, 2010.

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IV Year – I SEMESTER

	T	P	C
	0	3	2

VLSI Laboratory

The students are required to design the schematic diagrams using CMOS logic and to draw the layout diagrams to perform the following experiments using CMOS 130nm Technology with necessary EDA tools (Mentor Graphics/Tanner)

List of Experiments:

1. Design and implementation of an inverter
2. Design and implementation of universal gates
3. Design and implementation of full adder
4. Design and implementation of full subtractor
5. Design and implementation of RS-latch
6. Design and implementation of D-latch
7. Design and implementation asynchronous counter
8. Design and Implementation of static RAM cell
9. Design and Implementation of differential amplifier
10. Design and Implementation of ring oscillator

Equipment Required:

1. Mentor Graphics/Tanner software-latest version
2. Personal computer with necessary peripherals.

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IV Year – I SEMESTER

MICROWAVE ENGINEERING LAB

Minimum Twelve Experiments to be

conducted: Part – A (Any 7 Experiments) :

1. Reflex Klystron Characteristics.
2. Gunn Diode Characteristics.
3. Attenuation Measurement.
4. Directional Coupler Characteristics.
5. VSWR Measurement.
6. Impedance and Frequency Measurement.
7. Waveguide parameters measurement.
8. Scattering parameters of Circulator.
9. Scattering parameters of Magic Tee.

Part – B (Any 5 Experiments) :

10. Characterization of LED.
11. Characterization of Laser Diode.
12. Intensity modulation of Laser output through an optical fiber.
13. Measurement of Data rate for Digital Optical link.
14. Measurement of NA.
15. Measurement of losses for Analog Optical link.

Equipment required for Laboratories:

1. Regulated Klystron Power Supply
2. VSWR Meter -
3. Micro Ammeter - 0 – 500 μA
4. Multi meter
5. CRO
6. GUNN Power Supply, Pin Modulator
7. Reflex Klystron

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8. Crystal Diodes
9. Micro wave components (Attenuation)
10. Frequency Meter
11. Slotted line carriage
12. Probe detector
13. wave guide shorts
14. Pyramidal Horn Antennas
15. Directional Coupler
16. E, H, Magic Tees
17. Circulators, Isolator
18. Matched Loads
19. Fiber Optic Analog Trainer based LED
20. Fiber Optic Analog Trainer based laser
21. Fiber Optic Digital Trainer
22. Fiber cables - (Plastic, Glass)

IV Year – II SEMESTER

	T	P	C
	3+1	0	3

CELLULAR AND MOBILE COMMUNICATIONS

UNIT I

CELLULAR MOBILE RADIO SYSTEMS: Introduction to Cellular Mobile System, Performance criteria, uniqueness of mobile radio environment, operation of cellular systems, Hexagonal shaped cells, Analog and Digital Cellular systems.

ELEMENTS OF CELLULAR RADIO SYSTEM DESIGN : General description of the problem, concept of frequency channels, Co-channel Interference Reduction Factor, desired C/I from a normal case in a Omni directional Antenna system, Cell splitting, consideration of the components of Cellular system.

UNIT II

INTERFERENCE : Introduction to Co-Channel Interference, real time Co-Channel interference, Co-Channel measurement, design of Antenna system, Antenna parameters and their effects, diversity receiver, non-cochannel interference-different types. **CELL COVERAGE FOR SIGNAL AND TRAFFIC:** Signal reflections in flat and hilly terrain, effect of human made structures, phase difference between direct and reflected paths, constant standard deviation, straight line path loss slope, general formula for mobile propagation over water and flat open area, near and long distance propagation antenna height gain, form of a point to point model.

UNIT III

CELL SITE AND MOBILE ANTENNAS : Sum and difference patterns and their synthesis, omni directional antennas, directional antennas for interference reduction, space diversity antennas, umbrella pattern antennas, minimum separation of cell site antennas, high gain antennas.

UNIT IV

FREQUENCY MANAGEMENT AND CHANNEL ASSIGNMENT: Numbering and grouping, setup access and paging channels channel assignments to cell sites and mobile units, channel sharing and borrowing, sectorization, overlaid cells, non fixed channel assignment.

UNIT V

Handoff, dropped calls and cell splitting, types of handoff, handoff invitation, delaying handoff, forced handoff, mobile assigned handoff. Intersystem

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handoff, cell splitting, micro cells, vehicle locating methods, dropped call rates and their evaluation.

UNIT VI

DIGITAL CELLULAR NETWORKS : GSM architecture, GSM channels, multiplex access scheme, TDMA, CDMA.

TEXTBOOKS :

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Tata McGraw Hill, 2rd Edn., 2006.
2. Principles of Mobile Communications – Gordon L. Stuber, Springer International 2nd Edition, 2007.

REFERENCES :

1. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.
2. Wireless and Mobile Communications – Lee McGraw Hills, 3rd Edition, 2006.
3. Mobile Cellular Communication – G Sasibhushana Rao Pearson
3. Wireless Communication and Networking – Jon W. Mark and Weihua Zhqung, PHI, 2005.
4. Wireless Communication Technology – R. Blake, Thompson Asia Pvt. Ltd., 2004.

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IV Year – II SEMESTER

3+1 0 3

ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

UNIT I

Performance characteristics of instruments, Static characteristics, Accuracy, Resolution, Precision, Expected value, Error, Sensitivity. Errors in Measurement, Dynamic Characteristics-speed of response, Fidelity, Lag and Dynamic error. DC Voltmeters- Multi-range, Range extension/Solid state and differential voltmeters, AC voltmeters- multi range, range extension, shunt. Thermocouple type RF ammeter, Ohmmeters series type, shunt type, Multi-meter for Voltage, Current and resistance measurements.

UNIT II

Signal Generator- fixed and variable, AF oscillators, Standard and AF sine and square wave signal generators, Function Generators, Square pulse, Random noise, sweep, Arbitrary waveform. Wave Analyzers, Harmonic Distortion Analyzers, Spectrum Analyzers, Digital Fourier Analyzers.

UNIT III

Oscilloscopes CRT features, vertical amplifiers, horizontal deflection system, sweep, trigger pulse, delay line, sync selector circuits, simple CRO, triggered sweep CRO, Dual beam CRO, . Dual trace oscilloscope, sampling oscilloscope, storage oscilloscope, digital readout oscilloscope, digital storage oscilloscope, Lissajous method of frequency measurement, standard specifications of CRO, probes for CRO- Active & Passive, attenuator type.

UNIT IV

AC Bridges Measurement of inductance- Maxwell's bridge, Anderson bridge. Measurement of capacitance -Schearing Bridge. Wheat stone bridge. Wien Bridge, Errors and precautions in using bridges. Q-meter.

UNIT V

Transducers- active & passive transducers : Resistance, Capacitance, inductance; Strain gauges, LVDT, Piezo Electric transducers, Resistance Thermometers, Thermocouples, Thermistors, Sensistors.

UNIT VI

Measurement of physical parameters force, pressure, velocity, humidity, moisture, speed, proximity and displacement. Data acquisition systems.

TEXTBOOKS :

1. Electronic instrumentation, second edition - H.S.Kalsi, Tata McGraw Hill, 2004.
2. Modern Electronic Instrumentation and Measurement Techniques – A.D. Helfrick and W.D. Cooper, PHI, 5th Edition, 2002.

REFERENCES :

1. Electronic Instrumentation & Measurements - David A. Bell, PHI, 2nd Edition, 2003.
2. Electronic Test Instruments, Analog and Digital Measurements - Robert A.Witte, Pearson Education, 2^{nd} Ed., 2004.
3. Electronic Measurements & Instrumentations by K. Lal Kishore, Pearson Education - 2005.

OUTCOMES

The student will be able to

Select the instrument to be used based on the requirements.
Understand and analyze different signal generators and analyzers.
Understand the design of oscilloscopes for different applications.
Design different transducers for measurement of different parameters.

IV Year – II SEMESTER

3+1 0 3

ELECTIVE – III

SATELLITE COMMUNICATIONS

UNIT I

INTRODUCTION : Origin of Satellite Communications, Historical Background, Basic Concepts of Satellite Communications, Frequency allocations for Satellite Services, Applications, Future Trends of Satellite Communications.

UNIT II

ORBITAL MECHANICS AND LAUNCHERS: Orbital Mechanics, Look Angle determination, Orbital perturbations, Orbit determination, launches and launch vehicles, Orbital effects in communication systems performance.

UNIT III

SATELLITE SUBSYSTEMS : Attitude and orbit control system, telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antenna Equipment reliability and Space qualification.

UNIT IV

SATELLITE LINK DESIGN : Basic transmission theory, system noise temperature and G/T ratio, Design of down links, up link design, Design of satellite links for specified C/N, System design example.

MULTIPLE ACCESS: Frequency division multiple access (FDMA) Intermodulation, Calculation of C/N. Time division Multiple Access (TDMA) Frame structure, Examples. Satellite Switched TDMA Onboard processing, DAMA, Code Division Multiple access (CDMA),Spread spectrum transmission and reception.

UNIT V

EARTH STATION TECHNOLOGY : Introduction, Transmitters, Receivers, Antennas, Tracking systems, Terrestrial interface, Primary power test methods.

LOW EARTH ORBIT AND GEO-STATIONARY SATELLITE SYSTEMS: Orbit consideration, coverage and frequency considerations, Delay & Throughput considerations, System considerations, Operational NGSO constellation Designs

UNIT VI

SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM [1] : Radio and Satellite Navigation. GPS Position Location principles. GPS Receivers and codes. Satellite signal acquisition. GPS Navigation Message, GPS signal levels. GPS receiver operation. GPS C/A code accuracy, Differential GPS.

TEXT BOOKS:

1. Satellite Communications – Timothy Pratt, Charles Bostian and Jeremy Allnutt, WSE, Wiley Publications, 2nd Edition, 2003.
2. Satellite Communications Engineering – Wilbur L. Pritchard, Robert A Nelson and Henri G.Suyderhoud, 2nd Edition, Pearson Publications, 2003.

REFERENCES :

1. Satellite Communications : Design Principles – M. Richharia, BS Publications, 2nd Edition, 2003.
2. Satellite Communication - D.C Agarwal, Khanna Publications, 5th Ed.
3. Fundamentals of Satellite Communications – K.N. Raja Rao, PHI, 2004
4. Satellite Communications – Dennis Roddy, McGraw Hill, 2nd Edition, 1996.

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MIXED SIGNAL DESIGN

(ELECTIVE – III)

OBJECTIVES

The student will be introduced to

Understand the Switched capacitors Circuits and Operation and Analysis, PLLS.

In this course, students can study Data Converter Fundamentals, Nyquist Rate A/D Converters.

Another main object of this course is to motivate the graduate students to study and to analyze the Oversampling Converters and Continuous-Time Filters.

The concepts of Continuous-Time Filters, CMOS Transconductors Using Triode and Active Transistors and MOSFET-C Filters.

UNIT-I:

Switched Capacitor Circuits: Introduction to Switched Capacitor circuits-basic building blocks, Operation and Analysis, Non-ideal effects in switched capacitor circuits, Switched capacitor integrators first order filters, Switch sharing, biquad filters.

UNIT-II:

Phased Lock Loop (PLL): Basic PLL topology, Dynamics of simple PLL, Charge pump PLLs-Lock acquisition, Phase/Frequency detector and charge pump, Basic charge pump PLL, Non-ideal effects in PLLs-PFD/CP non-idealities, Jitter in PLLs, Delay locked loops, applications.

UNIT-III:

Data Converter Fundamentals: DC and dynamic specifications, Quantization noise, Nyquist rate D/A converters- Decoder based converters, Binary-Scaled converters, Thermometer-code converters, Hybrid converters

UNIT-IV:

Nyquist Rate A/D Converters: Successive approximation converters, Flash converter, Two-step A/D converters, Interpolating A/D converters, Folding A/D converters, Pipelined A/D converters, Time-interleaved converters.

UNIT-V:

Oversampling Converters: Noise shaping modulators, Decimating filters and interpolating filters, Higher order modulators, Delta sigma modulators with multi-bit quantizers, Delta sigma D/A

UNIT-VI:

Continuous-Time Filters: Introduction to Gm-C Filters, Bipolar Transconductors, CMOS transconductors Using Triode and Active Transistors, BiCMOS Tran conductors, MOSFET-C Filters.

Text Books:

1. Design of Analog CMOS Integrated Circuits- Behzad Razavi, TMH Edition, 2002
2. Analog Integrated Circuit Design- David A. Johns,Ken Martin, Wiley Student Edition, 2013

Reference Books:

1. CMOS Mixed-Signal Circuit Design - R. Jacob Baker, Wiley Interscience, 2009.
2. CMOS Analog Circuit Design –Philip E. Allen and Douglas R. Holberg, Oxford University Press, International Second Edition/Indian Edition, 2010.

OUTCOMES

After going through this course the student will be able to

Understand the concepts of Switched Capacitor circuits.

Design and analysis of Nyquist Rate A/D Converters.

Extend the Mixed Signal Design to Different Applications.

Concepts of Oversampling Converters and Continuous-Time Filters.

EMBEDDED SYSTEMS

(ELECTIVE – III)

OBJECTIVES

After going through this course the student will be able to

- Understand the building blocks of typical embedded system and different memory technology and memory types.
- Learn the characteristics of an embedded system, quality attributes of embedded systems, application specific and domain specific embedded system,
- Learn about communication devices and basics about VLSI and integrated circuit design and learn concept of firmware design approaches, ISR concept. Interrupt sources, interrupt servicing mechanism, multiple interrupts,
- Understand the concepts of c versus embedded c and compiler versus cross-compiler.
- Learn about the integrated development environment, software utility tool. Also learn about quality assurance and testing of the design, testing on host machine, simulators.

Unit-I:

Introduction: Embedded System-Definition, History, Classification, application areas and purpose of embedded systems. The typical embedded system-Core of the embedded system, Memory, Sensors and Actuators, Communication Interface, Embedded firmware, PCB and passive components. Characteristics, Quality attributes of an Embedded systems, Application-specific and Domain-Specific examples of an embedded system.

Unit-II:

Embedded Hardware Design: Analog and digital electronic components, I/O types and examples, Serial communication devices, Parallel device ports, Wireless devices, Timer and counting devices, Watchdog timer, Real time clock.

Unit-III:

Embedded Firmware Design: Embedded Firmware design approaches, Embedded Firmware development languages, ISR concept, Interrupt sources, Interrupt servicing mechanism, Multiple interrupts, DMA, Device driver programming, Concepts of C versus Embedded C and Compiler versus Cross-compiler.

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Unit-IV:

Real Time Operating System: Operating system basics, Types of operating systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Threads, Processes and Scheduling, Task Scheduling, Communication, Synchronization, Device Drivers, How to choose an RTOS.

Hardware Software Co-Design: Fundamental Issues in Hardware Software Co-Design, Computational models in embedded design, Hardware software Trade-offs, Integration of Hardware and Firmware, ICE.

Unit-V:

Embedded System Development: The integrated development environment, Types of files generated on cross-compilation, Deassembler/Decompiler, Simulators, Emulators and Debugging, Target hardware debugging, Boundary Scan, Embedded Software development process and tools.

Unit-VI:

Embedded System Implementation And Testing: The main software utility tool, CAD and the hardware, Translation tools-Pre-processors, Interpreters, Compilers and Linkers, Debugging tools, Quality assurance and testing of the design, Testing on host machine, Simulators, Laboratory Tools.

Text Books:

1. Embedded Systems Architecture By Tammy Noergaard, Elsevier Publications, 2005
2. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley Publications.

References:

1. Embedded Systems, Raj Kamal-Tata McGraw Hill Education Private Limited, Second Edition, 2008
2. Embedding system building blocks By Labrosse, CMP publishers.

OUTCOMES

After going through this course the student will be able to

- Know basics of embedded system, classification, memories, different communication interface and what embedded firmware is and its role in embedded system, different system components.
- Distinguish all communication devices in embedded system, other peripheral device.
- Distinguish concepts of C versus embedded C and compiler versus cross-compiler.
- Choose an operating system, and learn how to choose an RTOS

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RF CIRCUIT DESIGN

(ELECTIVE – III)

UNIT -I:

Introduction to RF Electronics:

The Electromagnetic Spectrum, units and Physical Constants. Microwave bands – RF behavior of Passive components: Tuned resonant circuits. Vectors, Inductors and Capacitors - Voltage and Current in capacitor circuits – Tuned RF / IF Transformers.

UNIT -II:

Transmission Line Analysis: Examples of transmission lines- Transmission line equations and Biasing- Micro Strip Transmission Lines- Special Termination Conditions- sourced and Loaded Transmission Lines. **Single And Multiport Networks:** The Smith Chart, Interconnectivity networks, Network properties and Applications, Scattering Parameters.

UNIT -III:

Matching and Biasing Networks:

Impedance matching using discrete components – Micro strip line matching networks, Amplifier classes of Operation and Biasing networks.

UNIT-IV

RF Passive & Active Components: Filter Basics – Lumped filter design – Distributed Filter Design – Diplexer Filters- Crystal and Saw filters- Active Filters - Tunable filters – Power Combiners / Dividers – Directional Couplers – Hybrid Couplers – Isolators. RF Diodes – BJTs- FETs- HEMTs and Models.

UNIT -V:

RF Transistor Amplifier Design: Characteristics of Amplifiers - Amplifier Circuit Configurations, Amplifier Matching Basics, Distortion and noise products, Stability Considerations, Small Signal amplifier design, Power amplifier design, MMIC amplifiers, Broadband High Power multistage amplifiers, Low noise amplifiers, VGA Amplifiers.

UNIT -VI:

Oscillators: Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration, LC Oscillators, VCOs, Crystal Oscillators, PLL Synthesizer, and Direct Digital Synthesizer. **RF Mixers:**

Basic characteristics of a mixer - Active mixers- Image Reject and Harmonic mixers. Frequency domain considerations.

TEXT BOOKS:

1. RF Circuit design: Theory and applications by Reinhold Ludwing, Pavel Bretchko. Pearson Education Asia Publication, New Delhi 2001.
2. Radio Frequency and Microwave Communication Circuits – Analysis and Design – Devendra K. Misra, Wiley Student Edition, John Wiley & Sons

REFERENCE BOOKS:

1. Radio frequency and Microwave Electronics - Mathew M.Radmangh, 2001, PE Asia Publ.
2. RF Circuit Design – Christopher Bowick, Cheryl Aljuni and John Biyler, Elsevier Science, 2008.
3. Secrets of RF Design - Joseph Carr., 3rd Edition, Tab Electronics.
4. Complete Wireless Design - Cotter W. Sawyer, 2nd Edition, Mc-Graw Hill.
5. Practical RF Circuit Design for Modem Wireless Systems Vol.2 -Less Besser and Rowan Gilmore.

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Cloud Computing
(ELECTIVE – III)

Course Objectives: The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud based software applications on top of cloud platforms.

Course Outcomes:

1. Understanding the key dimensions of the challenge of Cloud Computing
2. Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization
3. Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications.
4. Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas

Syllabus:

UNIT I: Systems modeling, Clustering and virtualization:

Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency

UNIT II: Virtual Machines and Virtualization of Clusters and Data Centers:

Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Center Automation.

UNIT III: Cloud Platform Architecture:

Cloud Computing and service Models, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

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UNIT IV: Cloud Programming and Software Environments:

Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.

UNIT V: Cloud Resource Management and Scheduling:

Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling Map Reduce Applications Subject to Deadlines.

UNIT VI:

Storage Systems: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system., Apache Hadoop, Big Table, Megastore, Amazon Simple Storage Service(S3)

TEXT BOOKS:

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
3. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press

REFERNCE BOOK:

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammarai selvi, TMH

IV Year – II SEMESTER

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	3+1	0	3

ELECTIVE - IV

WIRELESS SENSORS AND NETWORKS

UNIT I

OVERVIEW OF WIRELESS SENSOR NETWORKS:

Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints an challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks.

ARCHITECTURES:

Single-Node Architecture - Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments, Network Architecture -Sensor Network Scenarios, Optimization Goals and Figures of Merit, Gateway Concepts.

UNIT II

NETWORKING Technologies:

Physical Layer and Transceiver Design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs, WANETs.

UNIT-III

MAC Protocols for Wireless Sensor Networks:

Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention - Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

UNIT-IV

ROUTING PROTOCOLS:

Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On – Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols, Proactive Routing

UNIT-V

TRANSPORT LAYER AND SECURITY PROTOCOLS:

Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks.

UNIT- VI SECURITY

IN WSNs:

Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

SENSOR NETWORK PLATFORMS AND TOOLS:

Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node-level Simulators, State-centric programming.

APPLICATIONS of WSN:

S Ultra wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications

TEXT BOOKS:

1. Ad Hoc Wireless Networks: Architectures and Protocols - C. Siva Ram Murthy and B.S.Manoj, 2004, PHI
2. Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control – Jagannathan Sarangapani, CRC Press
3. Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.

REFERENCES:

1. . Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, and Applications", John Wiley, 2007.
2. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.
3. Ad- Hoc Mobile Wireless Networks: Protocols & Systems, C.K. Toh ,1 ed. Pearson Education.
4. Wireless Sensor Networks - C. S. Raghavendra, Krishna M. Sivalingam, 2004, Springer
5. Wireless Sensor Networks – S Anandamurugan , Lakshmi Publications

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SYSTEM ON CHIP

(ELECTIVE - IV)

OBJECTIVES

After going through this course the student will be able to

- Understand the System Architecture and Processor Architecture, approach for a SOC Design.
- Learn the, Basic concepts in Processor Micro Architecture, and Learn Different Types of Processors like VLIW Processors, Superscalar Processors etc.
- Learn about SOC external memory, Scratchpads and Cache memory and Multilevel Caches.
- Learn the SOC Design approach, Design and evaluation, Applications Like Image compression etc…

UNIT-I:

Introduction to the System Approach: System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, an approach for SOC Design, System Architecture and Complexity.

UNIT-II:

Processors : Introduction , Processor Selection for SOC, Basic concepts in Processor Architecture, Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT-III:

Memory Design for SOC: Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

UNIT-IV:

Interconnect Customization and Configuration: Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses, Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor

UNIT-V:

Interconnect Configuration: Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

UNIT-VI:

Application Studies / Case Studies: SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression.

Text Books:

1. Computer System Design System-on-Chip - Michael J. Flynn and Wayne Luk, Wiely India Pvt. Ltd.
2. Design of System on a Chip: Devices and Components – Ricardo Reis, 1st Ed., 2004, Springer

Reference Books:

1. ARM System on Chip Architecture – Steve Furber –2nd Ed., 2000, Addison Wesley Professional.
2. System on Chip Verification – Methodologies and Techniques – Prakash Rashinkar, Peter Paterson and Leena Singh L, 2001, Kluwer Academic Publishers.

OUTCOMES

After going through this course the student will be able to

Know basics of System Architecture and Processor Architecture.

Know different Types of Processors Like VLIW Processors, Superscalar Processors etc. and Basic concepts in Processor Micro Architecture.

Distinguish Cache memory and Multilevel Caches, SOC external memory.

Know the Concept of Inter Connect Architectures, SOC Standard Buses and Reconfiguration Technologies.

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LOW POWER VLSI DESIGN

(ELECTIVE - IV)

OBJECTIVES

The student will be able to understand the Fundamentals of Low Power VLSI Design.

In this course, students can study low-Power Design Approaches, Power estimation and analysis.

Another main object of this course is to motivate the graduate students to study and to analyze the Low-Voltage Low-Power Adders, Multipliers.

The concepts of Low-Voltage Low-Power Memories and Future Trend and Development of DRAM.

UNIT-I:

Fundamentals of Low Power VLSI Design: Need for Low Power Circuit Design, Sources of Power Dissipation – Switching Power Dissipation, Short Circuit Power Dissipation, Leakage Power Dissipation, Glitching Power Dissipation, Short Channel Effects –Drain Induced Barrier Lowering and Punch Through, Surface Scattering, Velocity Saturation, Impact Ionization, Hot Electron Effect.

UNIT-II:

Low-Power Design Approaches:

Low-Power Design through Voltage Scaling: VTCMOS circuits, MTCMOS circuits, Architectural Level Approach –Pipelining and Parallel Processing Approaches.

Switched Capacitance Minimization Approaches: System Level Measures, Circuit Level Measures, Mask level Measures.

UNIT-III:

Power estimation and analysis: SPICE circuit simulators, gate level logic simulation, capacitive power estimation, static state power and gate level capacitance estimation.

UNIT-IV:

Low-Voltage Low-Power Adders: Introduction, Standard Adder Cells, CMOS Adder's Architectures – Ripple Carry Adders, Carry Look-Ahead Adders, Carry Select Adders, Carry Save Adders, Low-Voltage Low-Power

Design Techniques –Trends of Technology and Power Supply Voltage, Low-Voltage Low-Power Logic Styles.

UNIT-V:

Low-Voltage Low-Power Multipliers Introduction, Overview of Multiplication, Types of Multiplier Architectures, Braun Multiplier, Baugh-Wooley Multiplier, Booth Multiplier, Introduction to Wallace Tree Multiplier.

UNIT-VI:

Low-Voltage Low-Power Memories: Basics of ROM, Low-Power ROM Technology, Future Trend and Development of ROMs, Basics of SRAM, Memory Cell, Precharge and Equalization Circuit, Low-Power SRAM Technologies, Basics of DRAM, Self-Refresh Circuit, Future Trend and Development of DRAM.

Text Books:

1. Low-Voltage, Low-Power VLSI Subsystems – Kiat-Seng Yeo, Kaushik Roy, TMH Professional Engineering.

Reference Books:

1. Low Power CMOS VLSI Circuit Design – Kaushik Roy, Sharat C. Prasad, John Wiley & Sons, 2000.
2. Practical Low Power Digital VLSI Design – Gary K. Yeap, Kluwer Academic Press, 2002.

OUTCOMES

After going through this course the student will be able to

Understand the concepts of Low-Power Design Approaches.

Design and analysis of Low-Voltage Low-Power Circuits.

Extend the Low Power Design to Different Applications.

Understand of Low-Voltage Low-Power Memories and Basics of DRAM.

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BIO-MEDICAL INSTRUMENTATION

(ELECTIVE - IV)

UNIT-I

Sources of Bioelectric potentials and Electrodes: Resisting and Action Potentials, Propagation of Action Potentials, The Bioelectric Potentials. Electrodes: Electrode theory, Bio Potential Electrodes, Biochemical Transducers, introduction to bio-medical signals.

UNIT-II

The Cardiovascular System: The Heart and Cardiovascular System, The Heart, Blood Pressure, Characteristics of Blood Flow, Heart Sounds, Cardio Vascular Measurements, Electrocardiography, Measurement of Blood Pressure, Measurement of Blood Flow and Cardiac output, Plethysmography, Measurement of Heart Sounds, Event detection, PQRS & T-Waves in ECG, the first & second Heart beats, ECG rhythm analysis, the di-crotic notch in the carotid pulse detection of events and waves, analysis of exercise ECG, analysis of event related potentials, correlation analysis of EEG channels, correlation of muscular contraction.

UNIT- III

Patient Care & Monitory and Measurements in Respiratory System: The elements of Intensive Care Monitory, Diagnosis, Calibration and reparability of Patient Monitoring equipment, other instrumentation for monitoring patients, pace makers, defibrillators, the physiology of respiratory system, tests and instrumentation for mechanics of breathing, respiratory theory equipment, analysis of respiration.

UNIT-IV

Bio telemetry and Instrumentation for the clinical laboratory Introduction to bio telemetry, Physiological parameters adaptable to bio telemetry, the components of bio telemetry system, implantable units, applications of telemetry in patient care – The blood, tests on blood cells, chemical test, automation of chemical tests.

UNIT-V

X-ray and radioisotope instrumentation and electrical safety of medical equipment: Generation of Ionizing radiation, instrumentation for diagnostic X-rays, special techniques, instrumentation for the medical use of radioisotopes, radiation therapy - Physiological effects of electrical current, shock Hazards from electrical equipment, Methods of accident prevention,

UNIT-VI

Modern Imaging Systems: Tomography, Magnetic resonance Imaging System, Ultrasonic Imaging System, Medical Thermography.

TEXT BOOK:

1. Biomedical Instrumentation and Measurements – C. Cromwell, F.J. Weibell, E.A.Pfeiffer – Pearson education.
2. Biomedical signal analysis – Rangaraj, M. Rangayya – Wiley Inter science – John willey & Sons Inc.

Reference:

1. Hand Book of Bio-Medical Instrumentation – R.S. Khandpur, (TMH)
2. Introduction to Bio-Medical Engineering – Domach, (Pearson)
3. Introduction to Bio-Medical Equipment Technology – Cart, (Pearson)

EMI / EMC

Pre requisites: EMTL and AWP Courses.

Objectives:

Student shall be able to understand the root causes for Electromagnetic Noise (EMI), its sources.

Shall be able to understand the effects of EMI and the required precautions to be taken/to be discussed with his peer group.

Shall be able to understand the different measurement techniques of EMI (for conducted and normal) and their influences in detail.

Shall be able to understand different compatibility techniques (EMC) to reduce/suppress EMI.

Shall be able to understand different standards being followed across the world in the fields of EMI/EMC.

UNIT-I: Natural and Nuclear sources of EMI / EMC : Introduction, Electromagnetic environment, History, Concepts, Practical experiences and concerns, frequency spectrum conservations. An overview of EMI / EMC, Natural and Nuclear sources of EMI.

UNIT-II: EMI from apparatus, circuits and open area test sites : Electromagnetic emissions, noise from relays and switches, non-linearities in circuits, passive inter modulation, cross talk in transmission lines, transients in power supply lines, electromagnetic interference (EMI). Open area test sites and measurements.

UNIT-III: Radiated and conducted interference measurements: Anechoic chamber, TEM cell, GH TEM Cell, characterization of conduction currents / voltages, conducted EM noise on power lines, conducted EMI from equipment, Immunity to conducted EMI detectors and measurements.

UNIT-IV:ESD, Grounding, shielding, bonding and EMI filters : Principles and types of grounding, shielding and bonding, characterization of filters, power lines filter design. ESD, Electrical fast transients / bursts, electrical surges.

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UNIT-V: Cables, connectors, components: Introduction, EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, opto-isolators, Transient and Surge Suppression Devices.

UNIT-VI: EMC standards- National / International .: Introduction, Standards for EMI and EMC, MIL-Standards, IEEE/ANSI standards, CISPR/IEC standards, FCC regulations, Euro norms, British Standards, EMI/EMC standards in JAPAN, Conclusions.

Text Books :

1. Engineering Electromagnetic Compatibility by **Dr. V.P. Kodali, IEEE Publication**, Printed in India by ***S. Chand & Co. Ltd., New Delhi, 2000***.
2. Electromagnetic Interference and Compatibility **IMPACT series, IIT – Delhi, Modules 1 – 9**.

References :

1. Introduction to Electromagnetic Compatibility, NY, **John Wiley, 1992, by C.R. Pal.**

Outcomes-

At the end of this Course,

- Students shall be able to distinguish effects of EMI and counter measures by EMC-techniques.
- Students shall apply the knowledge gained in selecting proper gadget/device/appliance/system, as per EMC-norms specified by regulating authorities.
- Students shall choose career in the fields of EMI/EMC as an Engineer/Researcher/Entrepreneur in India/abroad.

IV Year – II SEMESTER

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Project & Seminar

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I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
DIGITAL SYSTEM DESIGN							

Course Objectives:

- Students will study the transformation of sequential machines and digital design concepts.
- Students must be able to design SM charts and fault modeling.
- Students learn about PODEM, fault diagnosis.

Course Outcomes:

Upon completion of this course, the student will be able to

- An ability to describe, transformation of sequential machines.
- An ability to describe, digital design concepts.
- An ability to rapidly design SM charts.
- An ability to rapidly design fault modeling.
- An ability to study PODEM.
- An ability to identify fault diagnosis.

UNIT-I

Minimization and Transformation of Sequential Machines: The Finite State Model – Capabilities and limitations of FSM, State equivalence and Machine minimization, Simplification of incompletely specified machines. Fundamental mode model – Flow table – State reduction – Minimal closed covers – Races, Cycles and Hazards.

UNIT-II

Digital Design: Digital Design Using ROMs, PALs and PLAs , BCD Adder, 32 – bit adder, State graphs for control circuits, Scoreboard and Controller, A shift and add multiplier, Array multiplier, Keypad Scanner, Binary divider.

UNIT-III

SM Charts: State machine charts, Derivation of SM Charts, Realization of SM Chart, Implementation of Binary Multiplier, dice game controller.

UNIT-IV

Fault Modeling: Logic Fault model – Fault detection & Redundancy- Fault equivalence and fault location –Fault dominance – Single stuck at fault model – Multiple stuck at fault models – Bridging fault model. Fault diagnosis of combinational circuits by conventional methods – Path sensitization techniques, Boolean Difference method – Kohavi algorithm.

UNIT-V

Test Pattern Generation: Test algorithms – D algorithm, PODEM, Random testing, Transition count testing, Signature analysis and test bridging faults.

UNIT-VI

Fault Diagnosis in Sequential Circuits: Circuit Test Approach, Transition Check Approach – State identification and fault detection experiment, Machine identification, Design of fault detection experiment. 22 2013-14

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TEXT BOOKS:

1. Charles H. Roth, "*Fundamentals of Logic Design*", 5th Ed., Cengage Learning.
2. Miron Abramovici, Melvin A. Breuer and Arthur D. Friedman, "*Digital Systems Testing and Testable Design*", John Wiley & Sons Inc.
3. N. N. Biswas, "*Logic Design Theory*", PHI

REFERENCES:

1. Z. Kohavi, "*Switching and Finite Automata Theory*", 2nd Ed., TMH, 2001.
2. Morris Mano, M.D.Ciletti, " *Digital Design*", 4th Edition, PHI.

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I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
VLSI TECHNOLOGY AND DESIGN							

Course Objectives:

- Be able to create models of ASIC, FPGA, moderately sized CMOS circuits that realize specified digital functions.
- Be able to understand VLSI design issues, BiCMOS circuits.
- Have an understanding of subsystem design and layout, subsystem design processes

Course Outcomes:

Upon completion of this course, the student will be able to

- use mathematical methods and circuit analysis models in analysis of CMOS circuits.
- create models of ASIC,FPGA that realize specified digital functions.
- apply design issues for testability.
- understand of the characteristics of BiCMOS circuit.
- understand subsystem design and layout.
- understand chip design, floor planning.

UNIT-I

VLSI Technology: Fundamentals and applications, IC production process, semiconductor processes, design rules and process parameters, layout techniques and process parameters.

VLSI Design: Electronic design automation concept, ASIC and FPGA design flows, SOC designs, design technologies: combinational design techniques, sequential design techniques, state machine logic design techniques and design issues.

UNIT-II:

CMOS VLSI Design: MOS Technology and fabrication process of pMOS, nMOS, CMOS and BiCMOS technologies, comparison of different processes.

Building Blocks of a VLSI circuit: Computer architecture, memory architectures, communication interfaces, mixed signal interfaces.

UNIT-III:

VLSI Design Issues: Design process, design for testability, technology options, power calculations, package selection, clock mechanisms, mixed signal design.

UNIT-IV:

Basic electrical properties of MOS and BiCMOS circuits, MOS and BiCMOS circuit design processes, Basic circuit concepts, scaling of MOS circuits-qualitative and quantitative analysis with proper illustrations and necessary derivations of expressions.

UNIT-V:

Subsystem Design and Layout: Some architectural issues, switch logic, gate logic, examples of structured design (combinational logic), some clocked sequential circuits, other system considerations.

Subsystem Design Processes: Some general considerations and an illustration of design processes, design of an ALU subsystem. 24 2013-14

UNIT-VI:

Floor Planning: Introduction, Floor planning methods, off-chip connections.

Architecture Design: Introduction, Register-Transfer design, highlevel synthesis, architectures for low power, architecture testing.

Chip Design: Introduction and design methodologies.

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TEXT BOOKS:

1. K. Eshraghian, Douglas A. Pucknell, Sholeh Eshraghian, "*Essentials of VLSI Circuits and Systems*", PHI Publications, 2005.
2. Wayne Wolf, "*Modern VLSI Design*", 3rd Ed., Pearson Education, 1997.
3. Dr.K.V.K.K.Prasad, KattulaShyamala, "*VLSI Design*", Kogent Learning Solutions Inc., 2012.

REFERENCES:

1. Randall L.Geiger, Phillip E.Allen, Noel R.Strader, "*VLSI Design Technologies for Analog and Digital Circuits*", TMH Publications, 2010.
2. Ming-BO Lin, "*Introduction to VLSI Systems: A Logic, Circuit and System Perspective*", CRC Press, 2011.
3. N.H.E Weste, K. Eshraghian, "*Principals of CMOS VLSI Design*", 2nd Edition, Addison Wesley.

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I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
DIGITAL DATA COMMUNICATIONS							

Course Objectives:

- Introduce students to the evolution of digital modulation schemes and the concepts data communication.
- Awareness of different error correction codes, data link protocols.
- Introduction of different networks and multiple access techniques.

Course Outcomes:

Upon completion of this course, the student will be able to

- To understand the different digital modulation schemes.
- To understand the different concepts of data communication.
- To understand the different error correction codes.
- To understand the different data link protocols.
- To understand the different networks and multiple access techniques.

UNIT-I

Digital Modulation Schemes:

BPSK, QPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK – Methods, Band Width Efficiency, Carrier Recovery, Clock Recovery.

UNIT-II

Basic Concepts of Data Communications, Interfaces and Modems:

Data Communication Networks, Protocols and Standards, UART, USB, I2C, I2S, Line Configuration, Topology, Transmission Modes, Digital Data Transmission, DTE-DCE interface, Categories of Networks – TCP/ IP Protocol suite and Comparison with OSI model.

UNIT-III

Error Correction: Types of Errors, Vertical Redundancy Check (VRC), LRC, CRC, Checksum, Error Correction using Hamming code

UNIT-IV

Data Link Control: Line Discipline, Flow Control, Error Control **Data Link Protocols:** Asynchronous Protocols, Synchronous Protocols, Character Oriented Protocols, Bit-Oriented Protocol, Link Access Procedures.

UNIT-V

Multiplexing: Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM), Multiplexing Application, DSL. **Local Area Networks:** Ethernet, Other Ether Networks, Token Bus, Token Ring, FDDI.

Metropolitan Area Networks: IEEE 802.6, SMDS **Switching:** Circuit Switching, Packet Switching, Message Switching. **Networking and Interfacing Devices:** Repeaters, Bridges, Routers, Gateway, Other Devices.

UNIT-VI

Multiple Access Techniques:

Random Access, Aloha- Carrier Sense Multiple Access (CSMA)- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), Controlled Access- Reservation- Polling- Token Passing, Channelization, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), OFDM and OFDMA.

TEXT BOOKS:

1. Data Communication and Computer Networking - B. A.Forouzan, 2nd Ed., 2003, TMH.
2. Advanced Electronic Communication Systems - W. Tomasi, 5th Ed., 2008, PEI.

REFERENCES:

1. Prakash C. Gupta, *"Data Communications and Computer Networks"*, PHI, 2006.
2. William Stallings, "*Data and Computer Communications*", 8th Ed. , PHI, 2007.
3. T. Housely, "*Data Communication and Tele Processing Systems* ", 2nd Ed, BSP, 2008.
4. Brijendra Singh, "*Data Communications and Computer Networks*", 2nd Ed., PHI, 2005.

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I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
ADVANCED COMPUTER ARCHITECTURE							

Course Objectives:

- The course focus on computer design, pipelining, RISC instruction set.
- To introduce dynamic scheduling, different ILP software Techniques.
- To understand the concept of memory architecture, interconnection and intel architecture.

Course Outcomes:

Upon completion of this course, the student will be able to

- Know the classes of computers and new trends and developments in computer design.
- Understand pipelining, RISC processor, cache memory performance.
- Understand the various techniques to enhance a processors ability to exploit instruction level parallelism (ILP) and its challenges.
- Understand the architecture of Very large instruction word (VLIW).
- Describe the concept of systematic and distributed shared memory architecture.
- Understand the performance of interconnection network and intel architecture.

UNIT-I

Fundamentals of Computer Design: Fundamentals of Computer design, Changing faces of computing and task of computer designer, Technology trends, Cost price and their trends, Measuring and reporting performance, Quantitative principles of computer design, Amdahl's law. Instruction set principles and examples- Introduction, Classifying instruction set- Memory addressing- type and size of operands, Operations in the instruction set.

UNIT–II

Pipelines: Introduction, Basic RISC instruction set, Simple implementation of RISC instruction set, Classic five stage pipe lined RISC processor, Basic performance issues in pipelining, Pipeline hazards, Reducing pipeline branch penalties.

Memory Hierarchy Design: Introduction, Review of ABC of cache, Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT-III

Instruction Level Parallelism the Hardware Approach: Instruction- Level parallelism, Dynamic scheduling, Dynamic scheduling using Tomasulo's approach, Branch prediction, high performance instruction delivery- hardware based speculation.

UNIT-IV

ILP Software Approach Basic compiler level techniques, Static branch prediction, VLIW approach, Exploiting ILP, Parallelism at compile time, Cross cutting issues -Hardware verses Software.

UNIT–V

Multi Processors and Thread Level Parallelism: Multi Processors and Thread level Parallelism - Introduction; Characteristics of application domain, Systematic shared memory architecture, Distributed shared – memory architecture, Synchronization. 28 2013-14

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UNIT–VI

Inter Connection and Networks: Introduction, Interconnection network media, Practical issues in interconnecting networks, Examples of inter connection, Cluster, Designing of clusters.
Intel Architecture: Intel IA-64 ILP in embedded and mobile markets Fallacies and pit falls.

TEXT BOOKS:

1. John L. Hennessy, David A. Patterson - Computer Architecture: A Quantitative Approach, 3rd Edition, An Imprint of Elsevier.

REFERENCE BOOKS:

1. Kai Hwang, Faye A. Brigs., "*Computer Architecture and Parallel Processing*", MC Graw Hill.
2. Dezso Sima, Terence Fountain, Peter Kacsuk , "*Advanced Computer Architecture – A Design Space Approach*", Pearson Ed.

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I M.TECH-I SEMESTER (ELECTIVE– I)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
WIRELESS COMMUNICATION AND NETWORKS							

Course Objectives:

- To understand the concepts of basic cellular system, frequency reuse, channel assignment strategies, handoff strategies, interference.
- To understand the Mobile radio propagation for small scale fading and multipath, large scale path loss.
- To study the different generations of mobile networks, WAN and IEEE 802.11.

Course Outcomes:

Upon completion of this course, the student will be able to

- Able to understand the concepts of spectrum allocation, basic cellular system, frequency reuse, channel assignment strategies, handoff strategies, interference, improving coverage and capacity, cell splitting.
- Able to understand the Mobile radio propagation large scale path loss.
- To understand the different outdoor propagation models.
- To understand Mobile radio propagation for small scale fading and multipath.
- Able to understand the different equalizers and diversity techniques.
- To understand the different wireless networks, development of wireless networks.

UNIT-I

The Cellular Concept-System Design Fundamentals: Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference , Power Control for Reducing interference, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring .

UNIT–II

Mobile Radio Propagation: Large-Scale Path Loss: Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanisms, Reflection-Reflection from Dielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (Two-Ray) Model, Diffraction- Fresnel Zone Geometry, Knife-edge Diffraction Model, Multiple knifeedge Diffraction, Scattering.

UNIT–III

Outdoor Propagation Models- Longley- Ryce Model, Okumura Model, Hata Model, PCS Extension to Hata Model, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.

UNIT–IV

Mobile Radio Propagation: Small –Scale Fading and Multipath Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel- Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels 30 2013-14 Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading. Statistical Models for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT–V

Equalization and Diversity Introduction, Fundamentals of Equalization, Training A Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non-linear Equalization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm. Diversity Techniques-Derivation of selection Diversity improvement, Derivation of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE Receiver.

UNIT-VI

Wireless Networks Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11,IEEE 802.11 Medium Access Control, Comparison of IEEE 802.11 a,b,g and n standards, IEEE 802.16 and its enhancements, Wireless PANs, HiperLan, WLL.

TEXT BOOKS:

1. Theodore, S. Rappaport, "*Wireless Communications, Principles, Practice*", 2nd Ed., PHI, 2002.
2. Andrea Goldsmith, "*Wireless Communications*", Cambridge University Press, 2005.
3. Gottapu Sasibhushana Rao, "*Mobile Cellular Communication*", Pearson Education, 2012.

REFERENCES:

1. KavehPahLaven and P. Krishna Murthy, "*Principles of Wireless Networks*", PE, 2002.
2. Kamilo Feher, "*Wireless Digital Communications* ", PHI, 1999.
3. William Stallings, "*Wireless Communication and Networking*", PHI, 2003.
4. UpenDalal, "*Wireless Communication*", Oxford Univ. Press
5. Vijay K. Gary, "*Wireless Communications and Networking*", Elsevier

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I M.TECH-I SEMESTER (ELECTIVE–I)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
DIGITAL DESIGN USING HDL							

Course Objectives:

- Students will study the signals, variables, combinational logic circuit design using VHDL.
- Students must be able to design sequential logic circuit design using VHDL and digital logic circuits using Verilog HDL
- Students learn about synthesis and testing of digital logic circuit,CAD tools.

Course Outcomes:

Upon completion of this course, the student will be able to

- Demonstrate the use and application of signals, variables.
- Demonstrate the use and application of combinational logic circuit design using VHDL.
- Be able to simulate and debug sequential logic circuit described in VHDL.
- Be able to simulate and debug digital logic circuits using Verilog HDL.
- To synthesize digital circuits at several level of abstractions.
- To test digital logic using CAD tools

UNIT-I

Digital Logic Design using VHDL Introduction, designing with VHDL, design entry methods, logic synthesis , entities , architecture , packages and configurations, types of models: dataflow , behavioral , structural, signals vs. variables, generics, data types, concurrent vs. sequential statements , loops and program controls.

Digital Logic Design using Verilog HDL Introduction, Verilog Data types and Operators, Binary data manipulation, Combinational and Sequential logic design, Structural Models of Combinational Logic, Logic Simulation, Design Verification and Test Methodology, Propagation Delay, Truth Table models using Verilog.

UNIT-II

Combinational Logic Circuit Design using VHDL Combinational circuits building blocks: Multiplexers, Decoders , Encoders , Code converters, Arithmetic comparison circuits , VHDL for combinational circuits , Adders-Half Adder, Full Adder, Ripple-Carry Adder, Carry Look-Ahead Adder, Subtraction, Multiplication.

UNIT-III

Sequential Logic Circuit Design using VHDL Flip-flops, registers & counters, synchronous sequential circuits: Basic design steps, Mealy State model, Design of FSM using CAD tools, Serial Adder Example, State Minimization, Design of Counter using sequential Circuit approach.

UNIT-IV

Digital Logic Circuit Design Examples using Verilog HDL Behavioral modeling , Data types, Boolean-Equation-Based behavioral models of combinational logics , Propagation delay and continuous assignments, latches and level-sensitive circuits in Verilog, Cyclic behavioral models of flip-flops and latches and Edge detection, comparison of styles for behavioral model; Behavioral model, Multiplexers, Encoders and Digital Systems & Computer Electronics 33Decoders, Counters, Shift Registers, Register files, Dataflow models of a linear feedback shift register, Machines with multi cycle operations, ASM and ASMD charts for behavioral modeling, Design examples, Keypad scanner and encoder.

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UNIT-V

Synthesis of Digital Logic Circuit Design Introduction to Synthesis, Synthesis of combinational logic, Synthesis of sequential logic with latches and flip-flops, Synthesis of Explicit and Implicit State Machines, Registers and counters.

UNIT-VI

Testing of Digital Logic Circuits and CAD Tools Testing of logic circuits, fault model, complexity of a test set, path-sensitization, circuits with tree structure, random tests, testing of sequential circuits, built in self test, printed circuit boards, computer aided design tools, synthesis, physical design.

TEXT BOOKS:

1. Stephen Brown &ZvonkoVranesic, "*Fundamentals of Digital logic design with VHDL*", Tata McGraw Hill,2nd edition.
2. Michael D. Ciletti, "*Advanced digital design with the Verilog HDL*", Eastern economy edition, PHI.

REFERENCES:

1. Stephen Brown & ZvonkoVranesic, "*Fundamentals of Digital logic with Verilog design*", Tata McGraw Hill,2nd edition.
2. Bhaskar, "*VHDL Primer*", 3rd Edition, PHI Publications.
3. Ian Grout, "*Digital systems design with FPGAs and CPLDs*", Elsevier Publications.

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I M.TECH-I SEMESTER (ELECTIVE– I)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
ANALOG AND DIGITAL IC DESIGN							

Course Objectives:

- Students will study the current mirrors and amplifiers, PLL and comparators
- Students must be able to design combinational and sequential IC design using Verilog.
- Students learn about synthesis and test D/A and A/D converters.

Course Outcomes:

Upon completion of this course, the student will be able to

- An ability to describe, current mirrors.
- An ability to describe, current mirrors.
- An ability to rapidly design combinational logic that works.
- An ability to rapidly design sequential circuits.
- An ability to synthesize logic design Nyquist rate A/D .
- An ability to synthesize logic design Nyquist rate D/A .

UNIT-I

Current Mirrors And Single Stage Amplifiers: Simple COMS, BJT current mirror, Cascode, Wilson and Widlar current mirrors. Common Source amplifier source follower, common gate amplifier

Operational Amplifiers: General considerations one – state op-amps, two stage opamps-gains boosting stage- comparison I/P range limitations slew rate.

Phased Locked Loop Design: PLL concepts- The phase locked loop in the locked condition Integrated circuit PLLs – phase Detector- Voltage controlled oscillator case study.

UNIT-II

Comporators: Using an op-amp for a comparator-charge injection error- latched Comparator **Swithched Capacitors Circuits:** Basic Building blocks op-amps capacitors switches –non-over lapping clocks-Basic operations and analysis-resistor equivalence of la switched capacitor-parasitic sensitive integrator parasitic insensitive integrators signal flow graph analysis-First order filters- switch sharing fully differential filters.

UNIT-III

Combinational IC Design By Using Verilog: VERILOG modeling for decoders, encoders, multiplexers, adders and subtractors.

UNIT-IV

Sequential IC Design By Using VHD: VERILOG modeling for larches, flip flops, counters, shift registers, FSMs.

LOGIC FAMILIES & CHARACTERISTICS: COMS, TTL, ECL, logic families COMS / TTL- interfacing and comparison of logic families.

UNIT-V

Digital Integrated System Building Blocks: Multiplexers, decoders, barrel shifters, counters and digital single bit adders.

NYQUIST RATE D/A Converters: Decoder based converter resistor storing converters folded resistor string converter – Binary scale converters – Binary weighted resistor converters – Reduced resistance ratio ladders – R-2R based converters – Thermometer code current mode D/A converters.

UNIT-VI

NYQUIST RATE A/D Converters: Integrating converters – successive approximation converters. DAC based successive approximation – flash converters time interleaved A/D converters.

TEXT BOOKS:

1. David A Johns, Ken Martin, "*Analog Integrated circuit Design*", John Wiley & Sons.
2. BehzadRazavi, "*Design of Analog CMOS Integrated Circuits*", TMH
3. Ken Martin, "*Digital Integrated Circuit Design*", Oxford University, 2000
4. John F Wakerly, "*Digital Design Principles and Practices*", 3rd Ed., Pearson Education & Xilinx Design Series, 2002.

REFERENCES:

1. Ken Martin, "Digital *Integrated Circuit Design*", Oxford University, 2000.
2. Samir Palnitkar, "Verylog HDL-A Guide to Digital Design and Synthesis", Prentice Hall India, 2002.

I M.TECH-I SEMESTER (ELECTIVE–I)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
DATA CONVERTERS							

Course Objectives:

- Students will study the characteristics of AD/DA and switch capacitor concepts.
- Students must be able understand comparators and converters.
- Students learn about pipeline and sigma delta converters.

Course Outcomes:

Upon completion of this course, the student will be able to

- An ability to describe, characteristics of AD/DA .
- An ability to describe, switch capacitor concepts.
- An ability to rapidly design comparators.
- An ability to rapidly design fault modeling.
- An ability to study pipeline.
- An ability to understand sigma delta converters.

UNIT-I

Introduction And Characteristics Of AD/DA Converter Characteristics

Evolution, types and applications of AD/DA characteristics, issues in sampling, quantization and reconstruction, oversampling and antialiasing filters.

UNIT-II

Switch Capacitor Circuits Comparators

Switched-capacitor amplifiers, switched capacitor integrator, switched capacitor common mode feedback.

UNIT-III

Comparators

Single stage amplifier as comparator, cascaded amplifier stages as comparator, latched comparators. offset cancellation, Op Amp offset cancellation, Calibration techniques

UNIT-IV

NYQUIST RATE D/A Converters

Current Steering DACs, capacitive DACs, Binary weighted versus thermometer DACs, issues in current element matching, clock feed through, zero order hold circuits, DNL, INL and other performance metrics of ADCs and DACs

UNIT-V

Pipeline and Other ADCs

Performance metrics, Flash architecture, Pipelined Architecture, Successive approximation architecture, Time interleaved architecture.

UNIT-VI

Sigma Delta Converters

STF, NTF, first order and second order sigma delta modulator characteristics, Estimating the maximum stable amplitude, CTDSMs, OP-Amp nonlinearities

TEXT BOOKS:

1. BehzadRazavi, "*Principles of data conversion system design*", IEEE press, 1995.
2. M. Pelgrom, "*Analog-to-Digital Conversion*", Springer, 2010.
3. Rudy van de Plassche, "*CMOS Integrated Analog-to-Digital and Digital-to-Analog converters*", Kluwer Academic Publishers, Boston, 2003.

REFERENCES:

1. R. Schreier, G. Temes, "*Understanding Delta-Sigma Data Converters*", Wiley-IEEE Press, 2004.
2. Digital Signal Processing, "*J. G. Proakis, D. G. Manolakis*", Prentice Hall, 1995.

I M.TECH-I SEMESTER (ELECTIVE–I)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
EMBEDDED C							

Course Objectives:

- To learn the basic concepts of C programming and to learn the basic concepts of 8051 I/O Interfacing
- To learn the objective oriented programming with C and to learn the hardware and software delay creations
- To learn the example case study and to learn the applications of embedded c language

Course Outcomes:

Upon completion of this course, the student will be able to

- Understand the basic c programming
- Understand the basic Embedded C programming
- Understand the 8051 I/O Port programming
- Develop small embedded projects

UNIT – I

Programming Embedded Systems in C: Introduction ,What is an embedded system, Which processor should you use, Which programming language should you use, Which operating system should you use, How do you develop embedded software, Conclusions.

UNIT–II

Introducing the 8051 Microcontroller Family: Introduction, What's in a name, The external interface of the Standard 8051, Reset requirements ,Clock frequency and performance, Memory issues, I/O pins, Timers, Interrupts, Serial interface, Power consumption ,Conclusions

UNIT–III

Reading Switches: Introduction, Basic techniques for reading from port pins, Example: Reading and writing bytes, Example: Reading and writing bits (simple version), Example: Reading and writing bits (generic version), The need for pull-up resistors, Dealing with switch bounce, Example: Reading switch inputs (basic code), Example: Counting goats, Conclusions

UNIT–IV

Adding Structure to the Code: Introduction, Object-oriented programming with C, The Project Header (MAIN.H), The Port Header (PORT.H), Example: Restructuring the 'Hello Embedded World' example, Example: Restructuring the goat-counting example, Further examples, Conclusions

UNIT–V

Meeting Real-Time Constraints: Introduction, Creating 'hardware delays' using Timer 0 and Timer 1, Example: Generating a precise 50 ms delay, Example: Creating a portable hardware delay, Why not use Timer 2?, The need for 'timeout' mechanisms, Creating loop timeouts, Example: Testing loop timeouts, Example: A more reliable switch interface, Creating hardware timeouts, Example: Testing a hardware timeout, Conclusions

UNIT–VI

Case Study: Intruder Alarm System: Introduction, The software architecture, Key software components used in this example, running the program, the software, Conclusions

TEXT BOOKS:

1. Michael J. Pont, "*Embedded C*", Pearson Education.

REFERENCES:

1. Nigel Gardner, *"PIC micro MCU C-An introduction to programming, The Microchip PIC in CCS C"*.

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	4	-	-	40	60	100	3
SYSTEM MODELING AND SIMULATION							

Course Objectives:

- Students will study the system models, simulators.
- Students must be able understand probability concepts in simulation and queuing theory.
- Students learn about discrete system simulation, GPSS and SEMSCRIPT.

Course Outcomes:

Upon completion of this course, the student will be able to

- An ability to describe, system models.
- An ability to describe, simulators.
- An ability to rapidly design probability concepts in simulation.
- An ability to rapidly design queuing theory.
- An ability to study discrete system simulation.
- An ability to understand GPSS and SEMSCRIPT.

UNIT-I

System Models: Concepts, continuous and Discrete Systems, systems modeling, types of models, subsystems, corporate model, system study.

System simulation: Techniques, comparison of simulation and analytical methods, types of simulation, distributed log models, cobwed models.

UNIT-II

Continuous system simulation: Numerical solution of differential equations, analog computers, hybrid computers, continuous system simulation languages – CSMP, system dynamic growth models, logistic curves.

UNIT-III

Probability concepts in simulation: Monte Carlo techniques, stochastic variables, probability functions, random number generation algorithms.

UNIT-IV

Queuing Theory: Arrival pattern distribution, service times, queuing disciplines, measure of queues, mathematical solutions to queuing problems.

UNIT-V

Discrete Systems Simulation: Events generation of arrival patterns, simulation programming tasks, analysis of simulation output.

UNIT- VI

GPSS and SEMSCRIPT: General description of GPSS and SEMSCRIPT, programming in GPSS.

Simulation Programming techniques: Data Structures, implementation of activities, events and queues, event scanning, simulation algorithms in GPSS and SEMSCRIPT.

TEXT BOOK:

1. Geoffery Gordan, *"Systems Simulation"*, PHI, 1978.

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	4	-	-	40	60	100	3
NETWORK SECURITY AND CRYPTOGRAPHY							

Course Objectives:

- Understand the Security services and Data Encryption Algorithms.
- Gain knowledge on Cryptography Message authentication and Hash functions.
- Understand Hash Algorithms and IP security.

Course Outcomes:

Upon completion of this course, the student will be able to

- Study the Security and classical encryption Techniques.
- Conduct research in Network Security.
- Apply Security principles in System design.
- Encrypt and Decrypt the messages using Cipher Algorithms.
- Use Hash and MAC algorithms in Authentication principles.
- Use firewall design concepts and IP security.

UNIT-I

Introduction: Attacks, Services and Mechanisms, Security attacks, Security services, A Model for Internetwork security. Classical Techniques: Conventional Encryption model, Steganography, Classical Encryption Techniques.

Modern Techniques: Simplified DES, Block Cipher Principles, Data Encryption standard, Strength of DES, Differential and Linear Cryptanalysis, Block Cipher Design Principles and Modes of operations.

UNIT-II

Encryption Algorithms: Triple DES, International Data Encryption algorithm, Blowfish, RC5, CAST-128, RC2, Characteristics of Advanced Symmetric block ciphers. **Conventional Encryption :**Placement of Encryption function, Traffic confidentiality, Key distribution, Random Number Generation.

UNIT-III

Public Key Cryptography: Principles, RSA Algorithm, Key Management, Diffie-Hellman Key exchange, Elliptic Curve Cryptography. **Number Theory:** Prime and Relatively prime numbers, Modular arithmetic, Fermat's and Euler's theorems, Testing for primarily, Euclid's Algorithm, the Chinese remainder theorem, Discrete logarithms.

UNIT-IV

Message Authentication and Hash Functions: Authentication requirements and functions, Message Authentication, Hash functions, Security of Hash functions and MACs.

UNIT-V

Hash and Mac Algorithms MD File, Message digest Algorithm, Secure Hash Algorithm, RIPEMD- 160, HMAC. Digital signatures and Authentication protocols: Digital signatures, Authentication Protocols, Digital signature standards. 36 2013-14

Authentication Applications: Kerberos, X.509 directory Authentication service. Electronic Mail Security: Pretty Good Privacy, S/MIME.

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UNIT–VI

IP Security: Overview, Architecture, Authentication, Encapsulating Security Payload. Combining security Associations, Key Management. Web Security: Web Security requirements, Secure sockets layer and Transport layer security, Secure Electronic Transaction. Intruders, Viruses and Worms, Intruders, Viruses and Related threats.

Fire Walls: Fire wall Design Principles, Trusted systems.

TEXT BOOKS:

1. William Stallings, "*Cryptography and Network Security: Principles and Practice*",Pearson Education.
2. William Stallings, *"Network Security Essentials (Applications and Standards)"*, Pearson Education.

REFERENCES:

1. Eric Maiwald, " *Fundamentals of Network Security*", Dreamtech press.
2. Charlie Kaufman, Radia Perlman and Mike Speciner, "*Network Security - Private Communication in a Public World*", PHI.
3. Whitman, *"Principles of Information Security"*, Thomson.
4. Robert Bragg, Mark Rhodes, "*Network Security: The complete reference*", TMH
5. Buchmann, "*Introduction to Cryptography*".

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	4	-	-	40	60	100	3
ANALOG INTEGRATED CIRCUIT DESIGN							

Course Objectives:
The student will be able to
- Understand the concepts of Single Stage Amplifiers and their High frequency characteristics.
- Gain the knowledge on Noise presence in Feedback and Operational Amplifiers.
- Understand the general considerations in Operational Amplifiers

Course Outcomes:
Upon completion of this course, the student will be able to
- Design Single Stage Amplifiers and study current mirror configurations.
- Observe the High frequency characteristics of Amplifiers.
- Can estimate Noise occurrence & Noise Characteristics in Differential Amplifiers.
- Extend the Feedback amplifier concepts to Different Applications in Real Time.
- Gain the knowledge of Different Compensation techniques.
- Apply knowledge of Bandgap and references in Amplifier designing.

UNIT-I
Single Stage Amplifiers
Basic MOS physics and equivalent circuits and models, CS, CG and Source Follower cascode and folded cascade configurations, differential amplifiers and current mirror configurations.

UNIT-II
High Frequency Characteristics Amplifiers
Current mirrors, cascode stages for current mirrors, current mirror loads for differential pairs. Miller effect, association of poles with nodes, frequency response of CS, CG and source follower, cascade and differential pair stages

UNIT-III
Noise of Characteristics Amplifiers
Statistical characteristics of noise, noise in single stage amplifiers, noise in differential amplifiers.

UNIT-IV
Feedback And Operational Amplifiers
Properties and types of negative feedback circuits, effect of loading in feedback networks, operational amplifier performance parameters, One-stage Op Amps, Two-stage Op Amps, Input range limitations, Gain boosting, slew rate, power supply rejection, noise in Op Amps.

UNIT-V
Stability And Frequency Compensation
General considerations, Multipole systems, Phase Margin, Frequency Compensation, Compensation of two stage Op Amps, Slewing in two stage Op Amps, Other compensation techniques.

UNIT-VI
Bandgap References
supply independent biasing, temperature independent references, PTAT current generation,Constant-Gm Biasing.

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TEXT BOOKS:

1. BehzadRazavi, "*Design of Analog CMOS Integrated Circuits*", Tata McGraw Hill, 2001
2. Willey M.C. Sansen, "*Analog Design Essentials*", Springer, 2006.
3. Grebene, "*Bipolar and MOS Analog Integrated circuit design*", John Wiley & Sons, Inc., 2003.

REFERENCES:

1. Phillip E.Allen, DouglasR.Holberg, "*CMOS Analog Circuit Design*", Second edition, Oxford University Press, 2002
2. Recorded lecture available at http://www.ee.iitm.ac.in/~ani/ee5390/index.html
3. Jacob Baker "*CMOS: Circuit Design, Layout, and Simulation*", Third Edition, Wiley IEEE Press, 2010.

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	4	-	-	40	60	100	3
ADVANCED DIGITAL SYSTEM DESIGN							

Course Objectives:
The student will be able to

- Understand the analysis of Synchronous and Asynchronous Sequential circuits.
- Introduced to Multi-Input
-
- control design.
- Understand the Implementation of System Controllers using Combinational and Sequential Circuits.

Course Outcomes:
Upon completion of this course, the student will be able to

- Analyze Procedural Design steps of Synchronous.
- Analyze Procedural Design steps of Asynchronous Sequential circuits.
- Design Synchronous and Asynchronous Sequential circuits.
- Apply Multi-Input system control design concepts to develop Different Vending Machine applications in Real Time.
- Design System Controllers using Combinational MSI/LSI Circuits.
- Design Programmable System Controllers using Sequential Circuits.

UNIT-I
Synchronous Sequential Circuit Design
Analysis of clocked synchronous sequential circuits – Moore / Mealy State diagrams, State Table, State Reduction and Assignment - Design of synchronous sequential circuits.

UNIT-II
Analysis Of Asynchronous Sequential Circuit
Analysis of asynchronous sequential circuit – Cycles – Races - Static, Dynamic and Essential hazards – Primitive Flow Table.

UNIT-III
Asynchronous Sequential Circuit Design
State Reductions and State Assignment - Design of asynchronous sequential circuits.

UNIT-IV
VEM and Introduction To Multi-Input System Controller Design
Variable Entered Maps – simplification - System Controllers – Design Phases – MDS Diagram Generation – MDSD Symbology – Choosing the controller architecture – State Assignment – Next State decoder – Examples of 2s complement system and Pop Vending Machine – Concepts related to the use of conditional outputs.

UNIT-V
System Controllers Using Combinational MSI / LSI Circuits
Decoders and Multiplexers in system controllers – Indirect-Addressed MUX configuration – System controllers using ROM.

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UNIT-VI

Sequential and Programmable System Controllers

System controllers using Shift Registers and Counters – General requirements of a programmable controller - Microinstructions – Programmable controllers with fixed instruction set.

TEXT BOOKS:

1. William I. Fletcher, "*An Engineering Approach to Digital Design*", Prentice Hall India, 2011
2. Charles H. Roth Jr, "*Fundamentals of Logic Design*", Thomson Learning, 2004

REFERENCES:

1. Nripendra N Biswas "Logic Design Theory" Prentice Hall of India,2001

I M.TECH-I SEMESTER (ELECTIVE-II)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
PATTERN RECOGNITION							

Course Objectives:

- Introduce the fundamentals of statistical pattern recognition and Bayes decision theory.
- Understand the techniques of parameter estimation and density estimation.
- Understand the Linear discriminant functions and clustering.

Course Outcomes:

Upon completion of this course, the student will be able to

- Gain idea on fundamental concepts in pattern recognition
- Use the Bayesian decision theory concepts from ground level
- Use the maximum likelihood estimation, Bayesian estimation in real-time applications.
- Use the Non-Parametric estimation in real-time applications.
- Clearly understand the Linear discriminant functions and clustering
- Engage in life-long learning in the area of pattern recognition.

UNIT– I

Introduction

Machine Perception, Pattern recognition systems, the design cycle, learning and adaption.

UNIT–II

Bayesian Decision Theory

Bayesian decision theory – Continuous features, Minimum error rate classification, Classifiers, Discriminant Functions and decision surfaces, the normal density, discriminant functions for the normal density, Bayes decision theory – Discrete features.

UNIT–III

Maximum-Likelihood and Bayesian Parameter Estimation

Maximum-Likelihood Estimation, Bayesian Parameter Estimation, Bayesian Parameter Estimation: Gaussian case, Bayesian Parameter Estimation: General theory, Problems of Dimensionality, Hidden Markov Models.

UNIT–IV

Non-Parametric Techniques

Density Estimation, Parzen Windows, k_n-Nearest Neighbor Estimation, the Nearest Neighbor rule, Metrics and Nearest-Neighbor classification.

UNIT–V

Linear Discriminant Functions

Linear Discriminant Functions and decision surfaces, Generalized Linear Discriminant Functions, the two-category linearly separable case, Minimizing the Perception criterion function, Relaxation procedures, Non-separable behavior, minimum squared-error procedures, the Ho-Kashyap procedures.

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UNIT–VI

Unsupervised Learning and Clustering

Mixture densities and Identifiability, Maximum-Likelihood Estimates, Application to Normal mixtures, Unsupervised Bayesian learning, Data description and Clustering, Criterion functions for clustering, Hierarchical clustering, Component Analysis.

TEXT BOOKS:

1. Richard O. Duda, Peter E, Hart and David G. Stork, *"Pattern Classification"*, Second Edition, Wiley Publications, 2001, ISBN: 978-0-471-05669-0.

REFERENCES:

1. T.M. Mitchell, "*Machine learning*", McGraw-Hill, New York, 1997.
2. S. Theodoridis, K. Koutroumbas, *"Pattern Recognition"*, Academic Press, 1999.

I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	6	40	60	100	3
DESIGN AND SIMULATION LABORATORY							

Course Objectives:

- Student able to design logic gates.
- Student able to learn about converters.
- Student able to understand the importance of embedded theory

Course Outcomes:

Upon completion of this course, the student will be able to

- Ability to design logic gates and ALU.
- Ability to design Finite State Machine logic Circuit.
- Ability to design Combinational circuits like Full Adder.
- Ability to design A to D & D to A converters.
- Ability to create a new task.
- Ability to implement BANKER'S algorithm.

PART-A

VLSI Lab (Front-end Environment)

• The students are required to design the logic circuit to perform the following experiments using necessary simulator (Xilinx ISE Simulator/ Mentor Graphics Questa Simulator) to verify the logical /functional operation and to perform the analysis with appropriate synthesizer (Xilinx ISE Synthesizer/Mentor Graphics Precision RTL) and then verify the implemented logic with different hardware modules/kits (CPLD/ FPGA kits).

• The students are required to acquire the knowledge in both the Platforms (Xilinx and Mentor graphics) by perform at least FOUR experiments on each Platform.

LIST OF EXPERIMENTS:

1. Realization of Logic gates.
2. Parity Encoder.
3. Random Counter.
4. Synchronous RAM.
5. ALU.
6. UART Model.
7. Traffic Light Controller using Sequential Logic circuits
8. Finite State Machine (FSM) based logic circuit.

PART-B

VLSI Lab (Back-end Environment)

• The students are required to design and implement the Layout of the following experiments of any THREE using CMOS 130nm Technology with Mentor Graphics Tool. 38 2013-14

LIST OF EXPERIMENTS:

1. Inverter Characteristics.
2. Full Adder.
3. RS-Latch, D-Latch and Clock Divider.
4. Synchronous Counter and Asynchronous Counter.
5. Digital-to-Analog-Converter.
6. Analog-to-Digital Converter.

LAB REQUIREMENTS FOR PART-A AND PART-B:

Software: Xilinx ISE Suite 13.2 Version, Mentor Graphics-Questa Simulator, Mentor Graphics-Precision RTL, Mentor Graphics Back End/Tanner Software tool.

Hardware: Personal Computer with necessary peripherals, configuration and operating System and relevant VLSI (CPLD/FPGA) hardware Kits.

PART-C

Embedded Systems Laboratory

- The Students are required to write the programs using C-Language according to the Experiment requirements using RTOS Library Functions and macros ARM-926 developer kits.
- The following experiments are required to develop the algorithms, flow diagrams, source code and perform the compilation, execution and implement the same using necessary hardware kits for verification. The programs developed for the implementation should be at the level of an embedded system design.
- The students are required to perform at least THREE experiments.

LIST OF EXPERIMENTS: (using ARM-926 with PERFECT RTOS)

1. Register a new command in CLI.
2. Create a new Task.
3. Interrupt handling.
4. Allocate resource using semaphores.
   Digital Systems & Computer Electronics 39
5. Share resource using MUTEX.
6. Avoid deadlock using BANKER'S algorithm.

Lab Requirements for PART-C:

Software:

(i) Eclipse IDE for C and C++ (YAGARTO Eclipse IDE), Perfect RTOS Library

(ii) LINUX Environment for the compilation using Eclipse IDE & Java with latest version.

Hardware:

(i) The development kits of ARM-926 Developer Kits Boards.

(ii) Serial Cables, Network Cables and recommended power supply for the board.

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	4	-	-	40	60	100	3
ADHOC AND WIRELESS SENSOR NETWORKS							

Course Objectives:

- Students will be able to describe the unique issues in IEEE 802.11 standard, Bluetooth Adhoc/sensor networks.
- Students will be able to discuss the challenges in designing mac, routing and transport protocols for wireless ad-hoc/sensor networks.
- Students will be able to understand the challenges in quality of service energy management, usage of mac protocols for sensor networks.

Course Outcomes:

Upon completion of this course, the student will be able to

- Acquire the fundamental knowledge of LANs and PANs, mobile IP and optimizing web over wireless.
- Understand the concepts of Ad Hoc wireless networks and their applications.
- Understand the basics of routing protocol, classification and its application to Ad Hoc wireless network.
- Discuss the transport and security protocols, their applications to Ad Hoc WSN and their challenges.
- Discuss the issue and challenges of quality of service and energy management IN Ad hoc WSN.
- Understand the basic concepts of WSN, data gathering and their issues.

UNIT-I

Wireless LANS and PANS:

Introduction, Fundamentals of WLANS, IEEE 802.11Standard, HIPERLAN Standard, Bluetooth, Home RF.

Wireless Internet:

Wireless Internet, Mobile IP, TCP in Wireless Domain, WAP, Optimizing Web over Wireless.

UNIT-II

AD HOC Wireless Networks:

Introduction, Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet.

MAC Protocols for Ad Hoc Wireless Networks: Introduction, Issues in Designing a MAC protocol for Ad Hoc Wireless Networks, Design goals of a MAC Protocol for Ad Hoc Wireless Networks, Classifications of MAC Protocols, Contention - Based Protocols, Contention – Based Protocols with reservation Mechanisms, Contention – Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that use Directional Antennas, Other MAC Protocols.

UNIT –III

Routing Protocols:

Introduction, Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table –Driven Routing Protocols, On –Demand Routing Protocols, Hybrid Routing Protocols, Routing Protocols with Efficient Flooding Mechanisms, Hierarchical Routing Protocols, Power – Aware Routing Protocols.

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UNIT–IV

Transport Layer and Security Protocols:

Introduction, Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocol for Ad Hoc Wireless Networks, Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

UNIT–V

Quality of Service:

Introduction, Issues and Challenges in Providing QoS in Ad Hoc Wireless Networks, Classification of QoS Solutions, MAC Layer Solutions, Network Layer Solutions, QoS Frameworks for Ad Hoc Wireless Networks.

Energy Management: Introduction, Need for Energy Management in Ad Hoc Wireless Networks, Classification of Ad Hoc Wireless Networks, Battery Management Schemes, Transmission Power Management Schemes, System Power Management Schemes.

UNIT–VI

Wireless Sensor Networks:

Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, Other Issues.

TEXT BOOKS:

1. C. Siva Ram Murthy and B.S.Manoj, "*Ad Hoc Wireless Networks: Architectures and Protocols*", PHI, 2004.
2. Jagannathan Sarangapani, "*Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control*", CRC Press.

REFERENCES:

1. C.K. Toh, "*Ad-Hoc Mobile Wireless Networks: Protocols & Systems*", Pearson Education.
2. C. S. Raghavendra, Krishna M. Sivalingam, "Wireless Sensor Networks", Springer, 2004.

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	4	-	-	40	60	100	3

CMOS ANALOG AND DIGITAL IC DESIGN

Course Objectives:

- Understand the behavior of MOS Devices and Small-Signal & Large-Signal Modeling of MOS Transistor and Analog Sub-Circuits.
- Understand the design concepts of Combinational and Sequential MOS logic circuits.
- Understand the concepts of Sub circuits and CMOS Amplifiers like Differential Amplifiers,
- Cascode Amplifiers, Output Amplifiers, and Operational Amplifiers.

Course Outcomes:

Upon completion of this course, the student will be able to

- Design MOS devices and estimate their Electrical behavior.
- Design Combinational MOS logic circuits.
- Design Sequential MOS logic circuits.
- Use the Dynamic logic circuits and Memories.
- Extend the Analog Circuit Design to Different Applications in Real Time.
- Measure characteristics of CMOS amplifiers.

UNIT-I

MOS Devices and Modeling

The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large- Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

MOS Design

Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II

Combinational MOS Logic Circuits:

MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates , AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT-III

Sequential MOS Logic Circuits

Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT -IV

Dynamic Logic Circuits

Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

Semiconductor Memories

Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory- NOR flash and NAND flash.

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UNIT -V

Analog CMOS Sub-Circuits

MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT-VI

CMOS Amplifiers

Inverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.

CMOS Operational Amplifiers

Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power-Supply Rejection Ratio of Two-Stage Op Amps, Cascode Op Amps, Measurement Techniques of OP Amp.

TEXT BOOKS:

1. Ken Martin, "*Digital Integrated Circuit Design*", Oxford University Press, 2011.
2. Sung-Mo Kang, Yusuf Leblebici, "*CMOS Digital Integrated Circuits Analysis and Design*", 3rd Ed., TMH, 2011.
3. Philip E. Allen and Douglas R. Holberg, "*CMOS Analog Circuit Design*", Oxford University Press, International Second Edition/Indian Edition, 2010.
4. Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, "*Analysis and Design of Analog Integrated Circuits*", Fifth Edition, Wiley India, 2010.

REFERENCES:

1. David A. Johns, Ken Martin, "*Analog Integrated Circuit Design*", Wiley Student Edn, 2013.
2. Behzad Razavi, "*Design of Analog CMOS Integrated Circuits*", TMH Edition.
3. Baker, Li and Boyce, "*CMOS: Circuit Design, Layout and Simulation*", PHI.
4. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, "*Digital Integrated Circuits – A Design Perspective*", 2nd Ed., PHI.

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	4	-	-	40	60	100	3
DSP PROCESSORS AND ARCHITECTURES							

Course Objectives:

- Gain concepts of digital signal processing techniques, implementation of DSP & FFT & their computational accuracies in DSP implementation.
- Understand the concepts of DSP Processor and its architectures and program a DSP processor to filter signals.
- Understand the concepts of various DSP device families & Interfacing of P-DSPs with Memory and peripherals

Course Outcomes:

Upon completion of this course, the student will be able to

- Comprehends the knowledge & concepts of digital signal processing techniques, basic building blocks, implementation of DSP & FFT algorithms
- Estimate their computational accuracies in DSP implementation.
- Design Programmable DSP devices
- Use the DSP processors TMS 320C 54XX for implementation of DSP algorithms & its interfacing techniques with various I/O peripherals.
- Use various Analog Device Family of DSP Devices
- Interface Memory and I/O Peripherals to DSP processors.

UNIT–I

Introduction to Digital Signal Processing: Introduction, A Digital signal-processing system, the sampling process, discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), linear time-invariant systems, Digital filters, Decimation and interpolation.

UNIT–II

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT–III

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT-IV

Programmable Digital Signal Processors: Commercial Digital signal processing Devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of MS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts ofTMS320C54XX processors, Pipeline operation of TMS320C54XX Processors.

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UNIT–V

Analog Devices Family of DSP Devices: Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor. Introduction to Blackfin Processor - The Blackfin Processor, Introduction to Micro Signal Architecture, Overview of HardwareProcessing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT -VI

Interfacing Memory and I/O Peripherals to Programmable DSP

Devices: Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

TEXT BOOKS:

1. Avtar Singh and S. Srinivasan, "*Digital Signal Processing*", Thomson Publications, 2004.
2. K Padmanabhan, R. Vijayarajeswaran, Ananthi. S, "*A Practical Approach to Digital Signal Processing*", New Age International, 2006/2009
3. Woon- SengGan, Sen M. Kuo, "*Embedded Signal Processing with the Micro Signal Architecture Publisher*", Wiley-IEEE Press, 2007

REFERENCES:

1. B. Venkataramani and M. Bhaskar, "*Digital Signal Processors, Architecture, Programming and Applications* ", TMH, 2002.
2. Jonatham Stein, "*Digital Signal Processing*", John Wiley, 2005.
3. Lapsley et al., "*DSP Processor Fundamentals, Architectures & Features*", S. Chand & Co. ,2000.
4. *Digital Signal Processing Applications Using the ADSP-2100 Family,* The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Amy Mar, PHI.
5. Steven W. Smith, "*The Scientist and Engineer's Guide to Digital Signal Processing*", California Technical Publishing, ISBN 0- 9660176-3-3, 1997
6. David J. Katz and Rick Gentile, "*Embedded Media Processing*", Analog Devices, Newnes , ISBN 0750679123, 2005.

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	4	-	-	40	60	100	3
DESIGN OF FAULT TOLERANT SYSTEMS							

Course Objectives:

- Students will be able to describe the basic issues in fault tolerant design various self - checking circuits.
- Students will be able to understand the fundamentals of design for testability.
- Students will be able to understand the concepts of scan architectures and techniques and the basics of BIST

Course Outcomes:

Upon completion of this course, the student will be able to

- Acquire the fundamental knowledge of fault tolerance design.
- Discuss the concepts of fail- safe design and self -checking circuits.
- Understand the basics of design for testability and various delay faults.
- Discuss the transport and security protocols, their applications to Ad Hoc WSN and their challenges.
- Understand the Reed Muller's technique, use of control and syndrome testability design.
- Acquire the knowledge of built-in-Test concepts.

UNIT-I

Fault Tolerant Design Basic Concepts: Reliability concepts, Failure & Faults, Reliability and Failure rate, Relation between Reliability and Meantime between failure, Maintainability and Availability, Reliability of series, Parallel and Parallel-Series combinational circuits.

Fault Tolerant Design: Basic Concepts-Static, dynamic, hybrid Triple Modular Redundant System, self purging redundancy, Sift-out Modular redundancy (SMR), 5 MR reconfiguration techniques, use of error correcting code, Time redundancy and Software redundancy.

UNIT-II

Self-checking circuits & Fail safe design Self checking circuits:

Basic concepts of self-checking circuits, Design of totally self-checking checker, checkers using m out of n codes, Berger code, Low cost residue code.

Fail safe design: Strongly fault secure circuits, fail safe design of sequential circuits using partition theory and Berger code, totally self-checking PLA design.

UNIT-III

ATPG Fundamentals & Design for Testability for Combinational Circuits Introduction to ATPG Process -Testability and Fault analysis methods- Fault masking- Transition delay fault ATPG, path delay, fault ATPG.

UNIT-IV

Design for Testability for Combinational Circuits: Basic concepts of Testability, Controllability and Observability, the Reed Muller's expansion technique, OR-AND-OR Design, Use of control and Syndrome Testable Designs.

UNIT-V

Scan Architectures & Techniques Introduction to Scan Based testing, Functional testing, The Scan effective Circuit, The MUX-D Style Scan flip-flops, The Scan shift register, scan cell operation. Scan test Sequencing, Scan test timing, Partial Scan, Multiple Scan Chains, Scan based

Design rules(LSSD).At-speed scan testing and Architecture, multiple clock and scan domain operation ,critical paths for At speed scan test.

UNIT-VI

Built-In-Self-Test (BIST) BIST concepts, Test Pattern generation for BIST exhaustive testing, pseudorandom testing, Pseudo exhaustive testing, constant weight patterns, Generic offline BIST architecture, Memory Test architecture.

TEXT BOOKS:

1. Parag K. Lala, "*Fault Tolerant & Fault Testable Hardware Design*", PHI, 1984.
2. Alfred L.Crouch, "*Design for Test for Digital IC's and Embedded Core Systems*", Pearson Education, 2008.

REFERENCES:

1. Mirano Abramovici, Melvin A. Breuer and Arthur D. Friedman, "*Design Systems Testing and testable Design*", Jaico Books
2. Michael L. Bushnell, Vishwani D. Agrawal, "*Essentials of Electronic Testing for Digital, Memory and Mixed-Signal VLSI Circuits*", Springer.

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I M.TECH-II SEMESTER (ELECTIVE–III)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
SYSTEM ON CHIP DESIGN							

Course Objectives:

- Students will be introduce to system architectural concepts and complexities, concepts of processors
- Students will be able to understand the fundamentals of memory design for SoC and inter connections.
- Students will be able to understand the mapping, reconfiguration design approaches and image compression.

Course Outcomes:

Upon completion of this course, the student will be able to

- Acquire the fundamental knowledge of system architectural concepts
- Discuss the concepts processor micro architecture instructional handling.
- Understand the SoC memory concepts and models of simple processor memory instructions
- Discuss the interconnection concepts and SoC customization.
- In this course student will be able to give interconnections on SoC
- Understand the applications of SoC ,AES algorithms and image compression

UNIT-I

Introduction to the System Approach System Architecture, Components of the system, Hardware & Software, Processor Architectures, Memory and Addressing. System level interconnection, An approach for SOC Design, System Architecture and Complexity.

UNIT-II

Processors Introduction , Processor Selection for SOC, Basic concepts in Processor Architecture, Basic concepts in Processor Micro Architecture, Basic elements in Instruction handling. Buffers: minimizing Pipeline Delays, Branches, More Robust Processors, Vector Processors and Vector Instructions extensions, VLIW Processors, Superscalar Processors.

UNIT-III

Memory Design for SOC Overview of SOC external memory, Internal Memory, Size, Scratchpads and Cache memory, Cache Organization, Cache data, Write Policies, Strategies for line replacement at miss time, Types of Cache, Split – I, and D – Caches, Multilevel Caches, Virtual to real translation , SOC Memory System, Models of Simple Processor – memory interaction.

UNIT-IV

Interconnect Customization Inter Connect Architectures, Bus: Basic Architectures, SOC Standard Buses , Analytic Bus Models, Using the Bus model, Effects of Bus transactions and contention time. SOC Customization: An overview, Customizing Instruction Processor.

UNIT-V

Interconnect Configuration

Reconfiguration Technologies, Mapping design onto Reconfigurable devices, Instance- Specific design, Customizable Soft Processor, Reconfiguration - overhead analysis and trade-off analysis on reconfigurable Parallelism.

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UNIT-VI

Application Studies / Case Studies SOC Design approach, AES algorithms, Design and evaluation, Image compression – JPEG compression.

TEXT BOOKS:

1. Michael J. Flynn and Wayne Luk, "*Computer System Design System-on-Chip*", Wiely India Pvt. Ltd.
2. Steve Furber, "*ARM System on Chip Architecture*", 2nd Ed., Addison Wesley Professional, 2000.

REFERENCES:

1. Ricardo Reis, "*Design of System on a Chip: Devices and Components*", 1st Ed., Springer, 2004
2. Jason Andrews, "*Co-Verification of Hardware and Software for ARM System on Chip Design (Embedded Technology)*" — Newnes, BK and CDROM.
3. Prakash Rashinkar, Peter Paterson and Leena Singh L, "*System on Chip Verification – Methodologies and Techniques*", 2001, Kluwer Academic Publishers.

I M.TECH-II SEMESTER (ELECTIVE–III)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
SOFT COMPUTING TECHNIQUES							

Course Objectives:

- To understand the architecture of intelligent control and concepts of artificial neural networks.
- To have an exposure about basic concepts of and its control methodologies of fuzzy logic system.
- To know the basic concepts of genetic algorithm, its steps, GA applications and fuzzy logic controller using MATLAB.

Course Outcomes:

Upon completion of this course, the student will be able to

- Gain the knowledge of intelligent control architecture and rule based systems.
- Realize the concepts of artificial neural network sand basic mathematical.
- Know about fuzzy logic system, basic operation and approximate reasoning..
- Understand the fuzzy logic modeling and control schemes.
- Know about basic concepts of Genetic algorithms and its detailed steps. .
- In this course student will be able to understand the applications of genetic algorithm.

UNIT–I

Introduction: Approaches to intelligent control, Architecture for intelligent control, Symbolic reasoning system, Rule-based systems, the AI approach, Knowledge representation - Expert systems.

UNIT–II

Artificial Neural Networks: Concept of Artificial Neural Networks and its basic mathematical model, McCulloch-Pitts neuron model, simple perceptron, Adaline and Madaline, Feed-forward Multilayer Perceptron, Learning and Training the neural network, Data Processing: Scaling, Fourier transformation, principal-component analysis and wavelet transformations, Hopfield network, Self-organizing network and Recurrent network, Neural Network based controller.

UNIT–III

Fuzzy Logic System: Introduction to crisp sets and fuzzy sets, basic fuzzy set operation and approximate reasoning, Introduction to fuzzy logic modeling and control, Fuzzification, inference and defuzzification, Fuzzy knowledge and rule bases

UNIT– IV

Fuzzy Logic Control: Fuzzy modeling and control schemes for nonlinear systems, Self-organizing fuzzy logic control, Fuzzy logic control for nonlinear time delay system.

UNIT–V

Genetic Algorithm: Basic concept of Genetic algorithm and detail algorithmic steps, Adjustment of free parameters, Solution of typical control problems using genetic algorithm, Concept on some other search techniques like Tabu search and ant-colony search techniques for solving optimization problems.

UNIT–VI

Applications: GA application to power system optimization problem, Case studies: Identification and control of linear and nonlinear dynamic systems using MATLAB-Neural Network toolbox,

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Stability analysis of Neural-Network interconnection systems. Implementation of fuzzy logic controller using MATLAB fuzzy-logic toolbox. Stability analysis of fuzzy control systems.

TEXT BOOKS:

1. Jacek.M.Zurada, "*Introduction to Artificial Neural Systems*", Jaico Publishing House, 1999.
2. Kosko, B," *Neural Networks and Fuzzy Systems*", Prentice-Hall of India Pvt. Ltd., 1994.

REFERENCES:

1. Klir G.J. and Folger T.A., "*Fuzzy Sets, Uncertainty and Information*", Prentice-Hall of India Pvt. Ltd., 1993.
2. Zimmerman H.J., "*Fuzzy Set Theory and Its Applications*", Kluwer Academic Publishers, 1994.
3. Driankov, Hellendroon, "Introduction *to Fuzzy Control*", Narosa Publishers.
4. Dr. B. Yagananarayana, "*Artificial Neural Networks*", PHI, New Delhi, 1999.
5. Kishan Mehrotra, Chelkuri K. Mohan, Sanjay Ranka, "*Elements of Artificial Neural Networks*", Penram International.
6. Simon Haykin, "*Artificial Neural Network* ", 2nd Ed., Pearson Education.
7. S.N. Shivanandam, S. Sumati, S. N. Deepa, "*Introduction Neural Networks Using MATLAB 6.0*", 1/e, TMH, New Delhi.

I M.TECH-II SEMESTER (ELECTIVE–III)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
SOLID STATE DEVICE MODELING AND SIMULATION							

Course Objectives:

- To impart the detailed knowledge of MOSFET circuit and device simulations in VLSI
- To have an exposure about sparse matrix technique, adaptive multistep methods.
- To know the basic mathematical techniques for basic device simulations and computation of basic devices' characteristics.

Course Outcomes:

Upon completion of this course, the student will be able to

- Gain the knowledge operation modeling equivalent circuit and analysis of MOSET
- Realize the concepts circuit and device simulation.
- Know about sparse matrix techniques and solutions to nonlinear networks.\
- Understand the adaptation of multistep methods to the solution of electrical networks.
- Impart the mathematical knowledge for device simulations.
- Realize the computation of characteristics of simple devices.

UNIT-I

MOSFET Device Physics

MOSFET capacitor, Basic operation, Basic modeling, Advanced MOSFET modeling, RF modeling of MOS transistors, Equivalent circuit representation of MOS transistor, High frequency behavior of MOS transistor and A.C small signal modeling, model parameter extraction, modeling parasitic BJT, Resistors, Capacitors, Inductors.

UNIT-II

Device Modelling -I

Prime importance of circuit and device simulations in VLSI; Nodal, mesh, modified nodal and hybrid analysis equations.

UNIT-III

Device Modelling -II

Solution of network equations: Sparse matrix techniques, solution of nonlinear networks through Newton-Raphson technique, convergence and stability.

UNIT-IV

Multistep Methods

Solution of stiff systems of equations, adaptation of multistep methods to the solution of electrical networks, general purpose circuit simulators.

UNIT-V

Mathematical Techniques For Device Simulations

Poisson equation, continuity equation, drift-diffusion equation, Schrodinger equation, hydrodynamic equations, trap rate, finite difference solutions to these equations in 1D and 2D space, grid generation.

UNIT-VI

Simulation Of Devices

Computation of characteristics of simple devices like p-n junction, MOS capacitor and MOSFET; Small-signal analysis.

TEXT BOOKS:

1. Arora, N., "*MOSFET Models for VLSI Circuit Simulation*", Springer-Verlag, 1993
2. Selberherr, S., "*Analysis and Simulation of Semiconductor Devices*", Springer-Verlag., 1984
3. Fjeldly, T., Yetterdal, T. and Shur, M., "*Introduction to Device Modeling and Circuit Simulation*", Wiley-Interscience., 1997

REFERENCES :

1. Grasser, T., "*Advanced Device Modeling and Simulation*", World Scientific Publishing Company., 2003
2. Chua, L.O. and Lin, P.M., "*Computer-Aided Analysis of Electronic Circuits: Algorithms and Computational Techniques*", Prentice-Hall., 1975
3. Trond Ytterdal, Yuhua Cheng and Tor A. Fjeldly Wayne Wolf, "*Device Modeling for Analog and RF CMOS Circuit Design*", John Wiley & Sons Ltd.

I M.TECH-II SEMESTER (ELECTIVE–III)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
MOBILE COMPUTING TECHNOLOGIES							

Course Objectives:

- Student will learn the basic concepts of mobile computing architecture, and cellular technologies like GSM, GPS, GPRS, CDMA and 3G.
- Student will impart the knowledge in WAP Clint programming, Palm OS and windows CE architecture.
- Student will understand the voice over internet protocol and security issue in the mobile computing.

Course Outcomes:

Upon completion of this course, the student will be able to

- Acquire the knowledge of mobile computing and its applications and services.
- Understand the concepts of cellular technologies like GSM. GPS, CDMA, GPRS AND 3G.
- Understand the basics of wireless application protocol and fundamentals of intelligent networks.
- Acquire the fundament knowledge in client programming windows CE architecture programming for GUI.
- Understand the basics of voice over IP-H.23 frame work, real time protocols and IP multimedia systems.
- Discuss the security techniques and algorithms and security framework environment

UNIT–I

Introduction to Mobile Computing Architecture:

Mobile Computing – Dialog Control – Networks –Middleware and Gateways – Application and Services – Developing Mobile Computing Applications– Security in Mobile Computing – Architecture for Mobile Computing – Three Tier Architecture –Design considerations for Mobile Computing – Mobile Computing through Internet – Making existing Applications Mobile Enabled.

UNIT–II

Cellular Technologies: GSM, GPS, GPRS, CDMA and 3G:

Bluetooth – Radio Frequency Identification – Wireless Broadband – Mobile IP – Internet Protocol Version 6 (IPv6) –Java Card – GSM Architecture – GSM Entities – Call Routing in GSM – PLMN Interfaces – GSM addresses and Identifiers – Network aspects in GSM – Authentication and Security – Mobile computing over SMS – GPRS and Packet Data Network – GPRS Network Architecture – GPRS Network Operations – Data Services in GPRS – Applications for GPRS – Limitations of GPRS –Spread Spectrum technology – Is-95 – CDMA Versus GSM – Wireless Data – Third Generation Networks – Applications on 3G.

UNIT–III

Wireless Application Protocol (WAP) and Wireless LAN:

WAP – MMS – Wireless LAN Advantages – IEEE 802.11 Standards – Wireless LAN Architecture – Mobility in wireless LAN

Intelligent Networks and Interworking : Introduction – Fundamentals of Call processing – Intelligence in the Networks – SS#7 Signaling – IN Conceptual Model (INCM) – soft switch – Programmable Networks – Technologies and Interfaces for IN

UNIT–IV

Client Programming, Palm OS, Symbian OS, Win CE Architecture: Introduction – Moving beyond the Desktop – A Peek under the Hood: Hardware Overview – Mobile phones – PDA – Design Constraints in Applications for Handheld Devices – Palm OS architecture – Application Development– Multimedia – Symbian OS Architecture – Applications for Symbian, Different flavors of Windows CE -Windows CE Architecture.

J2ME: JAVA in the Handset – The Three-prong approach to JAVA Everywhere – JAVA 2MicroEdition (J2ME) technology – Programming for CLDC – GUI in MIDP – UI Design Issues –Multimedia– Record Management System – Communication in MIDP – Security considerations in MIDP –Optional Packages

UNIT–V

Voice Over Internet Protocol and Convergence:

Voice over IP- H.323 Framework for Voice over IP– Session Initiation Protocol – Comparison between H.323 and SIP – Real Time protocols –Convergence Technologies – Call Routing – Voice over IP Applications – IP multimedia subsystem (IMS) – Mobile VoIP.

UNIT–VI

Security Issues in Mobile Computing:

Introduction – Information Security – Security Techniques and Algorithms – Security Protocols – Public Key Infrastructure – Trust – Security Models– Security frameworks for Mobile Environment.

TEXT BOOKS:

1. Asoke K Talukder, Roopa R Yavagal, "*Mobile Computing – Technology, Applications and Service Creation*", TATA McGraw Hill, 2009.
2. Jochen Schiller, "*Mobile Communications*", 2ndEdition, Pearson Education

REFERENCES:

1. Vieri Vaughi, Alexander Damn Jaonvic, "*The CDMA 2000 System for Mobile Communications*", Pearson.
2. Adalestein , "*Fundamentals of Mobile & Parvasive Computing*", TMH, 2008.

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I M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
EMBEDDED REAL TIME OPERATING SYSTEMS (ELECTIVE–III)							

Course Objectives:

- Describe what makes a system a real -time system
- Explaisn the presence of and describe the characteristics of latency in real-time systems.
- Summarize special concerns that real -time systems present and how these concerns are addressed.

Course Outcomes:

Upon completion of this course, the student will be able to

- Understand and design embedded systems and real-time systems For real time systems.
- Identify the general structure and unique characteristics of real -time systems
- Evaluate the need for real-time operating system. Implement the real-time operating system principles
- Define the unique design problems and challenges of real-time systems
- Apply real-time systems design techniques to various software programs.
- Program an embedded system. Design, implement and test an embedded system.

UNIT-I

Introduction OS Services, Process Management, Timer Functions, Event Functions, Memory Management, Device, File and IO Systems Management, Interrupt Routines in RTOS Environment and Handling of Interrupt Source Calls.

UNIT-II

Real-Time Operating Systems: Basic Design Using an RTOS, RTOS Task Scheduling Models, Interrupt Latencyand Response of the Tasks as Performance Metrics, OS Security Issues.

UNIT-III

RTOS Programming Basic Functions and Types of RTOS for Embedded Systems, RTOS mCOS-II, RTOS Vx Works, Programming concepts of above RTOS with relevant Examples, Programming concepts of RTOS Windows CE, RTOS OSEK, RTOS Linux 2.6.x and RTOS RT Linux.

UNIT-IV

Program Modeling – Case Studies Case study of embedded system design and coding for an Automatic Chocolate Vending Machine (ACVM) Using Mucos RTOS, case study of digital camera hardware and software architecture, case study of coding for sending application layer byte streams on a TCP/IP Network Using RTOS Vx Works, CaseStudy of Embedded System for an Adaptive Cruise Control (ACC) System in Car, Case Study of Embedded System for a Smart Card, Case Study of Embedded System of Mobile Phone Software for Key Inputs.

UNIT-V

Target Image Creation & Programming in Linux Off-The-Shelf Operating Systems, Operating System Software, Target Image Creation for Window XP Embedded, Porting RTOS on a Micro Controller based Development Board.

Overview and programming concepts of Unix/Linux Programming, Shell Programming, System Programming.

UNIT-VI

Programming in RT Linux Overview of RT Linux, Core RT Linux API, Program to display a message periodically, semaphore management, Mutex, Management, Case Study of Appliance Control by RT Linux System.

TEXT BOOKS:

1. Dr. K.V.K.K. Prasad: "*Embedded/Real-Time Systems*" Dream Tech Publications, Black pad book.
2. Rajkamal: "*Embedded Systems-Architecture, Programming and Design*", Tata McGraw Hill Publications, Second Edition, 2008.

REFERENCE BOOKS:

1. Labrosse, "*Embedding system building blocks* ", CMP publishers.
2. Rob Williams," *Real time Systems Development*", Butterworth Heinemann Publications.

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I M.TECH-II SEMESTER (ELECTIVE–IV)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
INTERNET PROTOCOLS							

Course Objectives:

- Comprehend fundamental design principles of Internet Protocols, IP addressing, and IP networks, including routing and forwarding.
- Comprehend advanced Internet protocol technologies including network management, domain name system, network address translation, DHCP and multicasting.
- Apply understanding of Internet protocols by analyzing, evaluating, and improving actual network configurations of IP routers, switches and hosts.

Course Outcomes:

Upon completion of this course, the student will be able to

- Are able to describe the architecture of the Internet and able to describe IP addressing and are able to design an internetwork with assigned addresses.
- Are able to describe the Internet Protocol (IP) and Trans mission Control Protocol(TCP)
- Are able to describe the intra and inter routing protocols (Ex. RIP, OSPF and BGP)
- Are able to describe the Domain Name System (DNS), Network virtual terminal (NVT) and File transfer Protocol (FTP).
- Have a good understanding of multimedia concepts.
- An understanding of computer and networked system organization and architecture and knowledge of recent advances, current practices and trends in computer systems.

UNIT-I

Internetworking Concepts: Principles of Internetworking, Connectionless Internetworking, Application level Interconnections, Network level Interconnection, Properties of thee Internet, Internet Architecture, Wired LANS, Wireless LANs, Point-to-Point WANs, Switched WANs, Connecting Devices, TCP/IP Protocol Suite.

IP Address: Classful Addressing: Introduction, Classful Addressing, Other Issues, Sub-netting and Super-netting, **Classless Addressing:** Variable length Blocks, Sub-netting, Address Allocation. Delivery, Forwarding, and Routing of IP Packets: Delivery, Forwarding, Routing, Structure of Router. **ARP and RARP:** ARP, ARP Package, RARP.

UNIT–II

Internet Protocol (IP): Datagram, Fragmentation, Options, Checksum, IP V.6.

Transmission Control Protocol (TCP): TCP Services, TCP Features, Segment, A TCP Connection, State Transition Diagram, Flow Control, Error Control, Congestion Control, TCP Times.

UNIT–III

Stream Control Transmission Protocol (SCTP): SCTP Services, SCTP Features, Packet Format, Flow Control, Error Control, Congestion Control.

Mobile IP: Addressing, Agents, Three Phases, Inefficiency in Mobile IP.

Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP, Fast Retransmit/ Fast Recovery, Transmission/ Time Out Freezing, Selective Retransmission, Transaction Oriented TCP.

UNIT-IV

Unicast Routing Protocols (RIP, OSPF, and BGP): Intra and Interdomain Routing, Distance Vector Routing, RIP, Link State Routing, OSPF, Path Vector Routing, BGP.

Multicasting and Multicast Routing Protocols: Unicast – Multicast Broadcast, Multicast

Applications, Multicast Routing, Multicast Link State Routing: MOSPF. Multicast Distance Vector: DVMRP.

UNIT –V

Domain Name System (DNS): Name Space, Domain Name Space, Distribution of Name Space, and DNS in the internet.
Remote Login TELNET: Concept, Network Virtual Terminal (NVT).
File Transfer FTP and TFTP: File Transfer Protocol (FTP).
Electronic Mail: SMTP and POP.
Network Management-SNMP: Concept, Management Components, World Wide Web- HTTP Architecture.

UNIT -VI

Multimedia: Digitizing Audio and Video, Network security, security in the internet firewalls. Audio and Video Compression, Streaming Stored Audio/Video, Streaming Live Audio/Video, Real-Time Interactive Audio/
Video, RTP, RTCP, Voice Over IP. Network Security, Security in the Internet, Firewalls.

TEXT BOOKS:

1. Behrouz A. Forouzan, "*TCP/IP Protocol Suite*", Third Edition, TMH.
2. Comer, "*Internetworking with TCP/IP*", 3rd edition PHI.

REFERENCES:

1. Mahbub Hassan, Raj Jain, "*High performance TCP/IP Networking*", PHI, 2005
2. B.A. Forouzan, "*Data Communications & Networking*", 2nd Edition, TMH
3. William Stallings, "*High Speed Networks and Internets*", Pearson Education, 2002.
4. William Stallings, "*Data and Computer Communications*", 7th Edition, PHI.
5. AdrinFarrel, "*The Internet and Its Protocols*", Elsevier, 2005.

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	4	-	-	40	60	100	3
HIGH SPEED NETWORKS							

Course Objectives:

- Learns about high speed networks
- To facilitates the students on the basis of ATM and Frame relay concepts and explain the various types of LANs and to know about their applications.
- Enable the students to know techniques involved to support real-time traffic and congestion control in ATM.

Course Outcomes:

Upon completion of this course, the student will be able to

- describe the ISDN and B-ISDN architecture and protocols.
- describe the ATM service categories, ATM cell header, ATM adaptation layer
- describe the various networks and routing algorithms
- understand of computer and networked system organization and architecture and knowledge of recent advances, current practices and trends in computer systems.
- understand of TCP/IP networks management
- understand of high speed networks.

UNIT-I

Network Services and Layered Architecture: Traffic characterization and quality of service, Network services, High performance networks, Network elements, Basic network mechanisms, layered architecture.

UNIT-II

ISDN & B-ISDN: Over view of ISDN, ISDN channels, User access, ISDN protocols, Brief history of B-ISDN and ATM, ATM based services and applications, principles and building block of B-ISDN, general architecture of B-ISDN, frame relay.

UNIT-III

ATM NETWORKS: Network layering, switching of virtual channels and virtual paths, applications of virtual channels and connections. QOS parameters, traffic descriptors, ATM service categories, ATM cell header, ATM layer, ATM adaptation layer.

UNIT-IV

INTERCONNECTION NETWORKS: Introduction, Banyan Networks, Routing algorithm & blocking phenomenon, Batcher-Banyan networks, crossbar switch, three stage class networks. REARRANGEABLE NETWORKS: Rearrangeable class networks, folding algorithm, bens network, looping algorithm.

UNIT-V

ATM SIGNALING, ROUTING AND TRAFFIC CONTROL: ATM addressing, UNI signalling, PNNI signalling, PNNI routing, ABR Traffic management.

UNIT-VI

TCP/IP NETWORKS: History of TCP/IP, TCP application and Services, Motivation, TCP, UDP, IP services and Header formats, Internetworking, TCP congestion control, Queue management: Passive & active, QOS in IP networks: differentiated and integrated services.

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TEXT BOOKS:

1. William Stallings, "*ISDN & B-ISDN with Frame Relay*", PHI.
2. Leon Garcia widjaja, "*Communication Networks*", TMH, 2000.

REFERENCES:

1. N. N. Biswas, "*ATM Fundamentals*", Adventure books publishers, 1998.

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	4	-	-	40	60	100	3
ADVANCED DIGITAL COMMUNICATION							

Course Objectives:

- To understand the digital passband transmission and different types of digital modulation techniques.
- To understand and analyze the different channel coding techniques and design considerations of a digital communication system.
- To understand concept of spread spectrum communication system.

Course Outcomes:

Upon completion of this course, the student will be able to

- Analyze the performance of a pass band digital communication system in terms of error rate and spectral efficiency.
- Analyze Performance of various digital modulation techniques.
- Analyze Performance of various channel coding techniques.
- Perform the time and frequency domain analysis of the signals in a digital communication system.
- Select the blocks in a design of digital communication system.
- Analyze Performance of spread spectrum communication system.

UNIT-I

Digital Passband Transmission

Introduction, Pass band Transmission Model, Gram-Schmidt Orthogonalization Procedure, Geometric Interpretation of Signals, Response of Bank of Correlators to Noisy Input, Coherent Detection of Signals in Noise, Probability of Error, Correlation Receiver, Detection of Signals with unknown Phase.

UNIT-II

Digital Modulation Techniques I

Hierarchy of Digital Modulation Techniques, Coherent Binary PSK, Coherent Binary FSK, Coherent Quadriphase-Shift Keying, Coherent Minimum Shift Keying, Noncoherent Orthogonal Modulation, Noncoherent Binary Frequency-Shift Keying.

UNIT-III

Digital Modulation Techniques II

Differential Phase-Shift Keying, Comparison of Binary and Quaternary Modulation Schemes, M-ary Modulation Techniques, Power Spectra, Band-width Efficiency, Synchronization.

UNIT-IV

Channel Coding

Introduction, Discrete Memory less Channels, Linear Block Codes, Cyclic Codes, Convolution Codes, Maximum Likelihood Decoding of Convolution codes, Trellis-Coded Modulation, Coding for Compounded-Error Channels.

UNIT-V

Design Considerations Of A Digital Communication System

Intersymbol Interference, Nyquist's Criterion for Distortionless Baseband Binary Transmission, Correlative-Level Coding, Error Probability Plane, Bandwidth Efficiency Plane, Modulation and

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coding tradeoffs, defining, designing, and evaluating digital communication system. Modulation and coding for band limited channels.

UNIT-VI

Spread Spectrum Techniques

Pseudo noise sequences, Direct sequence Spread Spectrum systems, Frequency hopping systems, Synchronization and Jamming Considerations.

TEXT BOOKS:

1. Simon Haykin, *"Digital communication"*, Third Edition, John Wiley and Sons. (Units I, III & IV)
2. B.Sklar, *"Digital Communications"*, Second Edition, Pearson Education Asia. (Units II & IV)

REFERENCES:

1. J.G. Proakis, "*Digital Communications*", Third Edition, McGraw Hill.

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	4	-	-	40	60	100	3
DATA COMMUNICATION AND NETWORKS							

Course Objectives:

- Introduces computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks.
- It is based around the OSI Reference Model that deals with the major issues in the bottom three (Physical, Data Link and Network) layers of the model.
- Introduces routers, gateways and application services.

Course Outcomes:

Upon completion of this course, the student will be able to

- have a good understanding of the OSI Reference Model and in particular have a good knowledge of Physical, Data Link and Network layers.
- analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
- have a basic knowledge of the data link layer and HDLC and MAC protocols
- Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols.
- have an understanding of the routers and gateways
- have a good understanding of simple mail transfer, file transfer, hypertext transfer protocols and multimedia applications.

UNIT-I

Introduction

Components of network - Topologies - WAN / LAN - OSI - ISO layered Architecture - Modulation and demodulation - Bit error rates - Line coding - Error correcting codes.

UNIT-II

Data Link Layer

Design issues - CRC technique and sliding window techniques - Performance analysis of sliding window techniques - Framing formats - Case Study.

UNIT-III

HDLC protocols - Medium access control - CSMA / CD - Token ring and token bus - FDDI - Wireless LAN - Performance analysis of MAC protocols - Bridges.

Network Layer

Circuit switching - packet switching - Design issues - IP addressing and IP diagram.

UNIT-IV

Routers and Gateways

Routing -Sub netting - CIDR - ICMP - ARP - RARP - IPv6 - QoS.

UNIT-V

Transport Layer TCP And UDP

Error handling and flow control - Congestion control – TCP Retransmission - Timeout - Socket Abstraction.

UNIT-VI:

Application Services

Simple Mail Transfer Protocol (SMTP) - File Transfer Protocols (FTP), telnet, the World Wide Web (WWW).

Hypertext Transfer Protocol (HTTP), Domain name service (DNS), Security, Multimedia applications.

TEXT BOOKS:

1. William Stallings, "*Data and Computer Communications*", Seventh Edition, Prentice Hall, 2003.
2. Larry Peterson, Bruce S Davie, "*Computer Networks: A Systems Approach*", 2nd Edition, Morgan Kaufmann Publishers, 1999.

REFERENCES:

1. James F Kurose, "*Computer Networking: A Top - Down Approach Featuring the Internet*", 2nd Edition 2002, Addison Wesley.
2. W.Richard Stevens and Gary R Wright, "*TCP / IP Illustrated*", Addison Wesley, Volume 1 & 2, 2001.

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	4	-	-	40	60	100	3
EMBEDDED NETWORKING							

Course Objectives:

- To learn embedded communication protocols and ISA/PCI parallel bus protocols and to learn
- USB and CAN bus protocols
- To learn basic of Ethernet and to learn the basics of embedded Ethernet
- To learn the basics of wireless embedded networking

Course Outcomes:

Upon completion of this course, the student will be able to

- Understand different embedded communication protocol
- Understand USB bus
- understand CAN bus
- understand the basic concepts of Ethernet
- understand embedded Ethernet message exchange process
- understand embedded wireless embedded networking

UNIT–I

Embedded Communication Protocols: Embedded Networking: Introduction – Serial/Parallel Communication – Serial communication protocols -RS232 standard – RS485 – Synchronous Serial Protocols -Serial Peripheral Interface (SPI) – Inter Integrated Circuits (I2C) – PC Parallel port programming - ISA/PCI Bus protocols – Firewire.

UNIT–II

USB and CAN BUS: USB bus – Introduction – Speed Identification on the bus – USB States – USB bus communication: Packets –Data flow types –Enumeration –Descriptors –PIC 18 Microcontroller USB Interface – C Programs.

UNIT–III

CAN Bus – Introduction - Frames –Bit stuffing –Types of errors –Nominal Bit Timing – PIC microcontroller CAN Interface –A simple application with CAN.

UNIT–IV

Ethernet Basics: Elements of a network – Inside Ethernet – Building a Network: Hardware options – Cables, Connections and network speed – Design choices: Selecting components – Ethernet Controllers – Using the internet in local and internet communications – Inside the Internet protocol.

UNIT–V

Embedded Ethernet: Exchanging messages using UDP and TCP – Serving web pages with Dynamic Data – Serving web pages that respond to user Input – Email for Embedded Systems – Using FTP – Keeping Devices and Network secure.

UNIT–VI

Wireless Embedded Networking: Wireless sensor networks – Introduction – Applications – Network Topology – Localization –Time Synchronization – Energy efficient MAC protocols – SMAC – Energy efficient and robust routing – Data Centric routing.

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TEXT BOOKS:

1. Frank Vahid, Tony Givargis, "*Embedded Systems Design: A Unified Hardware/Software Introduction*", John & Wiley Publications, 2002
2. Jan Axelson, "*Parallel Port Complete: Programming, interfacing and using the PCs parallel printer port*", Penram Publications, 1996.

REFERENCES:

1. Dogan Ibrahim, "*Advanced PIC microcontroller projects in C: from USB to RTOS with the PIC18F series*", Elsevier 2008.
2. Jan Axelson, "*Embedded Ethernet and Internet Complete*", Penram publications, 2003.
3. Bhaskar Krishnamachari , "*Networking Wireless Sensors*", Cambridge press, 2005.

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I M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	6	40	60	100	3
EMBEDDED SYSTEMS LABORATORY							

Course Objectives:

- Experimenting on ARM-926 with perfect RTOS
- Experimenting on ARM-CORTEX processor using any open source RTOS. (Coo-Cox-Software- Platform)

Course Outcomes:

Upon completion of this course, the student will be able to write programs on

- register a command, create a new task, interrupt handling
- allocate resource using semaphore, share resource using MUTEX
- avoid deadlock using Banker's algorithm, synchronize two identical threads using Monitor program and readers/writers problem for concurrent tasks
- implementation of interfacing of display with the ARM- CORTEX processor
- interface ADC and DAC ports with the Input and Output sensitive devices
- Simulate the temperature DATA Logger with the SERIAL communication with PC
- Implementation of developer board as a modem for data communication using serial port communication between two PCs

✓ The Students are required to write the programs using C-Language according to the Experiment requirements using RTOS Library Functions and macros ARM-926 developer kits and ARM-Cortex.

✓ The following experiments are required to develop the algorithms, flow diagrams, source code and perform the compilation, execution and implement the same using necessary hardware kits for verification. The programs developed for the implementation should be at the level of an embedded system design.

✓ The students are required to perform at least SIX experiments from Part-I and TWO experiments from Part-II.

LIST OF EXPERIMENTS:

Part-I: Experiments using ARM-926 with PERFECT RTOS

1. Register a new command in CLI.
2. Create a new Task.
3. Interrupt handling.
4. Allocate resource using semaphores.
5. Share resource using MUTEX.
6. Avoid deadlock using BANKER'S algorithm.
7. Synchronize two identical threads using MONITOR.
8. Reader's Writer's Problem for concurrent Tasks.

Part-II: Experiments on ARM-CORTEX processor using any open source RTOS. (Coo-Cox-Software- Platform)

1. Implement the interfacing of display with the ARM- CORTEX processor.
2. Interface ADC and DAC ports with the Input and Output sensitive devices.
3. Simulate the temperature DATA Logger with the SERIAL communication with PC.
4. Implement the developer board as a modem for data communication using serial port communication between two PCs.

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LAB REQUIREMENTS:

Software:

(i) Eclipse IDE for C and C++ (YAGARTO Eclipse IDE), Perfect RTOS Library, COO-COX Software Platform, YAGARTO TOOLS, and TFTP SERVER.

(ii) LINUX Environment for the compilation using Eclipse IDE & Java with latest version.

Hardware:

(i) The development kits of ARM-926 Developer Kits and ARM-Cortex Boards.

(ii) Serial Cables, Network Cables and recommended power supply for the board.

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	4	-	-	40	60	100	3
DIGITAL SYSTEM DESIGN							

Course Objectives:

- An ability to implement minimization of switching functions in different methods and implementation of CAMP Algorithm.
- An ability to synthesize logic and state machines using a PLA design and minimization and implementation of state machines using Field-Programmable Gate Arrays, CPLDs etc.
- An ability to design a computer to be fault-tolerant for combinational circuits and sequential circuits.

Course Outcomes:

Upon completion of this course, the student will be able to

- To understand the minimization of switching functions in different methods.
- To understand implementation CAMP Algorithm.
- To understand synthesize logic and state machines using a PLA design and minimization
- To understand state machines using Field-Programmable Gate Arrays.
- To understand design a computer to be fault-tolerant for combinational circuits.
- To understand design a computer to be fault-tolerant for sequential circuits.

UNIT-I

Introduction to Minimization Procedures:

Review on minimization of switching functions using tabular methods, K-map, QM algorithm,

UNIT-II

CAMP Algorithm:

CAMP-I algorithm, Phase-I: Determination of Adjacencies, DA, CSC, SSMs and EPCs,, CAMP-I algorithm, Phase-II: Passport checking, Determination of SPC, CAMP-II algorithm: Determination of solution cube, Cube based operations, determination of selected cubes are wholly within the given switching function or not, Introduction to cube based algorithms.

UNIT-III

PLA Design, Minimization and Folding Algorithms:

Introduction to PLDs, basic configurations and advantages of PLDs, PLA-Introduction, Block diagram of PLA, size of PLA, PLA design aspects, PLA minimization algorithm (IISc algorithm), PLA folding algorithm(COMPACT algorithm)-Illustration of algorithms with suitable examples.

UNIT -IV

Design of Large Scale Digital Systems:

Algorithmic state machine charts-Introduction, Derivation of SM Charts, Realization of SM Chart, control implementation, control unit design, data processor design, ROM design, and PAL design aspects, digital system design approaches using CPLDs, FPGAs and ASICs.

UNIT-V

Fault Diagnosis in Combinational Circuits:

Faults classes and models, fault diagnosis and testing, fault detection test, test generation, testing process, obtaining a minimal complete test set, circuit under test methods- Path sensitization method, Boolean difference method, properties of Boolean differences, Kohavi algorithm, faults in PLAs, DFT schemes, built-in-self-test.

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UNIT-VI

Fault Diagnosis in Sequential Circuits:

Fault detection and location in sequential circuits, circuit test approach, initial state identification, Hamming experiments, synchronizing experiments, machine identification, distinguishing experiment, adaptive distinguishing experiments.

TEXT BOOKS:

1. N. N. Biswas, "*Logic Design Theory*", PHI.
2. Z. Kohavi, "*Switching and Finite Automata Theory*", 2nd Edition, TMH, 2001.
3. Parag K. Lala, "*Digital System Design using PLDs*", PHI, 1984.

REFERENCES:

1. Charles H. Roth, "*Fundamentals of Logic Design*", 5th Ed., Cengage Learning.
2. Miron Abramovici, Melvin A. Breuer and Arthur D. Friedman, " *Digital Systems Testing and Testable Design*", John Wiley & Sons Inc.

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I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
EMBEDDED REAL TIME OPERATING SYSTEMS							

Course Objectives:

- Describe what makes a system a real -time system
- Explain the presence of and describe the characteristics of latency in real-time systems.
- Summarize special concerns that real -time systems present and how these concerns are addressed.

Course Outcomes:

Upon completion of this course, the student will be able to

- Understand and design embedded systems and real-time systems For real time systems.
- Identify the general structure and unique characteristics of real -time systems
- Evaluate the need for real-time operating system. Implement the real-time operating system principles
- Define the unique design problems and challenges of real-time systems
- Apply real-time systems design techniques to various software programs.
- Program an embedded system. Design, implement and test an embedded system.Ex: realtime + embedded : games on a Gameboy or arcade games Ex: realtime: Spore on a laptop

UNIT-I

Introduction: OS Services, Process Management, Timer Functions, Event Functions, Memory Management, Device, File and IO Systems Management, Interrupt Routines in RTOS Environment and Handling of Interrupt Source Calls.

UNIT-II

Real-Time Operating System: Basic Design Using an RTOS, RTOS Task Scheduling Models, Interrupt Latency and Response of the Tasks as Performance Metrics, OS Security Issues.

UNIT-III

RTOS Programming: Basic Functions and Types of RTOS for Embedded Systems, RTOS mCOS-II, RTOS Vx Works, Programming concepts of above RTOS with relevant Examples, Programming concepts of RTOS Windows CE, RTOS OSEK, RTOS Linux 2.6.x and RTOS RT Linux.

UNIT-IV

Program Modeling – Case Studies: Case study of embedded system design and coding for an Automatic Chocolate Vending Machine (ACVM) Using Mucos RTOS, case study of digital camera hardware and software architecture, case study of coding for sending application layer byte streams on a TCP/IP Network Using RTOS Vx Works, Case Study of Embedded System for an Adaptive Cruise Control (ACC) System in Car, Case Study of Embedded System for a Smart Card, Case Study of Embedded System of Mobile Phone Software for Key Inputs.

UNIT-V

Target Image Creation & Programming in Linux: Off-The-Shelf Operating Systems, Operating System Software, Target Image Creation for Window XP Embedded, Porting RTOS on a Micro Controller based Development Board. Overview and programming concepts of Unix/Linux Programming, Shell Programming, System Programming.

UNIT-VI

Programming in RT Linux :Overview of RT Linux, Core RT Linux API, Program to display a message periodically, semaphore management, Mutex, Management, Case Study of Appliance Control by RT Linux System.

TEXT BOOKS:

1. Dr. K.V.K.K. Prasad, "*Embedded/Real-Time Systems*", Dream Tech Publications.
2. Rajkamal, "*Embedded Systems-Architecture, Programming and Design*", Second Edition, Tata McGraw Hill Publications, 2008.

REFERENCES:

1. Labrosse, "*Embedding system building blocks* ", CMP publishers.
2. Rob Williams," *Real time Systems Development*", Butterworth Heinemann Publications.

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I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
DIGITAL DATA COMMUNICATIONS							

Course Objectives:

- Introduce students to the evolution of digital modulation schemes and the concepts data communication.
- Awareness of different error correction codes, data link protocols.
- Introduction of different networks and multiple access techniques.

Course Outcomes:

Upon completion of this course, the student will be able to

- To understand the different digital modulation schemes.
- To understand the different concepts of data communication.
- To understand the different error correction codes.
- To understand the different data link protocols.
- To understand the different networks and multiple access techniques.

UNIT -I

Digital Modulation Schemes:

BPSK, QPSK, 8PSK, 16PSK, 8QAM, 16QAM, DPSK – Methods, Band Width Efficiency, Carrier Recovery, Clock Recovery.

UNIT -II

Basic Concepts of Data Communications, Interfaces and Modems:

Data Communication Networks, Protocols and Standards, UART, USB, I2C, I2S, Line Configuration, Topology, Transmission Modes, Digital Data Transmission, DTE-DCE interface, Categories of Networks – TCP/ IP Protocol suite and Comparison with OSI model.

UNIT -III

Error Correction: Types of Errors, Vertical Redundancy Check (VRC), LRC, CRC, Checksum, Error Correction using Hamming code

UNIT -IV

Data Link Control: Line Discipline, Flow Control, Error Control

Data Link Protocols: Asynchronous Protocols, Synchronous Protocols, Character Oriented Protocols, Bit-Oriented Protocol, Link Access Procedures.

UNIT -V

Multiplexing: Frequency Division Multiplexing (FDM), Time Division Multiplexing (TDM), Multiplexing Application, DSL.

Local Area Networks: Ethernet, Other Ether Networks, Token Bus, Token Ring, FDDI.

Metropolitan Area Networks: IEEE 802.6, SMDS

Switching: Circuit Switching, Packet Switching, Message Switching.

Networking and Interfacing Devices: Repeaters, Bridges, Routers, Gateway, Other Devices.

UNIT -VI

Multiple Access Techniques:

Random Access, Aloha- Carrier Sense Multiple Access (CSMA)- Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA), Controlled Access- Reservation- Polling- Token Passing, Channelization, Frequency Division Multiple Access (FDMA), Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA), OFDM and OFDMA.

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TEXT BOOKS:

1. B. A.Forouzan, "*Data Communication and Computer Networking*", 2nd Ed., TMH, 2003.
2. W. Tomasi, "*Advanced Electronic Communication Systems*", 5th Ed., PEI, 2008.

REFERENCES:

1. Prakash C. Gupta, "*Data Communications and Computer Networks*", PHI, 2006.
2. William Stallings, "*Data and Computer Communications*", 8th Ed., PHI, 2007.
3. T. Housely, "*Data Communication and Tele Processing Systems*", 2nd Ed., BSP, 2008.
4. Brijendra Singh, "*Data Communications and Computer Networks*", 2nd Ed., PHI, 2005.

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I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
WIRELESS COMMUNICATIONS AND NETWORKS							

Course Objectives:

- To understand the concepts of basic cellular system, frequency reuse, channel assignment strategies, handoff strategies, interference.
- To understand the Mobile radio propagation for small scale fading and multipath, large scale path loss.
- To study the different generations of mobile networks, WAN and IEEE 802.11.

Course Outcomes:

Upon completion of this course, the student will be able to

- Able to understand the concepts of spectrum allocation, basic cellular system, frequency reuse, channel assignment strategies, handoff strategies, interference, improving coverage and capacity, cell splitting.
- Able to understand the Mobile radio propagation large scale path loss.
- To understand the different outdoor propagation models.
- To understand Mobile radio propagation for small scale fading and multipath.
- Able to understand the different equalizers and diversity techniques.
- To understand the different wireless networks, development of wireless networks.

UNIT-I

The Cellular Concept-System Design Fundamentals: Introduction, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies- Prioritizing Handoffs, Practical Handoff Considerations, Interference and system capacity – Co channel Interference and system capacity, Channel planning for Wireless Systems, Adjacent Channel interference, Power Control for Reducing interference, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular Systems- Cell Splitting, Sectoring.

UNIT–II

Mobile Radio Propagation: Large-Scale Path Loss: Introduction to Radio Wave Propagation, Free Space Propagation Model, Relating Power to Electric Field, The Three Basic Propagation Mechanisms, Reflection-Reflection from Dielectrics, Brewster Angle, Reflection from prefect conductors, Ground Reflection (Two-Ray) Model, Diffraction- Fresnel Zone Geometry, Knife-edge Diffraction Model, Multiple knife-edge Diffraction, Scattering.

UNIT–III

Outdoor Propagation Models: Longley- Ryce Model, Okumura Model, Hata Model, PCS Extension to HataModel, Walfisch and Bertoni Model, Wideband PCS Microcell Model, Indoor Propagation Models-Partition losses (Same Floor), Partition losses between Floors, Log-distance path loss model, Ericsson Multiple Breakpoint Model, Attenuation Factor Model, Signal penetration into buildings, Ray Tracing and Site Specific Modeling.

UNIT–IV

Mobile Radio Propagation: Small –Scale Fading and Multipath Small Scale Multipath propagation-Factors influencing small scale fading, Doppler shift, Impulse Response Model of a multipath channel-Relationship between Bandwidth and Received power, Small-Scale Multipath Measurements-Direct RF Pulse System, Spread Spectrum Sliding Correlator Channel Sounding, Frequency Domain Channels Sounding, Parameters of Mobile Multipath Channels-Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time, Types of

Small-Scale Fading-Fading effects Due to Multipath Time Delay Spread, Flat fading, Frequency selective fading, Fading effects Due to Doppler Spread-Fast fading, slow fading, Statistical Models for multipath Fading Channels-Clarke's model for flat fading, spectral shape due to Doppler spread in Clarke's model, Simulation of Clarke and Gans Fading Model, Level crossing and fading statistics, Two-ray Rayleigh Fading Model.

UNIT -V

Equalization and Diversity Introduction, Fundamentals of Equalization, Training A Generic Adaptive Equalizer, Equalizers in a communication Receiver, Linear Equalizers, Non-linear Equalization-Decision Feedback Equalization (DFE), Maximum Likelihood Sequence Estimation (MLSE) Equalizer, Algorithms for adaptive equalization-Zero Forcing Algorithm, Least Mean Square Algorithm, Recursive least squares algorithm. Diversity Techniques-Derivation of selection Diversity improvement, Derivation of Maximal Ratio Combining improvement, Practical Space Diversity Consideration-Selection Diversity, Feedback or Scanning Diversity, Maximal Ratio Combining, Equal Gain Combining, Polarization Diversity, Frequency Diversity, Time Diversity, RAKE Receiver.

UNIT -VI

Wireless Networks Introduction to wireless Networks, Advantages and disadvantages of Wireless Local Area Networks, WLAN Topologies, WLAN Standard IEEE 802.11,IEEE 802.11 Medium Access Control, Comparison of IEEE 802.11 a, b, g and n standards, IEEE 802.16and its enhancements, Wireless PANs, Hiper Lan, WLL.

TEXT BOOKS:

1. Theodore, S. Rappaport, "*Wireless Communications, Principles, Practice*", 2nd Ed., PHI, 2002.
2. Andrea Goldsmith, "*Wireless Communications*", Cambridge University Press, 2005.
3. Gottapu Sasibhushana Rao, "*Mobile Cellular Communication*", Pearson Education, 2012.

REFERENCES:

1. Kaveh Pah Laven and P. Krishna Murthy, "*Principles of Wireless Networks*", PE, 2002.
2. Kamilo Feher, "*Wireless Digital Communications* ", PHI, 1999.
3. William Stallings, "*Wireless Communication and Networking*", PHI, 2003.
4. Upen Dalal, "*Wireless Communication*", Oxford Univ. Press.
5. Vijay K. Gary, "*Wireless Communications and Networking*", Elsevier.

I M.TECH-I SEMESTER (ELECTIVE–I)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
TRANSFORM TECHNIQUES							

Course Objectives:

- To study the different Fourier analysis and time frequency analysis techniques.
- To study the different Transform techniques.
- To study the different Multi Rate analysis.

Course Outcomes:

Upon completion of this course, the student will be able to

- To understand the concepts of different Fourier analysis techniques.
- To understand the concepts of different time frequency analysis techniques.
- To understand the different Transform techniques.
- To understand the Continuous Wavelet Transform (CWT).
- To understand the Multi Rate analysis.
- To understand the Wavelet packets and lifting.

UNIT-I

Fourier Analysis: Fourier series, Examples, Fourier Transform, Properties of Fourier Transform, Examples of Fourier transform, sampling theorem, Partial sum and Gibbs phenomenon, Fourier analysis of Discrete time Signals, Discrete Fourier Transform.

UNIT-II

Time – Frequency Analysis: Window function, Short Time Fourier Transform, Discrete Short Time Fourier Transform, Continuous wavelet transform, discrete wavelet transform, wavelet series, Interpretations of the Time-Frequency plot.

UNIT-III

Transforms: Walsh, Hadamard, Haar and Slant Transforms, DCT, DST, KLT, Singular value Decomposition – definition, properties and applications

UNIT-IV

Continuous Wavelet Transform (CWT): Short comings of STFT, Need for wavelets, Wavelet Basis- Concept of Scale and its relation with frequency, Continuous time wavelet Transform Equation- Series Expansion using Wavelets- CWT- Tiling of time scale plane for CWT. Important Wavelets: Haar, Mexican Hat, Meyer, Shannon, Daubechies.

UNIT-V

Multi Rate Analysis and DWT: Need for Scaling function – MultiResolution Analysis, Two-Channel Filter Banks, Perfect Reconstruction Condition, Relationship between Filter Banks and Wavelet Basis, DWT, Structure of DWT Filter Banks, Daubechies Wavelet Function, Applications of DWT.

UNIT-VI

Wavelet Packets and Lifting: Wavelet Packet Transform, Wavelet packet algorithms, Thresholding - Hard thresholding, Soft thresholding, Multidimensional Wavelets, Bi-orthogonal basis- B-Splines, Lifting Scheme of Wavelet Generation, Multi Wavelets

TEXT BOOKS:

1. Raghuveer M.Rao and Ajit S. Bopardikar, "*A Wavelet Tour of Signal Processing theory and applications*", Pearson Edu, Asia, New Delhi,2003.

2. K.P.Soman and K.I Ramachandran, " *Insight into Wavelets – from theory to practice*" PHI, Second edition, 2008

REFERENCES:

1. Jaideva C.Goswami and Andrew K.Chan, "*Fundamentals of Wavelets*", Wiley publishers, 2006
2. Stephen G. Mallat, "*A Wavelet Tour of Signal Processing*", 2 Ed., Academic Press,
3. S.Jayaraman, S.Esakkirajan, T.Veera Kumar, "Digital *Image Processing*", TMH, 2009.

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I M.TECH-I SEMESTER (ELECTIVE–I)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
VLSI TECHNOLOGY AND DESIGN							

Course Objectives:

- To examine the basic building blocks of large-scale digital integrated circuit.
- To introduce about Planar technology, electrical properties of MOS, CMOS and BiCMOS circuits.
- To familiarize with VLSI design steps and chip design methodologies.

Course Outcomes:

Upon completion of this course, the student will be able to

- Understand about IC fabrication technology and various electrical properties of MOS, CMOS and BiCMOS circuits..
- Design various logic circuits using MOS and CMOS transistors..
- Understand chip design methods.
- Synthesize digital circuits using VHDL.
- Design logic circuit layouts for both static CMOS
- Compute the power consumption of a VLSI chip.

UNIT-I

VLSI Technology: Fundamentals and applications, IC production process, semiconductor processes, design rules and process parameters, layout techniques and process parameters.

VLSI Design: Electronic design automation concept, ASIC and FPGA design flows, SOC designs, design technologies: combinational design techniques, sequential design techniques, state machine logic design techniques and design issues.

UNIT-II

CMOS VLSI Design: MOS Technology and fabrication process of pMOS, nMOS, CMOS and BiCMOS technologies, comparison of different processes.

Building Blocks of a VLSI circuit: Computer architecture, memory architectures, communication interfaces, mixed signal interfaces.

UNIT-III

VLSI Design Issues: Design process, design for testability, technology options, power calculations, package selection, clock mechanisms, mixed signal design.

UNIT-IV

Basic electrical properties of MOS and BiCMOS circuits, MOS and BiCMOS circuit design processes, Basic circuit concepts, scaling of MOS circuits-qualitative and quantitative analysis with proper illustrations and necessary derivations of expressions.

UNIT-V

Subsystem Design and Layout: Some architectural issues, switch logic, gate logic, examples of structured design (combinational logic), some clocked sequential circuits, other system considerations.

Subsystem Design Processes: Some general considerations and an illustration of design processes, design of an ALU subsystem.

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UNIT-VI

Floor Planning: Introduction, Floor planning methods, off-chip connections.

Architecture Design: Introduction, Register-Transfer design, high level synthesis, architectures for low power, architecture testing.

Chip Design: Introduction and design methodologies.

TEXT BOOKS:

1. K. Eshraghian, Douglas A. Pucknell, Sholeh Eshraghian, "*Essentials of VLSI Circuits and Systems*", PHI Publications, 2005.
2. Wayne Wolf, "*Modern VLSI Design*", 3rd Ed., Pearson Education, 1997.
3. Dr.K.V.K.K.Prasad, KattulaShyamala, "*VLSI Design*", Kogent Learning Solutions Inc., 2012.

REFERENCES:

1. Randall L.Geiger, Phillip E.Allen, Noel R.Strader, "*VLSI Design Technologies for Analog and Digital Circuits*", TMH Publications, 2010.
2. Ming-BO Lin, "*Introduction to VLSI Systems: A Logic, Circuit and System Perspective*", CRC Press, 2011.
3. N.H.E Weste, K. Eshraghian, "*Principals of CMOS VLSI Design*", 2ndEdition, Addison Wesley.

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I M.TECH-I SEMESTER (ELECTIVE-I)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
ELECTROMAGNETIC INTERFERENCE AND ELECTROMAGNETIC COMPATIBILITY (EMI / EMC)							

Course Objectives:

- To familiarize with the fundamentals that are essential for electronics industry in the field of EMI / EMC.
- To understand EMI sources and its measurements.
- To understand the various techniques for electromagnetic compatibility.

Course Outcomes:

Upon completion of this course, the student will be able to

- Real-world EMC design constraints.
- Make appropriate tradeoffs to achieve the most cost-effective design that meets all requirements.
- Designing electronic systems that function without errors or problems related to electromagnetic compatibility.
- Diagnose and solve basic electromagnetic compatibility problems.
- Design high speed Printed Circuit board with minimum interference.
- Design a EMI free system.

UNIT-I

Introduction, Natural and Nuclear Sources of EMI / EMC:

Electromagnetic environment, History, Concepts, Practical experiences and concerns, frequency spectrum conservations, An overview of EMI / EMC, Natural and Nuclear sources of EMI.

UNIT-II

EMI from Apparatus, Circuits and Open Area Test Sites:

Electromagnetic emissions, Noise from relays and switches, Nonlinearities in circuits, passive intermodulation, Cross talk in transmission lines, Transients in power supply lines, Electromagnetic interference (EMI), Open area test sites and measurements.

UNIT-III:

Radiated and Conducted Interference Measurements and ESD:

Anechoic Chamber, TEM cell, GH TEM Cell, Characterization of conduction currents / voltages, Conducted EM noise on power lines, Conducted EMI from equipment, Immunity to conducted EMI detectors and measurements.

UNIT-IV:

ESD, Grounding, Shielding, Bonding and EMI filters: Principles and types of grounding, Shielding and bonding, Characterization of filters, Power lines filter design. ESD, Electrical fast transients / bursts, Electrical surges.

UNIT-V:

Cables, Connectors, Components

Introduction, EMI suppression cables, EMC connectors, EMC gaskets, Isolation transformers, Opto isolators, Transients and surge suppression devices.

UNIT–VI: EMC Standards - National / International

Introduction, Standards for EMI and EMC, MIL standards, IEEE/ANSI standards, CISPR/IEC standards, FCC regulations, EURO norms, British standards, EMI/EMC standards in Japan, Conclusions

TEXT BOOKS:

1. Dr. V.P. Kodali, "*Engineering Electromagnetic Compatibility*", IEEE Publication, Printed in India by S. Chand & Co. Ltd., New Delhi, 2000.
2. "*Electromagnetic Interference and Compatibility*", IMPACT series, IIT–Delhi, Modules 1– 9.

REFERENCES:

1. C.R. Pal, "Introduction *to Electromagnetic Compatibility*", John Wiley, 1992.

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I M.TECH-I SEMESTER (ELECTIVE-I)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
ADHOC NETWORKS							

Course Objectives:

- To understand the state-of-the-art in network protocols, architectures and applications.
- Analyze existing network protocols and networks.
- Develop new protocols in networking

Course Outcomes:

Upon completion of the course the student will be able to

- Describe the unique issues in ad-hoc/sensor networks.
- Describe current technology trends for the implementation and deployment of wireless Adhoc/sensor networks.
- Discuss the challenges in designing MAC, routing and transport protocols for wireless Adhoc/sensor networks.
- Discuss the challenges in designing routing and transport protocols for wireless Adhoc/sensor networks.
- Comprehend the various sensor network Platforms, tools and applications.
- To understand the different network sensors and applications

UNIT-I

Introduction: Introduction of ad-hoc/sensor networks, Key definitions of adhoc/sensor networks - Advantages of ad-hoc/sensor networks - Unique constraints and challenges Driving Applications. Electromagnetic spectrum-Radio propagation mechanism characteristics of the wireless channel Adhoc Wireless Networks – Heterogeneity in Mobile Devices – Wireless Sensor Networks – Traffic Profiles – Types of Adhoc Mobile Communications – Types of Mobile Host Movements – Challenges Facing Adhoc Mobile Networks – Adhoc Wireless Internet.

UNIT-II

End To End Delivery And Security: Transport layer: Issues in designing- Transport layer classification, adhoc transport Protocols, Security issues in adhoc networks: issues and challenges, network security attacks, secure routing protocols AdHoc wireless networks Introductions to local area networks, wide area networks, MAN, PAN architectures and applications.

UNIT-III

Media Access Control (Mac) Protocols: Media Access Control (MAC) Protocols Introduction- Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks – Classifications of MAC Protocol. MACAW – FAMA – BTMA – DPRMA – Real-Time MAC protocol – Multichannel Protocols – Power Aware MAC.

UNIT-IV

Routing Protocols: Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks – Classifications of Routing Protocols -Table-driven protocols – DSDV – WRP – CGSR – On-Demand protocols – DSR – AODV – TORA – LAR – ABR – Zone Routing Protocol – Power Aware Routing protocols.

UNIT-V

Networking Sensors And Applications: Unique features, Deployment of ad-hoc/sensor network –Sensor tasking and control Transport layer and security protocols.

UNIT-VI

Sensor Network Platforms And Tools: Berkley Motes - Sensor network programming challenges - Embedded Operating System – Simulators, Applications: Applications of Ad-Hoc/Sensor Network and Future Directions. Ultra wide band radio communication- Wireless fidelity systems.

TEXT BOOKS:

1. Karl, Holger, and Andreas Willig. "*Protocols and architectures for wireless sensor networks*", John Wiley & Sons, 2007.
2. C. Siva Ram Murthy and B. S. Manoj, "*Ad Hoc Wireless Networks: Architectures and Protocols*", Prentice Hall, 2004.

REFERENCES:

1. Feng Zhao and Leonidas J. Guibas, "*Wireless Sensor Networks: An Information Processing Approach*" Morgan Kaufmann, 2004.
2. Stefano Basagni, Marco Conti, Silvia Giordano and Ivan Stojmenovic, "*Mobile ad hoc Networking*", Wiley-IEEE press, 2004.
3. Mohammad Ilyas, "*The Handbook of Adhoc Wireless Networks*", CRC Press, 2002.

I M.TECH-I SEMESTER (ELECTIVE-I)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
EMBEDDED C							

Course Objectives:

- To learn the basic concepts of C programming and to learn the basic concepts of 8051 IO Interfacing
- To learn the objective oriented programming with C and to learn the hardware and software delay creations
- To learn with the example case study and to learn the applications of embedded c language

Course Outcomes:

Upon completion of this course, the student will be able to

- Understand the basic c programming
- Understand the basic Embedded C programming
- Understand the 8051 IO Port programming
- Develop small embedded projects

UNIT–I

Programming Embedded Systems in C: Introduction ,What is an embedded system, Which processor should you use, Which programming language should you use, Which operating system should you use, How do you develop embedded software, Conclusions.

UNIT–II

Introducing the 8051 Microcontroller Family: Introduction, What's in a name, The external interface of the Standard 8051, Reset requirements ,Clock frequency and performance, Memory issues, I/O pins, Timers, Interrupts, Serial interface, Power consumption ,Conclusions

UNIT–III

Reading Switches: Introduction, Basic techniques for reading from port pins, Example: Reading and writing bytes, Example: Reading and writing bits (simple version), Example: Reading and writing bits (generic version), the need for pull-up resistors, Dealing with switch bounce, Example: Reading switch inputs (basic code), Example: Counting goats, Conclusions

UNIT–IV

Adding Structure to the Code: Introduction, Object-oriented programming with C, The Project Header (MAIN.H), The Port Header (PORT.H), Example: Restructuring the 'Hello Embedded World' example, Example: Restructuring the goat-counting example, Further examples, Conclusions

UNIT–V

Meeting Real-Time Constraints: Introduction, Creating 'hardware delays' using Timer 0 and Timer 1, Example: Generating a precise 50 ms delay, Example: Creating a portable hardware delay, Why not use Timer 2?, The need for 'timeout' mechanisms, Creating loop timeouts, Example: Testing loop timeouts, Example: A more reliable switch interface, Creating hardware timeouts, Example: Testing a hardware timeout, Conclusions

UNIT–VI

Case Study: Intruder Alarm System: Introduction, The software architecture, Key software Components used in this example, running the program, the software, Conclusions

TEXT BOOKS:

1. Michael J. Pont, "*Embedded C*", Pearson Education.

REFERENCES:

1. Nigel Gardner, *"PIC Micro MCU C - An Introduction to Programming, The Microchip PIC in CCS C"*.

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	4	-	-	40	60	100	3

STATISTICAL SIGNAL PROCESSING

Course Objectives:

- To introduce the basics of random signal processing.
- Concept wise introduction to estimation and prediction theory.
- To know about adaptive filtering and it's applications.
- A brief overview of the processing of speech signals.

Course Outcomes:

Upon completion of this course, the student will be able to

- Well equipped with the concepts of random signal processing
- Prediction and Estimation concepts are well understood
- Aware of adaptive filters and their applications
- Gather basic knowledge about speech signal processing
- Ability to understand Kalman Filter theory and design discrete Kalman filters
- Ability to use computer tools (such as MATLAB) in developing and testing stochastic DSP algorithms

UNIT-I

Signal models and characterization: Types and properties of statistical models for signals and how they relate to signal processing, common second-order methods of characterizing signals including autocorrelation, partial correlation, cross-correlation, power spectral density and cross-power spectral density.

UNIT-II

Spectral estimation: Nonparametric methods for estimation of power spectral density, autocorrelation, cross-correlation, transfer functions, and coherence form finite signal samples.

UNIT-III

Review of signal processing: A review on random processes, A review on filtering random processes, Examples.

Statistical parameter estimation: Maximum likehood estimation, maximum a posterior estimation, Cramer-Rao bound.

UNIT-IV

Eigen structure based frequency estimation: Pisarenko, MUSIC, ESPRIT their application sensor array direction finding.

UNIT-V

Spectrum estimation: Moving average (MA), Auto Regressive (AR), Auto Regressive Moving Average (ARMA), various non-parametric approaches.

UNIT-VI

Wiener filtering: The finite impulse case, causal and non-causal infinite impulse responses cases, Least mean squares adaptation, recursive least squares adaptation, Kalman filtering.

TEXT BOOKS:

1. Steven M. Kay, "*Fundamentals of Statistical Signal Processing: Estimation Theory*", Prentice Hall,1993.
2. Monsoon H. Hayes, "*Statistical digital signal processing and modelling*", Wiley,1996.

REFERENCES:

1. Dimitris G. Manolakis, Vinay K. Ingle, and Stephen M. Kogon, "*Statistical and adaptive signal processing*", Artech House, Inc, 2005

I M.TECH-I SEMESTER (ELECTIVE-II)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
OPTICAL COMMUNICATION TECHNOLOGY							

Course Objectives:

- To learn the basic elements of optical fiber transmission link, fiber modes configurations and structures.
- To learn the various optical source materials, LED structures, quantum efficiency, Laser diodes.
- To learn the fiber optical network components, variety of networking aspects, FDDI, SONET/SDH and operational principles WDM.

Course Outcomes:

Upon completion of this course, the student will be able to

- Ability to design a complete optical fiber communication system, to enable the design of data transmission optical systems.
- Ability to demonstrate an understanding of optical fiber propagation characteristics and transmission properties.
- Capacity to demonstrate an understanding of light sources including the principles of laser action in semiconductors.
- The characteristics of optical transmitters based on semiconductor and external modulation techniques, and the characteristics of optical amplifiers.
- Ability to describe the principles of photodetection and optical receiver sensitivity to the extent of the material presented.
- Ability to demonstrate an understanding of fiber devices and multiple wavelength division multiplexing techniques to the extent of the material presented.

UNIT–I

Signal propagation in Optical Fibers: Geometrical Optics approach and Wave Theory approach, Loss and Bandwidth, Chromatic Dispersion, Non Linear effects- Stimulated Brillouin and Stimulated Raman Scattering, Propagation in a Non-Linear Medium, Self-Phase Modulation and Cross Phase Modulation, Four Wave Mixing, Principle of Solitons.

UNIT–II

Fiber Optic Components for Communication & Networking: Couplers, Isolators and Circulators, Multiplexers, Bragg Gratings, Fabry-Perot Filters, Mach Zender Interferometers, Arrayed Waveguide Grating, Tunable Filters, High Channel Count Multiplexer Architectures, Optical Amplifiers, Direct and External Modulation Transmitters, Pump Sources for Amplifiers, Optical Switches and Wavelength Converters.

UNIT–III

Modulation: Signal formats for Modulation,Subcarrier Modulation and Multiplexing, Optical Modulations – Duobinary, Single Side Band and Multilevel Schemes

UNIT-IV

Demodulation:

Ideal and Practical receivers for Demodulation, Bit Error Rates, Timing Recovery and Equalization, Reed-Solomon Codes for Error Detection and Correction.

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UNIT-V

Transmission System Engineering: System Model, Power Penalty in Transmitter and Receiver, Optical Amplifiers, Crosstalk and Reduction of Crosstalk, Cascaded Filters, Dispersion Limitations and Compensation Techniques.

UNIT–VI

Fiber Non-linearities and System Design Considerations: Limitation in High Speed and WDM Systems due to Non-linearities in Fibers, Wavelength Stabilization against Temperature Variations, Overall System Design considerations – Fiber Dispersion, Modulation, Non-Linear Effects, Wavelengths, All Optical Networks.

TEXT BOOKS:

1. Rajiv Ramaswami and Kumar N. Sivarajan, "*Optical Networks: A Practical Perspective*", 2nd Ed., 2004, Elsevier Morgan Kaufmann Publishers (An Imprint of Elsevier).
2. Gerd Keiser, "*Optical Fiber Communications*", 3rd Ed., McGraw Hill, 2000.

REFERENCES:

1. John. M. Senior, "*Optical Fiber Communications: Principles and Practice*", 2nd Ed., PEI, 2000.
2. Harold Kolimbris, "*Fiber Optics Communication*", 2nd Ed., PEI, 2004.
3. Uyless Black, "*Optical Networks: Third Generation Transport Systems*", 2nd Ed., PEI, 2009
4. Govind Agarwal, "*Optical Fiber Communications* ", 2nd Ed., TMH, 2004.
5. S.C. Gupta, "*Optical Fiber Communications and Its Applications*, PHI, 2004.

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I M.TECH-I SEMESTER (ELECTIVE-II)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
DATA COMPRESSION							

Course Objectives:

- To provide students with contemporary knowledge in Data Compression and Coding.
- To equip students with skills to analyze and evaluate different Data Compression and Coding methods.
- Distinguish between different text, image, video, and audio file formats.

Course Outcomes:

Upon completion of this course, the student will be able to

- Explain the evolution and fundamental concepts of Data Compression and Coding techniques.
- Analyze the operation of a range of commonly used Coding and Compression techniques
- Identify the basic software and hardware tools used for data compression.
- Identify what new trends and what new possibilities of data compression are available.
- Identify different image file formats.
- Analyze the image compression standards.

UNIT–I

Compression - Definition – lossless compression - lossy compression - modeling and coding. compression measure - Shannon's source coding and channel coding theorems – Types of redundancy - transform coding – predictive coding – simple applications.

UNIT–II

Text Compression - Information theory concepts – entropy - Shannon-Fano coding – Huffman coding – arithmetic coding – dictionary-based coding – LZ77 – LZ78 – LZW – BWT – context based coding.

UNIT–III

Audio Compression - Basics of digital audio – audio file formats (WAV, MIDI) - ADPCM in speech coding – vocoders – LPC – CELP – MELP – scalar quantization – vector quantization Linde-Buzo-Gray algorithm - DPCM – MPEG audio compression.

UNIT-IV

Video Compression - Basics of digital video – video file formats (AVI, YUV) – color models in video – motion estimation and compensation - Video compression standards: MPEG-1, MPEG- 2, MPEG-4, H.261, H.263 and H.264/AVC.

UNIT–V

Image Compression - Basics of digital image – image file formats (BMP, GIF, TIFF) – Color models in images.

UNIT–VI

Discrete Fourier Transform – Discrete Cosine Transform – Discrete Wavelet Transform – Sub band coding - EZW – SPIHT – EBCOT - Image compression standards: JBIG, JPEG and JPEG 2000.

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TEXT BOOKS:

1. David Salomon, "*Data Compression: The Complete Reference*", 3rd Edition New Delhi, Springer International Edition, 2005.
2. Khalid Sayood, "*Introduction to Data Compression*", 2nd edition New Delhi, Harcourt India Private Ltd., , 2000.
3. Ze-Nian Li and Mark S. Drew, "*Fundamentals of Multimedia*", Pearson Education, New Delhi, 2004.

REFERENCES:

1. Mark Nelson and Jean-Loup Gailly, "*The Data Compression Book*", 2nd Edition, M&T Books, New York, 1996.
2. K. R. Rao and J. J. Hwang, "*Techniques and standards for image, video and audio coding*", Prentice Hall Inc., New Jersey, 1996.

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I M.TECH-I SEMESTER (ELECTIVE-II)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
RADAR SIGNAL PROCESSING							

Course Objectives:

- To provide operation of radar systems.
- To know different signal processing techniques.
- To provide pulse compression and coding techniques.

Course Outcomes:

Upon completion of this course, the student will be able to

- Describe operation of radar systems and discuss their main design parameters and components.
- Describe signals and waveforms used in radar systems.
- Discuss problems and design challenges in radar signaling and waveforms.
- Use various tools (or simulators) for signal and system level simulations in radar systems
- Discuss various signal processing techniques for various radar operations including MTI, pulse Doppler and SAR radars.
- Use various pulse Coding Techniques.

UNIT-I

Introduction: Radar Block Diagram, Radar Equation, Information Available from Radar Echo. Review of Radar Range Performance– General Radar Range Equation, Radar Detection with Noise Jamming, Beacon and Repeater Equations, Bistatic Radar.

UNIT-II

Matched Filter Receiver

Impulse Response, Frequency Response Characteristic and its Derivation, Matched Filter and Correlation Function, Correlation Detection and Cross-Correlation Receiver, Efficiency of Non-Matched Filters, Matched Filter for Non-White Noise.

UNIT-III

Detection of Radar Signals in Noise: Detection Criteria – Neyman-Pearson Observer, Likelihood-RatioReceiver, Inverse Probability Receiver, Sequential Observer, Detectors – Envelope Detector, Logarithmic Detector, I/Q Detector. Automatic Detection - CFAR Receiver, Cell Averaging CFAR Receiver, CFAR Loss, CFAR Uses in Radar. Radar Signal Management – Schematics, Component Parts, Resources and Constraints.

UNIT-IV

Waveform Selection [3, 2]: Radar Ambiguity Function and Ambiguity Diagram – Principles and Properties; Specific Cases – Ideal Case, Single Pulse of Sine Wave, Periodic Pulse Train, Single Linear FM Pulse, Noise Like Waveforms, Waveform Design Requirements, Optimum Waveforms for Detection in Clutter, Family of Radar Waveforms.

UNIT –V

Pulse Compression in Radar Signals: Introduction, Significance, Types, Linear FM Pulse Compression –Block Diagram, Characteristics, Reduction of Time Side lobes, Stretch Techniques, Generation and Decoding of FM Waveforms – Block Schematic and Characteristics of Passive System, Digital Compression, SAW Pulse Compression.

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UNIT-VI

Phase Coding Techniques: Principles, Binary Phase Coding, Barker Codes, Maximal Length Sequences (MLS/LRS/PN), Block Diagram of a Phase Coded CW Radar, Poly Phase Codes : Frank Codes, Costas Codes, Non-Linear FM Pulse Compression, Doppler Tolerant PC Waveforms – Short Pulse, Linear Period Modulation (LPM/HFM), Sidelobe Reduction for Phase Coded PC Signals.

TEXT BOOKS:

1. M.I. Skolnik, "*Radar Handbook*", 2nd Ed., McGraw Hill, 1991.
2. Fred E. Nathanson, "*Radar Design Principles: Signal Processing and the Environment*", 2nd Ed., PHI, 1999.
3. M.I. Skolnik, "*Introduction to Radar Systems*", 3rd Ed., TMH, 2001.

REFERENCES:

1. Peyton Z. Peebles, Jr., "*Radar Principles*", John Wiley, 2004.
2. R. Nitzberg, "*Radar Signal Processing and Adaptive Systems* ", Artech House, 1999.
3. F.E. Nathanson, "*Radar Design Principles*", 1st Ed., McGraw Hill, 1969.

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I M.TECH-I SEMESTER (ELECTIVE-II)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
SOFTWARE RADIO							

Course Objectives:

- Students able to design principles of software radio and poly phase filters.
- Students able to differentiate direct digital synthesis and analog signal synthesis &Analog to digital and digital to analog conversion.
- Student able to learn about DSP processors and Object oriented programming.

Course Outcomes:

Upon completion of this course, the student will be able to

- Ability to implement radio frequency issues and design software radio.
- Ability to recover timing in digital receivers.
- Ability to generate digital signals.
- Ability to improve data conversion performance.
- Ability to design DSP processors.
- Ability to design software radio.

UNIT-I:

Introduction: The Need for Software Radios, What is Software Radio, Characteristics and benefits of software radio- Design Principles of Software Radio, RF Implementation issues- The Purpose of RF Front – End, Dynamic Range- The Principal Challenge of Receiver Design – RF Receiver Front- End Topologies- Enhanced Flexibility of the RF Chain with Software Radios- Importance of the Components to Overall Performance- Transmitter Architectures and Their Issues- Noise and Distortion in the RF Chain, ADC and DAC Distortion.

UNIT-II:

Multi Rate Signal Processing: Introduction- Sample Rate Conversion Principles- Polyphase Filters-Digital Filter Banks- Timing Recovery in Digital Receivers Using Multirate Digital Filters.

UNIT-III:

Digital Generation of Signals: Introduction- Comparison of Direct Digital Synthesis with Analog Signal Synthesis- Approaches to Direct Digital Synthesis- Analysis of Spurious Signals-Spurious Components due to Periodic jitter- Band Pass Signal Generation- Performance of Direct Digital Synthesis Systems- Hybrid DDS-PLL Systems- Applications of direct Digital Synthesis-Generation of Random Sequences- ROM Compression Techniques.

UNIT-IV:

Analog to Digital and Digital to Analog Conversion: Parameters of ideal data converters-Parameters of Practical data converters- Analog to Digital and Digital to Analog Conversion-Techniques to improve data converter performance- Common ADC and DAC architectures.

UNIT-V:

Digital Hardware Choices: Introduction- Key Hardware Elements- DSP Processors- Field Programmable Gate Arrays- Trade-Offs in Using DSPs, FPGAs, and ASICs- Power Management Issues- Using a Combination of DSPs, FPGAs, and ASICs.

UNIT-VI:

Object – Oriented Representation of Radios and Network Resources: Networks- Object Oriented Programming- Object Brokers- Mobile Application Environments- Joint Tactical Radio System.

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Case Studies in Software Radio Design: Introduction and Historical Perspective, SPEAK easy-JTRS, Wireless Information Transfer System, SDR-3000 Digital Transceiver Subsystem, Spectrum Ware, CHARIOT.

TEXTBOOKS:

1. Jeffrey H. Reed, "*Software Radio: A Modern Approach to Radio Engineering*", PEA Publication, 2002.
2. Walter Tuttle Bee, "*Software Defined Radio: Enabling Technologies*", Wiley Publications, 2002.

REFERENCES:

1. Paul Burns, "*Software Defined Radio for 3G*", Artech House, 2002.
2. Markus Dillinger, Kambiz Madani, Nancy Alonistioti, "*Software Defined Radio: Architectures, Systems and Functions*", Wiley, 2003.
3. Joseph Mitola, "*Software Radio Architecture: Object Oriented Approaches to wireless System Enginering*", 2000, John Wiley & Sons.
4. B.Razavi, "*R.F. Microelectronics*", PHI, 1998.
5. S.K.Mitra," *DSP – A Computer Based Approach*", McGraw-Hill,1998.

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I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	6	40	60	100	3

DESIGN AND SIMULATION LABORATORY

Course Objectives:
- Student able to design logic gates.
- Student able to learn about converters.
- Student able to understand the importance of embedded theory.

Course Outcomes:
Upon completion of this course, the student will be able to
- Ability to design logic gates and ALU.
- Ability to design Finite State Machine logic Circuit.
- Ability to design Combinational circuits like Full Adder.
- Ability to design A to D & D to A converters.
- Ability to create a new task.
- Ability to implement BANKER'S algorithm.

PART-A:
VLSI Lab (Front-end Environment)
• The students are required to design the logic circuit to perform the following experiments using necessary simulator (Xilinx ISE Simulator/Mentor Graphics Questa Simulator) to verify the logical /functional operation and to perform the analysis with appropriate synthesizer (Xilinx ISE Synthesizer/Mentor Graphics Precision RTL) and then verify the implemented logic with different hardware modules/kits (CPLD/FPGA kits).
• The students are required to acquire the knowledge in both the Platforms (Xilinx and Mentor graphics) by perform at least FOUR experiments on each Platform.

LIST OF EXPERIMENTS:
1. Realization of Logic gates.
2. Parity Encoder.
3. Random Counter.
4. Synchronous RAM.
5. ALU.
6. UART Model.
7. Traffic Light Controller using Sequential Logic circuits
8. Finite State Machine (FSM) based logic circuit.

PART-B:
VLSI Lab (Back-end Environment)
• The students are required to design and implement the Layout of the following experiments of any THREE using CMOS 130nm Technology with Mentor Graphics Tool.

LIST OF EXPERIMENTS:
1. Inverter Characteristics.
2. Full Adder.
3. RS-Latch, D-Latch and Clock Divider.
4. Synchronous Counter and Asynchronous Counter.
5. Digital-to-Analog-Converter.
6. Analog-to-Digital Converter.

LAB REQUIREMENTS FOR PART-A AND PART-B:

Software: Xilinx ISE Suite 13.2 Version, Mentor Graphics-Questa Simulator, Mentor Graphics-Precision RTL, Mentor Graphics Back End/Tanner Software tool.

Hardware: Personal Computer with necessary peripherals, configuration and operating System and relevant VLSI (CPLD/FPGA) hardware Kits.

PART-C: Embedded Systems Laboratory

• The Students are required to write the programs using C-Language according to the Experiment requirements using RTOS Library Functions and macros ARM-926 developer kits.

• The following experiments are required to develop the algorithms, flow diagrams, source code and perform the compilation, execution and implement the same using necessary hardware kits for verification. The programs developed for the implementation should be at the level of an embedded system design.

• The students are required to perform at least THREE experiments.

LIST OF EXPERIMENTS: (using ARM-926 with PERFECT RTOS)

1. Register a new command in CLI.
2. Create a new Task.
3. Interrupt handling.
4. Allocate resource using semaphores.
5. Share resource using MUTEX.
6. Avoid deadlock using BANKER'S algorithm.

Lab Requirements for PART-C:

Software:

(i) Eclipse IDE for C and C++ (YAGARTO Eclipse IDE), Perfect RTOS Library

(ii) LINUX Environment for the compilation using Eclipse IDE & Java with latest version.

Hardware:

(i) The development kits of ARM-926 Developer Kits Boards.

(ii) Serial Cables, Network Cables and recommended power supply for the

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I M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
CODING THEORY AND APPLICATIONS							

Course Objectives:

- Student able to differentiate the types of errors and error detection.
- Student able to compute and detect errors in cyclic and convolutional codes.
- Student able to compute Syndrome and iterative algorithms and error correcting codes.

Course Outcomes:

Upon completion of this course, the student will be able to

- Ability to measure average and entropy.
- Ability to implement Design hamming code.
- Ability to compute cyclic hamming codes and shortened cyclic codes.
- Ability to compute conventional codes like encoding of conventional codes.
- Ability to decode single burst error correcting cyclic codes.
- Ability to compute iterative algorithms.

UNIT –I

Coding for Reliable Digital Transmission and Storage: Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information and Entropy, Types of Errors, Error Control Strategies.

UNIT–II

Linear Block Codes: Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. Applications of Block codes for Error control in data storage system

UNIT–III

Cyclic Codes: Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding, Cyclic Hamming Codes, Shortened cyclic codes, Error-trapping decoding for cyclic codes, Majority logic decoding for cyclic codes.

UNIT–IV

Convolutional Codes: Encoding of Convolutional Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding, Applications of Convolutional codes in ARQ system.

UNIT–V

Burst –Error-Correcting Codes: Decoding of Single-Burst error Correcting Cyclic codes, Single-Burst-Error-Correcting Cyclic codes, Burst-Error-Correcting Convolutional Codes, Bounds on Burst Error- Correcting Capability, Interleaved Cyclic and Convolutional Codes, Phased-Burst –Error-Correcting Cyclic and Convolutional codes.

UNIT -VI

BCH – Codes: BCH code- Definition, Minimum distance and BCH Bounds, Decoding Procedure for BCH Codes- Syndrome Computation and Iterative Algorithms, Error Location Polynomials and Numbers for single and double error correction

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TEXT BOOKS:

1. Shu Lin, Daniel J. Costello, Jr. "*Error Control Coding- Fundamentals and Applications*", Prentice Hall, Inc.
2. Man Young Rhee, "Error *Correcting Coding Theory*", McGraw-Hill Publishing, 1989.

REFERENCES:

1. Bernard Sklar, "*Digital Communications-Fundamental and Application*", PE.
2. John G. Proakis, "*Digital Communications*", 5th Ed., TMH, 2008.
3. Salvatore Gravano, "*Introduction to Error Control Codes*", Oxford.
4. Todd K.Moon, "*Error Correction Coding – Mathematical Methods and Algorithms*", Wiley India, 2006.
5. Ranjan Bose, "*Information Theory, Coding and Cryptography*", 2nd Ed., TMH, 2009.

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I M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
DETECTION AND ESTIMATION THEORY							

Course Objectives:

- Student able to understand about discrete linear models and detection problem.
- Student able to understand about importance of LMMSE Estimators and calculation of probability of error.
- Student able to measure non-parametric estimators and Model free estimation.

Course Outcomes:

Upon completion of this course, the student will be able to

- Ability to understand priority of Gaussian processes.
- Ability to calculate probability of errors.
- Ability to understand the importance of minimum probability error with a priori probability.
- Ability to design Kalman filters.
- Ability to test hypotheses and linear regression.
- Ability to estimate ergodicity and autocorrelation function.

UNIT–I

Random Processes

Discrete Linear Models, Markov Sequences and Processes, Processes, and Gaussian Processes.

UNIT–II

Detection Theory

Basic Detection Problem, Maximum A posteriori Decision Rule, Minimum Probability of Error Classifier.

UNIT–III

Detection Methods

Bayes Decision Rule, Multiple-Class Problem (Bayes)- minimum probability error with and without equal apriori probabilities, Neyman-Pearson Classifier, General Calculation of Probability of Error, General Gaussian Problem, Composite Hypotheses.

UNIT–IV

Linear Minimum Mean-Square Error Filtering

Linear Minimum Mean Squared Error Estimators, Nonlinear Minimum Mean Squared Error Estimators. Innovations, Digital Wiener Filters with Stored Data, Real-time Digital Wiener Filters, Kalman Filters.

UNIT –V

Statistics

Measurements, Nonparametric Estimators of Probability Distribution and Density Functions, Point Estimators of Parameters, Measures of the Quality of Estimators, Introduction to Interval Estimates, Distribution of Estimators, Tests of Hypotheses, Simple Linear Regression, Multiple Linear Regression.

UNIT–VI

Estimating the Parameters of Random Processes from Data

Tests for Stationary and Ergodicity, Model-free Estimation, Model based Estimation of Autocorrelation Functions, Power Special Density Functions.

TEXT BOOKS:

1. K. Sam Shanmugan & A.M. Breipohl, "*Random Signals: Detection, Estimation and Data Analysis*", Wiley India Pvt. Ltd, 2011.
2. Lonnie C. Ludeman, "*Random Processes: Filtering, Estimation and Detection*", Wiley India Pvt. Ltd., 2010.

REFERENCES:

1. Steven. M.Kay, "*Fundamentals of Statistical Signal Processing: Volume I Estimation Theory*", Prentice Hall, USA, 1998.
2. Steven.M.Kay, "*Fundamentals of Statistical Signal Processing: Volume I Detection Theory*", Prentice Hall, USA, 1998.
3. Srinath, Rajasekaran, Viswanathan, "*Introduction to Statistical Signal Processing with Applications*", PHI, 2003.
4. Louis L.Scharf, "*Statistical Signal Processing: Detection, Estimation and Time Series Analysis*", Addison Wesley, 1991.
5. Harry L. Van Trees, "*Detection, Estimation and Modulation Theory: Part – I*", John Wiley & Sons, USA, 2001.
6. Mischa Schwartz, Leonard Shaw, "*Signal Processing: Discrete Spectral Analysis – Detection & Estimation*", McGraw Hill, 1975.

I M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
IMAGE AND VIDEO PROCESSING							

Course Objectives:

- Student able to learn about fundamentals of image processing and image enhancement.
- Student able to gain knowledge image segmentation and image compression
- Student able to learn fundamentals about video processing and able to estimate multi-resolution motion.

Course Outcomes:

Upon completion of this course, the student will be able to

- Ability to design Fourier transform and two dimensional Fourier transform.
- Ability to differentiate image restoration techniques.
- Ability to differentiate segmentation techniques.
- Ability to understand importance of JPEG.
- Ability to differentiate analog video and digital video.
- Ability to estimate pixels in video

UNIT–I

Fundamentals of Image Processing and Image Transforms:
Introduction, Image sampling, Quantization, Resolution, Image file formats, Elements of image processing system, Applications of Digital image processing Introduction, Need for transform, image transforms, Fourier transform, 2 D Discrete Fourier transform and its transforms, Importance of phase, Walsh transform, Hadamard transform, Haar transform, slant transform, Discrete cosine transform, KL transform, singular value decomposition, Radon transform, comparison of different image transforms.

UNIT –II

Image Enhancement: Spatial domain methods: Histogram processing, Fundamentals of Spatial filtering, Smoothing spatial filters, Sharpening spatial filters.
Frequency domain methods: Basics of filtering in frequency domain, image smoothing, image sharpening, Selective filtering.
Image Restoration: Introduction to Image restoration, Image degradation, Types of image blur, Classification of image restoration techniques, Image restoration model, Linear and Nonlinear image restoration techniques, Blind deconvolution

UNIT–III

Image Segmentation: Introduction to image segmentation, Point, Line and Edge Detection, Region based segmentation. Classification of segmentation techniques, Region approach to image segmentation, clustering techniques, Image segmentation based on thresholding, Edge Based segmentation, Edge detection and linking, Hough transform, Active contour

UNIT-IV

Image Compression: Introduction, Need for image compression, Redundancy in images, Classification of redundancy in images, image compression scheme, Classification of image compression schemes, Fundamentals of information theory, Run length coding, Shannon–Fano coding, Huffman coding, Arithmetic coding, Predictive coding, Transformed based compression, Image compression standard, Wavelet-based image compression, JPEG Standards.

UNIT-V

Basic Steps of Video Processing: Analog Video, Digital Video. Time- Varying Image Formation models: Three-Dimensional Motion Models, Geometric Image Formation, Photometric Image Formation, Sampling of Video signals, Filtering operations.

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UNIT–VI

2-D Motion Estimation: Optical flow, General Methodologies, Pixel Based Motion Estimation, Block- Matching Algorithm, Mesh based Motion Estimation, Global Motion Estimation, Region based Motion Estimation, Multi resolution motion estimation, Waveform based coding, Block based transform coding, Predictive coding, Application of motion estimation in Video coding.

TEXT BOOKS:

1. Gonzaleze and Woods, "*Digital Image Processing*", 3rd Ed., Pearson.
2. Yao Wang, Joem Ostermann and Ya–quin Zhang, "*Video Processing and Communication*", 1st Ed., PH Int.
3. S. Jayaraman, S. Esakkirajan and T. VeeraKumar, "*Digital Image Processing*, Tata McGraw Hill publishers, 2009.

REFRENCES:

1. Scotte Umbaugh, "*Digital Image Processing and Analysis-Human and Computer Vision Application with CVIP Tools*", 2nd Ed, CRC Press, 2011.
2. M. Tekalp, "*Digital Video Processing* ", Prentice Hall International.
3. John Woods, "*Multidimentional Signal, Image and Video Processing and Coding*", 2nd Ed, Elsevier.
4. Vipula Singh, "*Digital Image Processing with MATLAB and Labview*", Elsevier.
5. Keith Jack, "*Video Demystified – A Hand Book for the Digital Engineer*", 5th Ed., Elsevier.

I M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3

ADVANCED DIGITAL COMMUNICATION

Course Objectives:

- To understand the digital passband transmission and different types of digital modulation techniques.
- To understand and analyze the different channel coding techniques and design considerations of a digital communication system.
- To understand concept of spread spectrum communication system.

Course Outcomes:

After successfully completing the course students will be able to

- Analyze the performance of a pass band digital communication system in terms of error rate and spectral efficiency.
- Analyze Performance of various digital modulation techniques.
- Analyze Performance of various channel coding techniques.
- Perform the time and frequency domain analysis of the signals in a digital communication system.
- Select the blocks in a design of digital communication system.
- Analyze Performance of spread spectrum communication system.

UNIT-I

Digital Passband Transmission

Introduction, Pass band Transmission Model, Gram-Schmidt Orthogonalization Procedure, Geometric Interpretation of Signals, Response of Bank of Correlators to Noisy Input, Coherent Detection of Signals in Noise, Probability of Error, Correlation Receiver, Detection of Signals with unknown Phase.

UNIT-II

Digital Modulation Techniques I

Hierarchy of Digital Modulation Techniques, Coherent Binary PSK, Coherent Binary FSK, Coherent Quadriphase-Shift Keying, Coherent Minimum Shift Keying, Noncoherent Orthogonal Modulation, Noncoherent Binary Frequency-Shift Keying.

UNIT-III

Digital Modulation Techniques Ii

Differential Phase-Shift Keying, Comparison of Binary and Quaternary Modulation Schemes, M-ary Modulation Techniques, Power Spectra, Band-width Efficiency, Synchronization.

UNIT-IV

Channel Coding

Introduction, Discrete Memory less Channels, Linear Block Codes, Cyclic Codes, Convolution Codes, Maximum Likelihood Decoding of Convolution codes, Trellis-Coded Modulation, Coding for Compounded-Error Channels.

UNIT-V

Design Considerations Of A Digital Communication System

Intersymbol Interference, Nyquist's Criterion for Distortionless Baseband Binary Transmission, Correlative-Level Coding, Error Probability Plane, Bandwidth Efficiency Plane, Modulation and coding tradeoffs, defining, designing, and evaluating digital communication system, Modulation and coding for band limited channels.

UNIT-VI

Spread Spectrum Techniques

Pseudo noise sequences, Direct sequence Spread Spectrum systems, Frequency hopping systems, Synchronization and Jamming Considerations.

TEXT BOOKS:

1. Simon Haykin, *"Digital communication"*, Third Edition, John Wiley and Sons. (Units I, III & IV)
2. B.Sklar, *"Digital Communications"*, Second Edition, Pearson Education Asia. (Units II & IV)

REFERENCES:

1. J.G. Proakis, "*Digital Communications*", Third Edition, McGraw Hill.

I M.TECH-II SEMESTER (ELECTIVE-III)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
CMOS ANALOG AND DIGITAL IC DESIGN							

Course Objectives:

- Understand the behavior of MOS Devices and Small-Signal & Large-Signal Modeling of MOS Transistor and Analog Sub-Circuits.
- Understand the design concepts of Combinational and Sequential MOS logic circuits. .
- Understand the concepts of Sub circuits and CMOS Amplifiers like Differential Amplifiers, Cascode Amplifiers, Output Amplifiers, and Operational Amplifiers.

Course Outcomes:

Upon completion of this course, the student will be able to

- Design MOS devices and estimate their Electrical behavior.
- Design Combinational MOS logic circuits.
- Design Sequential MOS logic circuits.
- Use the Dynamic logic circuits and Memories.
- Extend the Analog Circuit Design to Different Applications in Real Time.
- Measure characteristics of CMOS amplifiers.

UNIT-I

MOS Devices and Modeling

The MOS Transistor, Passive Components- Capacitor & Resistor, Integrated circuit Layout, CMOS Device Modeling - Simple MOS Large-Signal Model, Other Model Parameters, Small-Signal Model for the MOS Transistor, Computer Simulation Models, Sub-threshold MOS Model.

MOS Design Pseudo NMOS Logic – Inverter, Inverter threshold voltage, Output high voltage, Output Low voltage, Gain at gate threshold voltage, Transient response, Rise time, Fall time, Pseudo NMOS logic gates, Transistor equivalency, CMOS Inverter logic.

UNIT-II

Combinational MOS Logic Circuits

MOS logic circuits with NMOS loads, Primitive CMOS logic gates – NOR & NAND gate, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates , AOI and OIA gates, CMOS full adder, CMOS transmission gates, Designing with Transmission gates.

UNIT–III

Sequential MOS Logic Circuits

Behaviour of bistable elements, SR Latch, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip-flop.

UNIT–IV

Dynamic Logic Circuits

Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance Dynamic CMOS circuits.

Semiconductor Memories Types, RAM array organization, DRAM – Types, Operation, Leakage currents in DRAM cell and refresh operation, SRAM operation Leakage currents in SRAM cells, Flash Memory-NOR flash and NAND flash.

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UNIT–V

Analog CMOS Sub-Circuits

MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors-Current mirror with Beta Helper, Degeneration, Cascode current Mirror and Wilson Current Mirror, Current and Voltage References, Band gap Reference.

UNIT-VI

CMOS Amplifiers

nverters, Differential Amplifiers, Cascode Amplifiers, Current Amplifiers, Output Amplifiers, High Gain Amplifiers Architectures.

CMOS Operational Amplifiers Design of CMOS Op Amps, Compensation of Op Amps, Design of Two-Stage Op Amps, Power- Supply Rejection Ratio of Two-Stage Op Amps, Cascode Op Amps, Measurement Techniques of OP Amp.

TEXT BOOKS:

1. Ken Martin, "*Digital Integrated Circuit Design*", Oxford University Press, 2011.
2. Sung-Mo Kang, Yusuf Leblebici, "*CMOS Digital Integrated Circuits Analysis and Design*", 3rd Ed., TMH, 2011.
3. Philip E. Allen and Douglas R. Holberg, "*CMOS Analog Circuit Design*", Oxford University Press, International Second Edition/Indian Edition, 2010.
4. Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, "*Analysis and Design of Analog Integrated Circuits*", Fifth Edition, Wiley India, 2010.

REFERENCES:

1. David A. Johns, Ken Martin, "*Analog Integrated Circuit Design*", Wiley Student Edn, 2013.
2. Behzad Razavi, "*Design of Analog CMOS Integrated Circuits*", TMH Edition.
3. Baker, Li and Boyce, "*CMOS: Circuit Design, Layout and Simulation*", PHI.
4. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, *"Digital Integrated Circuits – A Design Perspective"*, 2nd Ed., PHI.

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	4	-	-	40	60	100	3
ADVANCED COMPUTER ARCHITECTURE							

Course Objectives:

- The course focus on computer design, pipelining, RISC instruction set.
- To introduce dynamic scheduling, different ILP software Techniques.
- To understand the concept of memory architecture, interconnection and intel architecture.

Course Outcomes:

Upon completion of this course, the student will be able to

- Know the classes of computers and new trends and developments in computer design.
- Understand pipelining, RISC processor, cache memory performance.
- Understand the various techniques to enhance a processors ability to exploit instruction level parallelism(ILP) and its challenges.
- Understand the architecture of Very large instruction word(VLIW).
- Describe the concept of systematic and distributed shared memory architecture.
- Understand the performance of interconnection network and intel architecture.

UNIT -I

Fundamentals of Computer Design: Fundamentals of Computer design,Changing faces of computing and task of computer designer,Technology trends, Cost price and their trends, Measuring andreporting performance, Quantitative principles of computer design,Amdahl's law.Instruction set principles and examples- Introduction, Classifyinginstruction set- MEmory addressing- type and size of operands,Operations in the instruction set.

UNIT–II

Pipelines: Introduction, Basic RISC instruction set, Simpleimplementation of RISC instruction set, Classic five stage pipe linedRISC processor, Basic performance issues in pipelining, Pipelinehazards, Reducing pipeline branch penalties.

Memory Hierarchy Design: Introduction, Review of ABC of cache,Cache performance, Reducing cache miss penalty, Virtual memory.

UNIT-III

Instruction Level Parallelism the Hardware Approach: Instruction-Level parallelism, Dynamic scheduling, Dynamic scheduling usingTomasulo's approach, Branch prediction, high performance instructiondelivery- hardware based speculation.

UNIT–IV

ILP Software Approach Basic compiler level techniques, Static branchprediction, VLIW approach, Exploiting ILP, Parallelism at compile time,Cross cutting issues -Hardware verses Software.

UNIT –V

Multi Processors and Thread Level Parallelism: Multi Processorsand Thread level Parallelism-Introduction, Characteristics ofapplication domain, Systematic shared memory architecture, Distributedshared – memory architecture, Synchronization.

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UNIT–VI

Inter Connection and Networks: Introduction, Interconnection networkmedia, Practical issues in interconnecting networks, Examples of interconnection, Cluster, Designing of clusters.
Intel Architecture: Intel IA-64 ILP in embedded and mobile markets, Fallacies and pit falls.

TEXT BOOKS:

1. John L. Hennessy, David A. Patterson - Computer Architecture: A Quantitative Approach, 3rd Edition, An Imprint of Elsevier.

REFERENCES:

1. Kai Hwang, Faye A. Brigs., "*Computer Architecture and Parallel Processing*", MC Graw Hill.
2. Dezso Sima, Terence Fountain, Peter Kacsuk , "*Advanced Computer Architecture – A Design Space Approach*", Pearson Ed.

I M.TECH-II SEMESTER (ELECTIVE-III)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
RF CIRCUIT DESIGN							

Course Objectives:

- The course focus on RF behavior of passive components and transmission lines.
- To introduce active components and RF transistor amplifier design.
- To understand the concept of oscillators and RF mixers.

Course Outcomes:

Upon completion of this course, the student will be able to

- Understand the concept of electromagnetic spectrum and microwave bands.
- Understand the transmission line equations and smith chart.
- Understand the various techniques to matching and biasing network.
- Understand the transistor amplifier design.
- Describe the concept of different types oscillators.
- Understand the performance of RF mixers.

UNIT-I

Introduction to RF Electronics: The Electromagnetic Spectrum, units and Physical Constants, Microwave bands – RF behavior of Passive components: Tuned resonant circuits, Vectors, Inductors and Capacitors - Voltage and Current in capacitor circuits – Tuned RF / IF Transformers.

UNIT-II

Transmission Line Analysis: Examples of transmission lines, Transmission line equations and Biasing- Micro Strip Transmission Lines- Special Termination Conditions- sourced and Loaded Transmission Lines. Single And Multiport Networks: The Smith Chart, Interconnectivity networks, Network properties and Applications, Scattering Parameters.

UNIT-III

Matching and Biasing Networks: Impedance matching using discrete components – Micro strip line matching networks, Amplifier classes of Operation and Biasing networks. RF Passive & Active Components: Filter Basics – Lumped filter design – Distributed Filter Design – Diplexer Filters- Crystal and Saw filters- Active Filters - Tunable filters – Power Combiners / Dividers – Directional Couplers – Hybrid Couplers – Isolators. RF Diodes – BJTs- FETs- HEMTs and Models.

UNIT-IV

RF Transistor Amplifier Design: Characteristics of Amplifiers - Amplifier Circuit Configurations, Amplifier Matching Basics, Distortion and noise products, Stability Considerations, Small Signal amplifier design, Power amplifier design, MMIC amplifiers, Broadband High Power multistage amplifiers, Low noise amplifiers, VGA Amplifiers.

UNIT-V

Oscillators: Oscillator basics, Low phase noise oscillator design, High frequency Oscillator configuration, LC Oscillators, VCOs, Crystal Oscillators, PLL Synthesizer, and Direct Digital Synthesizer.

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UNIT-VI

RF Mixers: Basic characteristics of a mixer - Active mixers- Image Reject and Harmonic mixers, Frequency domain considerations.

TEXT BOOKS:

1. Reinhold Ludwing, Pavel Bretchko, "*RF Circuit design: Theory and applications*", Pearson Education Asia Publication, New Delhi 2001.
2. Devendra K. Misra, "*Radio Frequency and Microwave Communication Circuits – Analysis and Design*" , Wiley Student Edition, John Wiley & Sons

REFERENCES:

1. Mathew M.Radmangh, "*Radio frequency and Microwave Electronics*", 2001, PE Asia Publ.
2. Christopher Bowick, Cheryl Aljuni and John Biyler, "*RF Circuit Design*", Elsevier Science, 2008.
3. Joseph Carr, "*Secrets of RF Design*", 3rd Edition, Tab Electronics.
4. Cotter W. Sawyer, "*Complete Wireless Design*", 2nd Edition, Mc-Graw Hill.

I M.TECH-II SEMESTER (ELECTIVE-III)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
NEURAL NETWORKS AND FUZZY LOGIC CONTROL							

Course Objectives:

- To cater the knowledge of Neural Networks and Fuzzy Logic Control and use these for controlling real time systems.
- To introduce fuzzy classical sets, neural network and fuzzy logic applications.
- To introduce adaptive fuzzy systems and neuro fuzzy controller.

Course Outcomes:

Upon completion of this course, the student will be able to

- To expose the students to the concepts of feed forward neural networks.
- To provide adequate knowledge about feedback neural networks.
- To teach about the concept of fuzziness involved in various systems. To provide adequate knowledge about fuzzy set theory.
- To understand fault diagnosis and load forecasting.
- To provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
- To provide adequate knowledge of application of fuzzy logic control to real time systems.

UNIT-I

Architectures

Introduction –Biological neuron-Artificial neuron-Neuron modeling Learning rules-Single layer-Multi layer feed forward network-Backpropagation-Learning factors.

UNIT-II

Neural Networks For Control: Feedback networks-Discrete time hop field networks-Schemes of neuro –control, identification and control of dynamical systems-case studies (Inverted Pendulum, Articulation Control).

UNIT-III

Fuzzy Systems: Classical sets - Fuzzy sets - Fuzzy relations - Fuzzification - Defuzzification - Fuzzy rules.

UNIT-IV

Applications of Neural Networks And Fuzzy Logic

Neural network applications: Process identification, Fraction approximation, Control and Process monitoring, Fault diagnosis and load forecasting.

Fuzzy logic Applications: Fuzzy logic control and Fuzzy classification.

UNIT-V

Fuzzy Logic Control: Membership function – Knowledge base-Decision –making logic – Optimizations of membership function using neural networks Adaptive fuzzy systems-Introduction to generate genetic algorithm.

UNIT-VI

Application of FLC: Fuzzy logic control-Inverted pendulum-Image processing-Home Heating system-Blood pressure during anesthesia-Introduction to neuro fuzzy controller.

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TEXT BOOKS:

1. Kosko, B, "*Neural Networks and Fuzzy Systems: A Dynamical Approach to Machine Intelligence*", Prentice Hall, New Delhi, 2004.
2. Timothy J Ross, "*Fuzzy Logic with Engineering Applications*", John Willey and Sons, West Sussex, England, 2005.

REFERENCES:

1. Jack M. Zurada, "*Introduction to Artificial Neural Systems*", PWS Publishing Co., Boston, 2002.
2. Klir G.J. &Folger T.A., "*Fuzzy sets, Uncertainty and Information*", Prentice –Hall of India Pvt. Ltd., New Delhi, 2008.
3. Zimmerman H.J., "*Fuzzy set theory and its Applications*", Kluwer Academic Publishers Dordrecht, 2001.
4. Driankov, Hellendroonb, "*Introduction to fuzzy control*", Narosa Publishers,2001
5. Laurance Fausett, Englewood cliffs, N.J., "*Fundamentals of Neural Networks*", Pearson Education, New Delhi, 2008.

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I M.TECH-II SEMESTER (ELECTIVE-III)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
VISUAL CRYPTOGRAPHY							

Course Objectives:

- The course focuses on traditional and extended visual cryptography.
- To introduce color visual cryptography and various problems.
- To understand the different applications of visual cryptography.

Course Outcomes:

Upon completion of this course, the student will be able to

- To expose the students to the concepts analysis in frequency domain of visual cryptography.
- To provide adequate knowledge about multiple secret sharing.
- To teach about the concept of image sharing using random masks.
- To understand alignment and flipping issues in VCS.
- To provide comprehensive knowledge of cheating prevention of visual cryptography.
- To provide adequate knowledge of real time applications of visual cryptography.

UNIT-I

Traditional Visual Cryptography

Secret Sharing, Visual Cryptography, Size Invariant Visual Cryptography, Recursive Visual Cryptography, Analysis of Visual Cryptography, Mathematical Background, Analysis in frequency domain.

UNIT-II

Extended Visual Cryptography

Extended Visual Cryptography, Halftone Visual Cryptography, Dot-Size Variant Visual Cryptography, Basic Multiple Secret Sharing, Embedded share of Visual Cryptography in Halftone image.

UNIT-III

Colour Visual Cryptography

Colour Visual Cryptography, Image Sharing using Random Masks, Quality Evaluation.

UNIT-IV

Various Problems in Visual Cryptography

Alignment problems, Flipping issues in VCS, Distortion problems.

UNIT-V

Cheating Prevention of Visual Cryptography

Attacks, 2D Barcode Authentication for Basic VC Shares, Braille for Authentication of Basic VC Shares

UNIT-VI

Applications of Visual Cryptography

Moire patterns, Watermarking, Criteria for Evaluation purposes.

TEXT BOOKS:

1. Jonathan Weir and WeiQi Yan, "*Visual Cryptography and its applications*", ISBN 978-87-403-0126-7, 2012, (Units – I, II, III, VI).
2. Feng Liu, WeiQi Yan, "*Visual Cryptography for Image Processing and Security - Theory, Methods and Applications*", Second Edition, Springer, 2015 (Units – IV, V).

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I M.TECH-II SEMESTER (ELECTIVE-IV)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
DSP PROCESSORS AND ARCHITECTURES							

Course Objectives:

- Gain concepts of digital signal processing techniques, implementation of DSP, FFT and their computational accuracies in DSP implementation.
- Understand the concepts of DSP Processor and its architectures and program a DSP
- processor to filter signals.
- Understand the concepts of various DSP device families & Interfacing of P-DSPs with Memory and peripherals

Course Outcomes:

Upon completion of this course, the student will be able to

- Comprehends the knowledge & concepts of digital signal processing techniques, basic building blocks, implementation of DSP & FFT algorithms
- Estimate their computational accuracies in DSP implementation.
- Design Programmable DSP devices
- Use the DSP processors TMS 320C 54XX for implementation of DSP algorithms & its interfacing techniques with various I/O peripherals.
- Use various Analog Device Family of DSP Devices
- Interface Memory and I/O Peripherals to DSP processors.

UNIT–I

Introduction to Digital Signal Processing: Introduction, A Digital signal-processing system, The sampling process, Discrete time sequences. Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT), Linear time-invariant systems, Digital filters, Decimation and interpolation.

UNIT–II

Computational Accuracy in DSP Implementations: Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations, A/D Conversion errors, DSP Computational errors, D/A Conversion Errors, Compensating filter.

UNIT–III

Architectures for Programmable DSP Devices: Basic Architectural features, DSP Computational Building Blocks, Bus Architecture and Memory, Data Addressing Capabilities, Address Generation UNIT, Programmability and Program Execution, Speed Issues, Features for External interfacing.

UNIT-IV

Programmable Digital Signal Processors: Commercial Digital signal processing devices, Data Addressing modes of TMS320C54XX DSPs, Data Addressing modes of TMS320C54XX Processors, Memory space of TMS320C54XX Processors, Program Control, TMS320C54XX instructions and Programming, On-Chip Peripherals, Interrupts of TMS320C54XX processors, Pipeline operation of TMS320C54XX Processors.

UNIT–V

Analog Devices Family of DSP Devices: Analog Devices Family of DSP Devices – ALU and MAC block diagram, Shifter Instruction, Base Architecture of ADSP 2100, ADSP-2181 high performance Processor. Introduction to Blackfin Processor - The Blackfin Processor, Introduction to Micro Signal Architecture, Overview of Hardware Processing Units and Register files, Address Arithmetic Unit, Control Unit, Bus Architecture and Memory, Basic Peripherals.

UNIT –VI

Interfacing Memory and I/O Peripherals to Programmable DSP Devices:
Memory space organization, External bus interfacing signals, Memory interface, Parallel I/O interface, Programmed I/O, Interrupts and I/O, Direct memory access (DMA).

TEXT BOOKS:

1. Avtar Singh and S. Srinivasan, "*Digital Signal Processing*", Thomson Publications, 2004.
2. K Padmanabhan, R. Vijaya rajeswaran, Ananthi, "*A Practical Approach to Digital Signal Processing*", S, New Age International, 2006/2009
3. Woon- Seng Gan, Sen M. Kuo, "*Embedded Signal Processing with the Micro Signal Architecture* ", Wiley-IEEE Press, 2007

REFERENCES:

1. B.Venkataramani and M. Bhaskar, "*Digital Signal Processors, Architecture, Programming and Applications*", 2002, TMH.
2. Jonatham Stein, "*Digital Signal Processing*", John Wiley, 2005.
3. Lapsley et al., "*DSP Processor Fundamentals, Architectures & Features*", S. Chand & Co, 2000.
4. "*Digital Signal Processing Applications Using the ADSP-2100 Family*", The Applications Engineering Staff of Analog Devices, DSP Division, Edited by Amy Mar, PHI
5. Steven W. Smith, "*The Scientist and Engineer's Guide to Digital Signal Processing*", California Technical Publishing, ISBN 0- 9660176-3-3, 1997
6. David J. Katz and Rick Gentile, "*Embedded Media Processing*", Analog Devices, Newnes, ISBN 0750679123, 2005

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I M.TECH-II SEMESTER (ELECTIVE-IV)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
ADVANCED DIGITAL SIGNAL PROCESSING							

Course Objectives:

- Ability to understand Signal processing at Different rates and its applications.
- Students able to implement Digital filters and able to estimate non-parametric methods.
- Students able to implement filter structures and able to estimate power spectrum of
- parametric methods.

Course Outcomes:

Upon completion of this course, the student will be able to

- Ability to differentiate Decimation and interpolation.
- Ability to Design phase filters.
- Ability to implement Quadrature Mirror filters.
- Ability to Estimate Welch and Blackman-Tukey methods.
- Ability to implementation of structures of IIR filters.
- Ability to Estimate power spectrum of parametric methods like Yule-walker.

UNIT–I

Review of DFT, FFT, IIR Filters and FIR Filters:

Multi Rate Signal Processing: Introduction, Decimation by a factor D, Interpolation by a factor I, Sampling rate conversion by a rational factor I/D, Multistage Implementation of Sampling Rate Conversion, Filter design & Implementation for sampling rate conversion.

UNIT–II

Applications of Multi Rate Signal Processing I:

Design of Phase Shifters, Interfacing of Digital Systems with Different Sampling Rates, Implementation of Narrow Band Low Pass Filters.

UNIT–III

Applications of Multi Rate Signal Processing II:

Implementation of Digital Filter Banks, Sub-band Coding of Speech Signals, Quadrature Mirror Filters, Trans-multiplexers, Over Sampling A/D and D/A Conversion.

UNIT-IV

Non-Parametric Methods of Power Spectral Estimation:

Estimation of spectra from finite duration observation of signals, Non-parametric Methods: Bartlett, Welch & Blackman-Tukey methods, Comparison of all Non-Parametric methods

UNIT–V

Implementation of Digital Filters:

Introduction to filter structures (IIR & FIR), Frequency sampling structures of FIR, Lattice structures, Forward prediction error, Backward prediction error, Reflection coefficients for lattice realization, Implementation of lattice structures for IIR filters, Advantages of lattice structures.

UNIT–VI

Parametric Methods of Power Spectrum Estimation:

Autocorrelation & Its Properties, Relation between auto correlation & model parameters, AR Models - Yule-Walker & Burg Methods, MA & ARMA models for power spectrum estimation, Finite word length effect in IIR digital Filters – Finite word-length effects in FFT algorithms.

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TEXT BOOKS

1. J.G.Proakis and D. G. Manolakis, "*Digital Signal Processing: Principles, Algorithms and Applications*", 4th Ed., PHI.
2. Alan V Oppenheim & R. W Schaffer, "*Discrete Time Signal Processing*", PHI.
3. Emmanuel C. Ifeacher, Barrie. W. Jervis, "*DSP – A Practical Approach*", 2 Ed., Pearson Education.

REFERENCES:

1. S. M .Kay, "*Modern Spectral Estimation: Theory & Application*", PHI, 1988.
2. P.P.Vaidyanathan , "*Multi Rate Systems and Filter Banks*", Pearson Education.
3. S.Salivahanan, A.Vallavaraj, C.Gnanapriya, "*Digital Signal Processing*", TMH, 2000.

I M.TECH-II SEMESTER (ELECTIVE-IV)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
DATA COMMUNICATION AND NETWORKS							

Course Objectives:

- Introduces computer networks and concentrates on building a firm foundation for understanding Data Communications and Computer Networks.
- It is based around the OSI Reference Model that deals with the major issues in the bottom three (Physical, Data Link and Network) layers of the model.
- Introduces routers, gateways and application services.

Course Outcomes:

Upon completion of this course, the student will be able to

- Have a good understanding of the OSI Reference Model and in particular have a good knowledge of Physical, Data Link and Network layers.
- Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies.
- Have a basic knowledge of the data link layer and HDLC and MAC protocols
- Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols.
- Have an understanding of the routers and gateways
- Have a good understanding of simple mail transfer, file transfer, hypertext transfer protocols and multimedia applications.

UNIT-I

Introduction

Components of network - Topologies - WAN / LAN - OSI - ISO layered Architecture - Modulation and demodulation - Bit error rates - Line coding - Error correcting codes.

UNIT-II

Data Link Layer

Design issues - CRC technique and sliding window techniques - Performance analysis of sliding window techniques - Framing formats - Case Study.

UNIT-III

HDLC protocols - Medium access control - CSMA / CD - Token ring and token bus - FDDI - Wireless LAN - Performance analysis of MAC protocols - Bridges.

Network Layer

Circuit switching - packet switching - Design issues - IP addressing and IP diagram.

UNIT-IV

Routers And Gateways

Routing -Sub netting - CIDR - ICMP - ARP - RARP - IPv6 - QoS.

UNIT-V

Transport Layer Tcp And Udp

Error handling and flow control - Congestion control – TCP Retransmission - Timeout - Socket Abstraction.

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UNIT-VI

Application Services

Simple Mail Transfer Protocol (SMTP) - File Transfer Protocols (FTP), telnet, the World Wide Web (WWW).

Hypertext Transfer Protocol (HTTP), Domain name service (DNS), Security, Multimedia applications.

TEXT BOOKS:

1. William Stallings, "*Data and Computer Communications*", Seventh Edition, Prentice Hall, 2003.
2. Larry Peterson, Bruce S Davie, "*Computer Networks: A Systems Approach*", 2nd Edition, Morgan Kaufmann Publishers, 1999.
3. James F Kurose, "*Computer Networking: A Top - Down Approach Featuring the Internet*", 2nd Edition, Addison Wesley, 2002.
4. W.Richard Stevens and Gary R Wright, "*TCP / IP Illustrated*", Addison Wesley, Volume 1 & 2, 2001.

I M.TECH-II SEMESTER (ELECTIVE-IV)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3

ADVANCED OPTIMIZATION TECHNIQUES

Course Objectives:

- Able to understanding of the key concepts, theory, and algorithms of linear optimization, integer optimization, and some modern convex optimization,
- To Learn about Genetic Algorithm and Genetic Programming.
- Describe different optimization techniques.

Course Outcomes:

Upon completion of this course, the student will be able to

- Understand the basic theory and some advanced topics in single variable optimization, variable optimization, and Linear programming.
- Identify the proper optimization technique(s) to attempt when problems are too large or too complicated to solve in a straightforward way.
- Use optimization software and implement solution algorithms involving large-scale optimization techniques..
- To Understand Genetic Algorithm
- To Understand Genetic Programming.
- To Learn different applications of optimization for engineering systems

UNIT– I

Linear programming-Two-phase simplex method, Big-M method, duality, interpretation, applications. Assignment problem- Hungarian's algorithm, Degeneracy, applications, unbalanced problems, traveling salesman problem.

UNIT–II

Classical optimization techniques-Single variable optimization with and without constraints, multi – variable optimization without constraints, multi – variable optimization with constraints – method of Lagrange multipliers, Kuhn-Tucker conditions.

UNIT–III

Numerical methods for Optimization-Nelder Mead's Simplex search method, Gradient of a function, Steepest descent method, Newton's method, types of penalty methods for handling constraints.

UNIT–IV

Genetic algorithm (GA) -Differences and similarities between conventional and evolutionary algorithms, working principle, reproduction, crossover, mutation, termination criteria, different reproduction and crossover operators, GA for constrained optimization, draw backs of GA.

UNIT–V

Genetic Programming (GP)-Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP.

UNIT–VI

Multi-Objective GA-Pareto's analysis, Non-dominated front, multi – objective GA, Nondominated sorted GA, convergence criterion, applications of multi-objective problems . Basic Problem solving using Genetic algorithm, Genetic Programming & Multi Objective GA and simple applications of optimization for engineering systems.

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TEXT BOOKS:

1. JasbirArora, "*Optimal design*", McGraw Hill (International) Publishers.
2. Kalyanmoy Deb, "*Optimization for Engineering Design*", PHI Publishers.
3. S.S.Rao, "*Engineering Optimization*", New Age Publishers.

REFERENCE BOOKS:

1. D.E. Goldberg, "*Genetic algorithms in Search, Optimization, and Machine learning*", Addison Wesley Publishers.
2. Kalyanmoy Deb, "*Multi objective Genetic algorithms*", PHI Publishers.

I M.TECH-II SEMESTER (ELECTIVE-IV)	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
WIRELESS LANS AND PANS							

Course Objectives:

- To learn different Cellular Systems in different generations and to learn different WLAN Topologies and WLAN Technologies.
- To learn Wireless LAN standard IEEE 802.11 and to learn wireless Personal area networks.
- To learn different IEEE 802.15 working Group technologies and Zigbee technology and to learn the differences between Wired and Wireless Networks.

Course Outcomes:

Upon completion of this course, the student will be able to

- Design Cellular Systems for Next generation.
- Design different WLAN topologies and technologies.
- Design different Security methods for Wireless LANs.
- Design different Personal Area Networks.

UNIT–I

Introduction to Wireless System: Introduction, First and Second Generation Cellular Systems, Cellular Communications from 1G to 3G, Wireless 4G systems, The Wireless Spectrum.

UNIT–II

Random Access Protocols: Random Access Methods: Pure ALOHA, Slotted ALOHA, Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple Access with Collision Detection (CSMA/CD), Carrier Sense Multiple Access with Collision Avoidance (CSMA/CA).

UNIT–III

Wireless LANS: Introduction, importance of Wireless LANs, WLAN Topologies, Transmission Techniques: Wired Networks, Wireless Networks, comparison of wired and Wireless LANs; WLAN Technologies: Infrared technology, UHF narrowband technology, Spread Spectrum technology

UNIT–IV

The IEEE 802.11 Standard for Wireless LANS: Network Architecture, Physical layer, The Medium Access Control Layer; MAC Layer issues: Hidden Terminal Problem, Reliability, Collision avoidance, Congestion avoidance, Congestion control, Security, The IEEE 802.11e MAC protocol

UNIT–V

Wireless PANS: Introduction, importance of Wireless PANs, The Bluetooth technology: history and applications, technical overview, the Bluetooth specifications, piconetsynchronization and Bluetooth clocks, Master-Slave Switch; Bluetooth security; Enhancements to Bluetooth: Bluetooth interference issues, Intra and Inter Piconetscheduling, Bridge selection, Traffic Engineering, QoS and Dynamics Slot Assignment, Scatternet formation.

UNIT–VI

The IEEE 802.15 Working Group for WPANS: The IEEE 802.15.3, The IEEE 802.15.4, ZigBee Technology, ZigBee components and network topologies, The IEEE 802.15.4 LR-WPAN Device architecture: Physical Layer, Data Link Layer, The Network Layer, Applications; IEEE 802.15.3a Ultra wideband.

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TEXT BOOKS:

1. Carlos de Morais Cordeiro and Dharma Prakash Agrawal, "*Ad Hoc and Sensor Networks*", World Scientific, 2011.
2. Vijay K.Garg, "*Wireless Communications and Networking*", Morgan Kaufmann Publishers, 2009.

REFERENCE BOOKS:

1. Kaveh Pahlaram, Prashant Krishnamurthy, "*Wireless Networks*", PHI, 2002.
2. Marks Ciampor, Jeorge Olenewa, "*Wireless Communication*", Cengage Learning, 2007.

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I M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	6	40	60	100	3
ADVANCED COMMUNICATIONS LABORATORY							

Course Objectives:

- To obtain the Bit error rate using binary data
- Verify the various transforms on a given image
- To implement the FIR and IIR filter using DSP trainer Kit
- To study the ISDN training system with protocol analyzer

Course Outcomes:

Upon completion of this course, the student will be able to

- obtain the Bit error rate using binary data.
- verify the FIR and IIR filter using DSP trainer Kit.
- study the ISDN training system with protocol analyzer.
- Determined the various losses present in o optical fiber.
- Determined the output of a convolution of encoder and decoder for a given sequence.

Note:

1. Minimum of 10 Experiments have to be conducted

2. All Experiments may be Simulated using MATLAB and to be verified using related training kits.

1. Measurement of Bit Error Rate using Binary Data
2. Verification of minimum distance in Hamming code
3. Determination of output of Convolutional Encoder for a given sequence
4. Determination of output of Convolutional Decoder for a given sequence
5. Efficiency of DS Spread- Spectrum Technique
6. Simulation of Frequency Hopping (FH) system
7. Effect of Sampling and Quantization of Digital Image
8. Verification of Various Transforms (FT / DCT/ Walsh /Hadamard) on a given Image (Finding Transform and Inverse Transform)
9. Point, Line and Edge detection techniques using derivative operators.
10. Implementation of FIR filter using DSP Trainer Kit (C-Code/Assembly code)
11. Implementation of IIR filter using DSP Trainer Kit (C-Code/ Assembly code)
12. Determination of Losses in Optical Fiber
13. Observing the Waveforms at various test points of a mobile phone using Mobile Phone Trainer
14. Study of Direct Sequence Spread Spectrum Modulation & Demodulation using CDMA-DSS BER Trainer
15. Study of ISDN Training System with Protocol Analyzer
16. Characteristics of LASER Diode.

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I B.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	3
C PROGRAMMING							

COURSE OBJECTIVE:

This course is designed to provide a comprehensive study of the C programming language. It stresses the strengths of C, which provide students with the means of writing efficient, maintainable, and portable code. The nature of C language is emphasized in the wide variety of examples and applications. To learn and acquire art of computer programming. To know about some popular programming languages and how to choose.

COURSE OUTCOMES:

After completion of this course, the students would be able to

C01: Describe and Summarize basic programming constructs required to write programs.

C02: Use control structures (if, if/else, switch, while, do/while, for), derived data types (arrays) and user defined data types.

C03: Implement modular programming using functions

C04: Interpret dynamic memory allocation using pointers and Organize data into files.

UNIT I

COMPUTER LANGUAGES: Machine, Symbolic and High-level languages.

BASICS OF C Programming: Structure of a C program, identifiers, data types and sizes. Constants, Variables, Operators, type conversion & casting, Expression evaluation, Program development steps, Creating and Running Programs.

UNIT II

SELECTION: If-else, nested if, Multi-way selection: switch.

ITERATIVE: Loops-while, do-while and for statements, break, continue, Looping applications: Summation, powers, smallest and largest.

ARRAYS: Arrays- concepts, declaration, definition, accessing elements, storing elements,1-D arrays, 2-D arrays & multidimensional arrays, array applications, Strings and Strings functions.

UNIT III

FUNCTIONS- MODULAR PROGRAMMINGS: functions, basics, categories, parameter passing, storage classes, user defined functions, standard library functions, recursive functions, header files, C Preprocessor directives, Passing arrays to functions.

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UNIT IV

POINTERS: Pointers- concepts, initialization of pointer variables, pointers and function arguments, passing by address- dangling memory, address arithmetic, character pointers and functions, pointers to pointers and arrays, dynamic memory management functions, command line arguments.

UNIT V

ENUMERATED, STRUCTURE AND UNION TYPES: Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, unions, typedef, bit-fields.

UNIT VI

FILE HANDLING: Text files and binary files, Formatted I/O, File I/O operations, random files.

TEXT BOOKS:

1. Programming in C, Reema Thareja, OXFORD .
2. The C programming Language by Dennis Richie and Brian Kernighan 2nd ed..

REFERENCE BOOKS:

1. Programming in ANSI C, Dr.E.Balaguruswamy, Tata McGraw-Hill Education.

2. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PEARSON.

3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.

4. Programming in C, Second Edition by Ashok N.Kamthane, Pearson.

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	-	-	3	25	50	75	2
C PROGRAMMING LAB							

COURSE OBJECTIVE:

The purpose of this course is to introduce to students to the field of language. The students will be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.

COURSE OUTCOMES:

After completion of this C Programming Lab, students should be able to:

CO1: Study, analyse and understand logical structure of computer programming and different constructs to develop programs in C Language.

CO2: Know how to write, compile and debug programs in C Language.

CO3: Understand and analyse data types, typecasting and operator precedence.

CO4: Analyse the use of conditional and looping statements to solve problems associated with conditions and repetitions.

CO5: Explain and analyse simple data structures, use of pointers and dynamic memory allocation techniques.

CO6: Summarize the role of functions involving the idea of modularity, know how to create files and apply file I/O operations.

Exercise 1

a) Write a C Program to calculate the area of triangle using the formula Area = (s (s-a) (s-b) (s-c)) 1/2 where s= (a+b+c)/2.

b) Write a C Program to find the largest of three numbers using ternary operator.

c) Write a C Program to swap two numbers without using a temporary variable.

Exercise 2

a) Write a C program to find the roots of a quadratic equation.

b) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement).

Exercise 3

a) Write a C program to find the sum of individual digits of a positive integer and find the reverse of the given number.

b) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.

Exercise 4

a) Write a C Program to print the multiplication table of a given number n up to a given value, where n is entered by the user.

b) Write a C Program to enter a decimal number, and calculate and display the binary equivalent of that number.

c) Write a C Program to check whether the given number is Armstrong number or not.

Exercise 5

a) Write a C program to interchange the largest and smallest numbers in the array.

b) Write a C program to input two m x n matrices, check the compatibility and perform addition and multiplication of them.

Exercise 6

a) Write a C Program to find both the largest and smallest number of an array of integers

b) Write a C Program to find transpose of a matrix.

Exercise 7

Write C programs that use both recursive and non-recursive functions for the following

i) To find the factorial of a given integer.

ii) To find the GCD (greatest common divisor) of two given integers.

Exercise 8

Write a C Program for the following.

i) To find Fibonacci sequence

ii) Write C programs illustrating call by value and call by reference concepts.

Exercise 9

Write C Programs for the following string operations without using the built in functions - to concatenate two strings

a) To append a string to another string
b) To compare two strings

Exercise 10

Write C Programs for the following string operations without using the built in functions

a) To find the length of a string
b) To find whether a given string is palindrome or not

Exercise 11

Write a C program that uses functions to perform the following operations:

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i. To insert a sub-string in to given main string from a given position.

ii. To delete n Characters from a given position in a given string.

iii. To replace a character of string either from beginning or ending or at a specified location

Exercise 12

a) Write a C Program to Implement Taylor series method

b) Write a C Program to Implement Euler's method

c) Write a C Program to Implement Runge Kutta method

Exercise 13

a) Write a C program to implement a linear search.

b) Write a C program to implement binary search

c) Write a C program to implement sorting of an array of elements.

Exercise 14

a) Write C Program to reverse a string using pointers

b) Write a C Program to compare two arrays using pointers

c) Write a C program to swap two numbers using pointers

Exercise 15

Examples which explores the use of structures, union and other user defined variables

Exercise 16

a) Write a C program which copies one file to another.

b) Write a C program to count the number of characters and number of lines in a file.

c) Write a C Program to merge two files into a third file. The names of the files must be entered using command line arguments.

*** At the end of the semester the student has to submit a Mini-Project on Computer Programming. The list of Mini-Projects is available in the department.**

TEXT BOOKS:

1. Programming in C, Reema Thareja, OXFORD .
2. The C programming Language by Dennis Richie and Brian Kernighan 2nd ed..

REFERENCE BOOKS:

1. Programming in ANSI C, Dr.E.Balaguruswamy, Tata McGraw-Hill Education.

2. Problem Solving and Program Design in C, Hanly, Koffman, 7th ed, PEARSON.

3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE.

4. Programming in C, Second Edition by Ashok N.Kamthane, Pearson.

I B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2
BASIC COMMUNICSTION SKILLS LAB (Common to All Branches)							

COURSE OBJECTIVES:

- To build confidence in the students to communicate effectively in English.
- To strengthen the oral communication to enable them to interact with the people in various social situations.
- To enable the learners develop better pronunciation through emphasis on word accent, intonation and Rhythm

COURSE OUTCOMES:

Learners should be able to

CO1 : Improve their basic communication skills to interact with peers and others in various social situations

CO2 : Speak English effortlessly with good pronunciation

CO3 : Take part in various conversations/discourses using the formal and informal expressions they have learned.

Unit-1

a. Greeting, Introducing and Taking leave
b. Pure Vowels

Unit-2

a. Giving information and Asking for information
b. Diphthongs

Unit-3

a. Inviting, Accepting and Declining Invitations
b. Consonants

Unit-4

a. Commands, Instructions and Requests
b. Accent and Rhythm

Unit-5

a. Suggestions and Opinions
b. Intonation

Text Book:

Strengthen Your Communication Skills – Maruthi Publications, 2013

Reference Books:

1. *Personality Development and Soft Skills* (Oxford University Press, New Delhi)
2. J.D.O Conner, *Better English Pronunciation*, Cambridge University Press 1980
3. T.Balasubramanian, *A Text Book of English Phonetics for Indian Students*, Macmillan, 1981
4. Sanjay Kumar, Pusph Latha, *Communication skills,* Oxford University Press 2005

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	2	-	4	40	60	100	4
ENGINEERING GRAPHICS (Common to CSE, ECE & EEE)							

Course objectives:

The course is mainly intended to

- Impart basic knowledge and skills required to prepare engineering drawing which is an universal language of engineers for communication, designing and production
- Get enhanced imagination capacity, visualize and communicate geometrical elements
- Understand the fundamentals of geometry like engineering curves, planes, solids, sections, developments & isometric views and its applications in design and manufacturing of various engineering components

Course Outcomes:

At the end of this course student will acquire ability to

- Apply principles of drawing to represent dimensions of an object and use the different types of scales for drawing of various sizes of engineering curves
- Draw various polygons and Ellipse
- Draw Orthographic projections in 1st and 3rd angle projections
- Draw different orientations of points, lines, planes and solids with reference to principal planes.
- Draw orthographic views (2D) from the given isometric view (3D) and vice versa

UNIT-I

Introduction to engineering drawing: Importance, Drawing Instruments and their uses. Basics of Geometric construction.

Polygons: Construct the regular polygons using given length of a side, inscription of polygons and circumscription of polygons.

Ellipse- Arcs of circles Method and Oblong Method

Scales: Representation fraction-Construction of plain, diagonal and vernier scale.

UNIT-II

Orthographic projections: Principle of orthographic projections, first and third angle projections, projections of points.

Projection of Straight lines: parallel to both the planes, parallel to one plane and inclined to the other plane.

UNIT-III

Projection of Straight lines inclined to both the planes, determination of true length, angles of inclination and Traces.

UNIT-IV

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

UNIT-V

Projections of solids-prisms, pyramids, cones and cylinders with the axis inclined to one of the planes

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UNIT-VI

Conversion of isometric views to orthographic views; Conversion orthographic views to isometric views

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers.
3. Engineering Graphics by PI Varghese, McGrawHill Publishers

REFERENCE BOOKS:

1. Engineering Graphics for Degree by K.C. John, PHI Publishers
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

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I B.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
INTRODUCTION TO COMPUTERS AND PROBLEM SOLVING							

COURSE OBJECTIVE:

The course provides knowledge on the basic computer architecture and problem solving techniques.

COURSE OUTCOMES:

After completion of this course, the students should be able to

C01: Explain the working of key components of a computer system, evaluation of computers and the working of various input-output devices.

C02: Find the working of the processor and the memory devices.

C03: Summarize the representation of numbers, alphabets and other character codes in computer system.

C04: Study the problem solving strategies and analyzing the algorithms and flow charts.

UNIT I

Introduction to Computers: What is a Computer? Characteristics of Computers, Generations of Computers, Classification of Computers, Basic Computer Organization, Applications of Computers.

Input and Output Devices: Input Devices, Output Devices.

UNIT II

Computer Memory and Processors: Introduction, Memory Hierarchy, Processor Registers, Cache Memory, Primary Memory, Secondary Storage Devices, Basic Processor Architecture.

UNIT III

Number Systems and Computer Codes: Binary Number System, Working with Binary Numbers, Octal Number System, Hexadecimal Number System, Working with Fractions, Signed Number Representation in Binary BCD Code, ASCII Code, Extended Binary Coded Decimal Interchange Code, Excess-3 Code, Gray Code, Unicode.

UNIT IV

Introduction to Computer Problem-Solving: Introduction, The Problem-Solving Aspect, Top-down Design, Implementation of Algorithms, Flow Charts, Programs Verification, The Efficiency of Algorithms, the Analysis of Algorithms.

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UNIT V

Fundamental Algorithms: Introduction. Exchanging the Values of Two Variables. Counting. Summation of a Set of Numbers. Factorial Computation. sine Function Computation. Generation of the Fibonacci sequence. Reversing the Digits of an Integer. Base Conversion. Character to Number Conversion.

UNIT VI

Factoring Methods: Introduction, Finding the Square Root of a Number, The Smallest Divisor of an Integer, The Greatest Common Divisor of Two Integers, Generating Prime Numbers, Computing the prime Factors of an Integer.

Arrays: Introduction, Array Order Reversal, Array Counting or Histogramming, Finding the Maximum Number in a set, searching an element in an array.

TEXT BOOKS:

1. Fundamentals of Computers, Reema Thareja, Oxford .

2. How to solve it by Computer, R.G. Dromey, PHI .

REFERENCE BOOKS:

1. How to Design Programs, Matthias Fellesen, Robert Bruce Findler, Matthew Flatt, Shriram Krishnamurthi, PHI .

2. Think like a Programmer, V.Anton Spraul, No Starch Press.

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I B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
FUNCTIONAL ENGLISH (Common to All Branches)							

COURSE OBJECTIVES:

- To enable the engineering students develop their basic communication skills in English for academic and social purposes.
- To equip the students with appropriate oral and written communication skills.
- To inculcate the skills of listening, reading and critical thinking.
- To integrate English Language learning with employability skills and training.
- To enhance the students' proficiency in reading skills enabling them meet the academic demands of their course

COURSE OUTCOMES:

Learners are able to

CO1 : Speak clearly, effortlessly, confidently and appropriately.

CO2 : Write coherently with acceptable accuracy, organizing ideas logically.

CO3 : Listen and read to comprehend different discourses and different genres of texts.

CO4 : The learner will be able to read and infer, analyze, predict, interpret and draw conclusions any printed text.

Teaching Methodology:

The methodology of teaching will be chalk and talk, PPT, audio-visual and activity based

UNIT-I

Hours of Instruction per unit: 8

HUMOUR: An Astrologer's Day

Objective: To criticize the superstitious beliefs of the people in the contemporary society. To make the learners understand that an astrologer is not trustworthy as he deceives the people by bewitching them in order to get some money. So we should not believe anyone by means of outward appearance.

Outcome: To students will develop rational thinking instead of believing blindly everything without reason.

a. Vocabulary : Prefixes, Suffixes (www.englishhints.com, www.enchantedlearning.com, www.learnenglish.de/grammar/prefixtext.html)

b. Grammar : Nouns, Pronouns, Articles

c. Writing : Sentences structures

UNIT-II

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Hours of Instruction per unit: 8

INSPIRATION: Building a New State

Objective: To make the students know the value of natural resources that are abundantly available in our country.

Outcome: Learner will understand the importance of the natural resources that are valuable in nature in order to develop our nation.

a. Vocabulary : Homophones, Homographs, Homonyms Synonyms & Antonyms and Commonly confused words (http://www.magickeys.com/books/riddles/words.html)
b. Grammar : Finite verbs, Non-finite verbs & question tags
c. Listening : Main points & sub-points
d. Writing : Paragraphs, Note making, Expansion of Proverbs

UNIT-III

Hours of Instruction per unit: 8

SUSTAINABLE DEVELOPMENT: Water: The Elixir of Life

Objective: To inform the learner how precious the water is, as well as the advantages and the characteristics of water.

Outcome: The learner will understand that water is the elixir of life and it should not be wasted but should be utilized in a proper way.

a. Vocabulary : One Word Substitutes, (http://www.pinnacle.edu.in/campusfiles/1826_campusFile_1.pdf)
b. Grammar : Tenses
c. Listening : Listening for the theme and gist
d. Writing : Official letters, Curricula vitae, Covering Letters

UNIT-IV

Hours of Instruction per unit: 8

RELATIONSHIPS: The Wood rose

Objective: To enlighten the learner the value of human relationships as we are social animals and the need to maintain good relationship with elders and senior citizens.

Outcome: The learner will come to know that the old people are not to be ignored but it is the duty of the children to consider the wishes, feelings, emotions, ideas and thoughts of the older generation.

a. Vocabulary : Phrasal verbs & idioms
b. Grammar : Subject verb agreement, Active and Passive voice, Prepositions
c. Listening : Listening for specific detail and information.
d. Writing : Official reports (Fundamentals of technical communication Pg No. 119-153)

UNIT-V

Hours of Instruction per unit: 8

SCIENCE AND HUMANISIM: Progress

Objective: to enable the learner grasp the negative aspect of scientific inventions which are responsible for the anti social activities of the present day.

Outcome: understand that Science and Technology is a double edged knife and must be used with discrimination

a. Vocabulary : collocations, Technical vocabulary, common errors in vocabulary
b. Grammar : conditional sentences, conjunctions, common errors in grammar
c. Listening : Listening for opinions and attitude.
d. Writing : Events and essays

UNIT-VI

Hours of Instruction per unit: 8

READING

Objective: To understand types and sub-skills of reading and apply techniques to improve reading speed.

Outcome: demonstrate reading speed and comprehend the gist of passage.

Intensive reading, Extensive reading, predicting the content, skimming, scanning, Inferring meanings: lexical and contextual.

TEXTBOOK:

1. Using English – Orient Black Swan Pvt.Ltd.Publishers

Reference Books:

2. Meenakshi raman, Sangeeta, Sharma *Fundamentals of technical communication*, Pg: 119-153 Oxford University Press, 2015
3. Rutherford, Andrea. J, *Basic Communication Skills for Technology*. Pearson, New Delhi. 2001
4. Raymond Murphy, *Murphy's English Grammar,* Cambridge University Press 2004
5. Meenakshi Raman, Sangeeta Sharma, *Technical Communication: English Skills for Engineers*, Oxford University Press, 2009
6. Michael Swan, *Practical English Usage,* Oxford University Press, 1996

Online Sources:

1. www.englishhints.com, www.enchantedlearning.com,
2. www.learnenglish.de/grammar/prefixtext.html
3. http://www.magickeys.com/books/riddles/words.html

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I B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2

ENHANCING COMMUNICATION SKILLS LAB
(Common to All Braches)

1. To train the students to use language effectively in professional situations like group discussions, public speaking, presentations and interviews.
2. To make the students understand the importance of body language.
3. To develop positive attitude and soft skills to improve their employability quotient.
4. To expose the students to variety of a self-instructional, learner friendly, electronic media and stimulate intellectual faculties/resources

Course Outcomes:

Learners are able to

1. Give presentations and attend job interviews confidently.
2. Speak confidently in challenging situations.
3. Know the importance of Non-verbal communication and interpret nonverbal symbols
4. Face computer based competitive exams like GRE, TOFEL, and IELTS.

5. **Unit-1:** Body Language
6. **Unit-2:** Dialogues
7. **Unit-3:** Presentation Skills
8. **Unit-4:** Group Discussion
9. **Unit-5:** Interviews and Telephonic Interviews
10. **Unit-6:** Debates

Text Book:

Strengthen your Communication Skills by Maruthi Publications, 2013

Reference Books:

1. *Personality Development and Soft Skills* (Oxford University Press, New Delhi)

2. M Ashraf Rizvi, *Effective Technical Communication skills*, McGraw-Hill, 2005

3. Barun K Mitra, *Personality Development and Soft Skills,* Oxford University Press, 2011

4. Konar N, *Communication Skills for Professionals,* PHI Learning Private Limited, 2011

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II Year – I SEMESTER

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OBJECT-ORIENTED PROGRAMMING THROUGH C++

Objectives: Expertise in object oriented principles and their implementation in C++

UNIT I :

Objectives: Exposure to basics of object oriented mode, C++ programming and I/O in C++

INTRODUCTION: Differences Between C And C++, The Object Oriented Technology . Disadvantage of Conventional Programming, Concepts of Object Oriented Programming, Advantages of OOP Structure of A C++ Program, Header Files And Libraries

INPUT AND OUTPUT IN C++ :

Introduction, Streams In C++ And Stream Classes, Pre-Defined Streams, Stream Classes, Formatted And Unformatted Data,Unformatted Console I/O Operations, Member Functions Of Istream Class, Formatted Console I/O Operations, Bit Fields, Flags Without Bit Field, Manipulators, User Defined Manipulators

UNIT II :

Objectives: Focus on Basic concept in C++ programming, Operators, control structures , functions, overloading, recursion

Tokens In C++, Variable Declaration And Initialization, Data Types, Operators In C And C++, Scope Access Operator, Namespace, Memory Management Operators, Comma Operator, Revision Of Decision Statements, Control Loop Statements

FUNCTIONS IN C++ : Introduction, Structure Of Function, Passing Arguments, Lvalues And Rvalues, Retrun By Reference, Returning More Values By Reference, Default Arguments, Const Arguments, Inputting Default Arguments, Inline Functions, Function Overloading, Principles Of Function Overloading, Recursion

UNIT III :

Objectives: Acquaintance with classes, objects and member functions

CLASSES AND OBJECTS : Introduction, Classes In C++, Declaring Objects, Access Specifiers And Their Scope, Member Functions, Outside Member Function As Inline, Data Hiding or Encapsulation, Classes, Objects and Memory, Static Member Variables, Static Member Functions Static Object, Array Of Objects, Objects As Function Arguments, Friend Functions, The Const Member Functions, The Volatile Member Function, Recursive Member Function, Local Classes, Empty, Static And Const Classes, Member Function and Non- Member Function, Overloading Member Functions, Nested Class

UNIT IV :

Objectives: Focus on constructors , destructors, variants in them, operator overloading, type conversions

CONSTRUCTORS AND DESTRUCTORS : Introduction, Characteristic Of Constructors & Destructors, Applications With Constructors, Parameterized Constructor, Overloading Constructors (Multiple Constructors), Array Of Objects Using Constructors, Constructors With Default Arguments, Copy Constructors, The Const Objects, Destructors, Calling Constructors And Destructors, Qualifier And Nested Classes, Anonymous Objects, Private Constructors And Destructors, Dynamic Initialization Using Constructors, Dynamic Operators and Constructors, Recursive Constructor, Constructor and Destructor With Static Members, Local Vs. Global Object

OPERATOR OVERLOADING AND TYPE CONVERSION : Introduction, Overloading Unary Operators, Constraint on Increment And Decrement Operators, Overloading Binary Operators, Overloading With Friend Function, Overloading Assignment Operator (=), Type Conversion, Rules For Overloading Operators, One Argument Constructor And Operator Function, Overloading Stream Operators

UNIT V :

Objective: Concentration on inheritance, types of inheritance, polymorphism, virtual functions

INHERITANCE : Introduction, Reusability, Access Specifiers And Simple Inheritance, Protected Data With Private Inheritance, Types Of Inheritances(Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Multipath Inheritance), Virtual Base Classes, Constructors, Destructors, And Inheritance, Object As A Class Member, Abstract Classes, Qualifier Classes And Inheritance, Constructor In Derived Class, Pointers And Inheritance, Overloading Member Function, Advantages Of Inheritance, Disadvantages Of Inheritance.

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BINDING, POLYMORPHISM AND VIRTUAL FUNCTIONS: Introduction. Binding In C++. Static (Early) Binding. Dynamic (Late) Binding. Pointer To Base And Derived Class Objects. Virtual Functions. Rules For Virtual Functions. Array Of Pointers. Pure Virtual Functions. Abstract Classes. Working Of Virtual Functions. Virtual Functions In Derived Classes. Object Slicing. Constructors And Virtual Functions. Virtual Destructors. Destructor And Virtual Functions.

UNIT VI :

Objectives: Focus on Files, File operations, generic programming, templates, function templates, Exception handling

APPLICATIONS WITH FILES: Introduction. File Stream Classes. File Opening Modes. File Pointers And Manipulators. Manipulators With Arguments. Sequential Access Files. Binary And ASCII Filesrandom Access Operation,

GENERIC PROGRAMMING WITH TEMPLATES : Introduction, Need Of Template, Definition Of Class Template, Normal Function Template, Working Of Function Templates, Class Template With More Parameters, Functions Templates With More Arguments, Overloading Of Template Functions, Member Function Templates,Recursion With Template Function, Class Template With Overloaded Operators, Class Template Revisited, Class Templates And Inheritance, Container Classes , Types Of Containers, Container Adaptors, Iterators

EXCEPTION HANDLING : Introduction, Principles Of Exception Handling,The Keywords Try, Throw And Catch , Exception Handling Mechanism, Multiple Catch Statements, Catching Multiple Exceptions, Re-Throwing Exception, Specifying Exception, Exceptions In Constructor And Destructors, Controlling Uncaught Exceptions, Class Template With Exception Handling

TEXT BOOKS :

1. Programming In C++ , Ashok N Kamthane. Pearson 2nd Edition.
2. Object Oriented Programming C++ , Joyce Farrell, Cengage
3. Mastering C ++, Venugopal, Rajkumar, Ravi kumar TMH
4. Object Oriented Programming with C++, 2nd ed, Sourav Sahay, OXFORD

REFERENCE BOOKS:

1. The Complete Reference, C++, 4ed, Herbert Schildt, TMH

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MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE

Objectives: Acquaintance with the basic mathematical implication for computer science, applications of mathematics in computer science

UNIT I:

Objective: Acquiring the relevance of statements, inferences and predicates in computer science

Mathematical Logic :

Propositional Calculus: Statements and Notations, Connectives, Truth Tables, Tautologies, Equivalence of Formulas, Duality law, Tautological Implications, Normal Forms, Theory of Inference for Statement Calculus, **Consistency of Premises, Indirect Method of Proof.**

Predicate calculus: Predicative Logic, Statement Functions, Variables and Quantifiers, Free & Bound Variables, Inference theory for predicate calculus.

UNIT II :

Objective: Overview of number theory, basic algorithms in number theory and mathematical induction

Number Theory & Induction:

Properties of integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat's Theorem and Euler 's Theorem)

Mathematical Induction: Principle of Mathematical Induction, exercises

UNIT III:

Objective: Focuses on sets and relations and their operations, relations and functions

Set Theory:

Introduction, Operations on Binary Sets, Principle of Inclusion and Exclusion

Relations: Properties of Binary Relations, Relation Matrix and Digraph, Operations on Relations, Partition and Covering, Transitive Closure, Equivalence, Compatibility and Partial Ordering Relations, Hasse Diagrams.

Functions: Bijective Functions, Composition of Functions, Inverse Functions, Permutation Functions, Recursive Functions

UNIT IV:

Objectives: Exposure of graphs, their representation, types, trees and tree variants

Graph Theory:

Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multigraphs, (Problems and Theorems without proofs)

Planar Graphs, Euler's Formula, Graph Colouring and Covering, Chromatic Number,(Problems and Theorems without proofs)

Trees, Directed trees, Binary Trees, Decision Trees,

Spanning Trees: Properties, Algorithms for Spanning trees and Minimum Spanning Tree.

UNIT V:

Objective: Overview of algebraic structures, Group theory, Binomial theorem, permutations and combinations

Algebraic Structures: Lattice: Properties, Lattices as Algebraic Systems, Algebraic Systems with one Binary Operation, Properties of Binary operations, Semi groups and Monoids: Homomorphism of Semi groups and Monoids, Groups: Abelian Group, Cosets, Subgroups (Definitions and Examples of all Structures) Algebraic Systems with two Binary Operations: Rings

Combinatorics: Basic of Counting, Permutations, Derangements, Permutations with Repetition of Objects, Circular Permutations, Restricted Permutations, Combinations, Restricted Combinations, Pigeonhole Principle and its Application.

Binomial Theorem: Binomial and Multinomial Coefficients, Generating Functions of Permutations and Combinations, The Principles of Inclusion – Exclusion.

UNIT VI:

Objective: Overview of generating functions, recurrence relations and solving recurrence relations

Recurrence Relation:
Generating Function of Sequences. Partial Fractions. Calculating Coefficient of Generating Functions Recurrence Relations. Formulation as Recurrence Relations. Solving linear homogeneous recurrence Relations by substitution. generating functions and The Method of Characteristic Roots.
Solving Inhomogeneous Recurrence Relations

TEXT BOOKS :

1. Discrete Mathematical Structures with Applications to Computer Science. Tremblay. Manohar. TMH
2. Discrete Mathematics for Computer Scientists & Mathematicians. 2/e. Mott. Kandel. Baker. PHI
3. Discrete Mathematics. Swapan Kumar chakrborthy. Bikash kanti sarkar. OXFORD
4. Discrete Mathematics and its Applications with combinatorics and graph theory. 7th ed. Rosen. TMH
5. Discrete Mathematics. Theory and Applications. Malik sen. Cengage
6. Discrete mathematics and Graph theory. 3rd ed. Biswal. PHI

REFERENCE BOOKS:

1. Discrete Mathematics. Proofs. Structures and applications. 3rd ed. CRC Press
2. Discrete Mathematics. S.Santha. Cengage
3. Discrete Mathematics with Applications. Thomas Koshy. Elsevier
4. Discrete Mathematics,2/e. JK Sharma .Macmillan

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DATA STRUCTURES

Objectives: Comprehensive knowledge of data structures and ability to implement the same in software applications

UNIT I:

Objective: exposure to algorithmic complexities, recursive algorithms, searching and sorting techniques

Preliminaries of algorithm, Algorithm analysis and complexity,

Data structure- Definition, types of data structures

Recursion: Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion, recursive algorithms for factorial function, GCD computation, Fibonacci sequence, Towers of Hanoi, Tail recursion

List Searches using Linear Search, Binary Search, Fibonacci Search

Sorting Techniques: Basic concepts, Sorting by : insertion (Insertion sort), selection (heap sort), exchange (bubble sort, quick sort), distribution (radix sort) and merging (merge sort) Algorithms.

UNIT II:

Objectives: Applying stack and queue techniques for logical operations

Stacks and Queues: Basic Stack Operations, Representation of a Stack using Arrays, Stack Applications: Reversing list, Factorial Calculation, Infix to postfix Transformation, Evaluating Arithmetic Expressions.

Queues: Basic Queues Operations, Representation of a Queue using array, Implementation of Queue Operations using Stack, Applications of Queues-Round robin Algorithm, Circular Queues, Priority Queues.

UNIT III:

Objectives: Exposure to list representation models in various types of applications

Linked Lists: Introduction, single linked list, representation of a linked list in memory, Operations on a single linked list, Reversing a single linked list, applications of single linked list to represent polynomial expressions and sparse matrix manipulation, Advantages and disadvantages of single linked list, Circular linked list, Double linked list

UNIT IV:

Objectives: Implementation of tree implementation in various forms

Trees: Basic tree concepts, Binary Trees: Properties, Representation of Binary Trees using arrays and linked lists, operations on a Binary tree , Binary Tree Traversals (recursive), Creation of binary tree from in, pre and post order traversals

UNIT-V:

Objectives: Advanced understanding of other variants of trees and their operations

Advanced concepts of Trees: Tree Travels using stack (non recursive), Threaded Binary Trees. Binary search tree, Basic concepts, BST operations: insertion, deletion, Balanced binary trees – need, basics and applications in computer science (No operations)

UNIT VI:

Objectives: orientation on graphs, representation of graphs, graph traversals, spanning trees

Graphs: Basic concepts, Representations of Graphs: using Linked list and adjacency matrix, Graph algorithms

Graph Traversals (BFS & DFS), applications: Dijkstra's shortest path, Transitive closure, Minimum Spanning Tree using Prim's Algorithm, warshall's Algorithm(**Algorithemic Concepts Only, No Programs required**).

TEXT BOOKS:

1. Data Structure with C, Seymour Lipschutz, TMH
2. Data Structures using C,Reema Thareja, Oxford
3. Data Structures, 2/e, Richard F, Gilberg , Forouzan, Cengage
4. Data structures and algorithm analysis in C, 2nd ed, mark allen weiss

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REFERENCE BOOKS:

1. Data Structures and Algorithms. 2008.G.A.V.Pai. TMH
2. Classic Data Structures. 2/e. Debasis .Samanta.PHI.2009
3. Fundamentals of Data Structure in C. 2/e. Horowitz.Sahni. Anderson Freed.University Prees

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OBJECT-ORIENTED PROGRAMMING LAB

1. Write a C++ program illustrating Variable Scope.
2. Write a C++ program illustrating Swap integer values by reference.
3. Write a C++ program illustrating Checking whether the number is even or odd using Ternary operator.
4. Write a C++ program illustrating a program to find the roots of a quadratic equation .Use switch statements to handle different values of the discriminant (b^2-4*a*c).
5. Write a C++ program illustrating interactive program to multiply 2 variables after checking the compatibility.
6. Write a C++ program illustrating interactive program for computing the roots of a quadratic equation by handling all possible cases. Use streams to perform I/O operations.
7. Write a C++ program illustrating to sort integer numbers.
8. Write a C++ program illustrating factorial using recursion.
9. Write a C++ program illustrating pass by value, pass by reference, pass by address.
10. Write a C++ program illustrating Function overloading.
11. Write a C++ program illustrating an interactive program for swapping integer, real, and character type variables without using function overloading .Write the same program by using function overloading features and compare the same with its C counterpart.
12. Write a C++ program illustrating inline functions.
13. Write a C++ program illustrating Friend function.
14. Write a C++ program illustrating Exception handling.
15. Write a C++ program illustrating Function template.
16. Write a C++ program illustrating Overloading increment, decrement, binary+&<< operator.
17. Write a C++ program illustrating Virtual function.
18. Write a C++ program illustrating an interactive program to process complex numbers .It has to Perform addition, subtraction, multiplication, and division of complex numbers. print results in x+iy form. Create a class for the complex number representation.
19. Write a C++ program illustrating user defined string processing functions using pointers (string length, string copy, string concatenation)
20. Write a C++ program illustrating Constructor overloading (Both parameterised and default).
21. Write a C++ program illustrating Copy constructor.
22. Write a C++ program illustrating access data members & member functions using 'THIS' pointer.
23. Write a C++ program illustrating for overloading ++ operator to increment data.
24. Write a C++ program illustrating overloading of new and delete operator.
25. Write a C++ program illustrating Abstract classes.
26. Write a C++ program illustrating Inheritance (Multiple, Multilevel, Hybrid).
27. Write a C++ program illustrating Virtual classes & virtual functions.
28. Write a C++ program illustrating overloading function template.
29. Write a C++ program illustrating Class template.

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DATA STRUCTURES LAB

Exercise 1:
Write recursive program which computes the n^{th} Fibonacci number, for appropriate values of n.
Analyze behavior of the program Obtain the frequency count of the statement for various values of n.

Exercise 2:
Write recursive program for the following
a) Write recursive and non recursive C program for calculation of Factorial of an integer
b) Write recursive and non recursive C program for calculation of GCD (n, m)
c) Write recursive and non recursive C program for Towers of Hanoi : N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

Exercise 3:
a) Write C program that use both recursive and non recursive functions to perform Linear search for a Key value in a given list.
b) Write C program that use both recursive and non recursive functions to perform Binary search for a Key value in a given list.
c) Write C program that use both recursive and non recursive functions to perform Fibonacci search for a Key value in a given list.

Exercise 4:
a) Write C program that implement Bubble sort, to sort a given list of integers in ascending order
b) Write C program that implement Quick sort, to sort a given list of integers in ascending order
c) Write C program that implement Insertion sort,to sort a given list of integers in ascending order

Exercise 5:
a) Write C program that implement heap sort, to sort a given list of integers in ascending order
b) Write C program that implement radix sort, to sort a given list of integers in ascending order
c) Write C program that implement merge sort, to sort a given list of integers in ascending order

Exercise 6:
a) Write C program that implement stack (its operations) using arrays
b) Write C program that implement stack (its operations) using Linked list

Exercise 7:
a) Write a C program that uses Stack operations to Convert infix expression into postfix expression
a) Write C program that implement Queue (its operations) using arrays.
b) Write C program that implement Queue (its operations) using linked lists

Exercise 8:
a) Write a C program that uses functions to create a singly linked list
b) Write a C program that uses functions to perform insertion operation on a singly linked list
c) Write a C program that uses functions to perform deletion operation on a singly linked list

Exercise 9:
a) Adding two large integers which are represented in linked list fashion.
b) Write a C program to reverse elements of a single linked list.
c) Write a C program to store a polynomial expression in memory using linked list
d) Write a C program to representation the given Sparse matrix using arrays.
e) Write a C program to representation the given Sparse matrix using linked list

Exercise10:
a) Write a C program to Create a Binary Tree of integers
b) Write a recursive C program for Traversing a binary tree in preorder, inorder and postorder.
c) Write a non recursive C program for Traversing a binary tree in preorder, inorder and postorder.
d) Program to check balance property of a tree.

Exercise 11:
a) Write a C program to Create a BST
b) Write a C program to insert a node into a BST.
c) Write a C program to delete a node from a BST.

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JAVA PROGRAMMING

Objective: Implementing programs for user interface and application development using core java principles

UNIT I:

Objective: Focus on object oriented concepts and java program structure and its installation

Introduction to OOP

Introduction, Need of Object Oriented Programming, Principles of Object Oriented Languages, Procedural languages Vs OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features, Program structures, Installation of JDK1.6

UNIT II:

Objective: Comprehension of java programming constructs, control structures in Java

Programming Constructs

Variables , Primitive Datatypes, Identifiers- Naming Coventions, Keywords, Literals, Operators-Binary,Unary and ternary, Expressions, Precedence rules and Associativity, Primitive TypeConversion and Casting, Flow of control-Branching,Conditional, loops.,

Classes and Objects- classes, Objects, Creating Objects, Methods, constructors-Constructor overloading, cleaning up unused objects-Garbage collector, Class variable and Methods-Static keyword, this keyword, Arrays, Command line arguments

UNIT III:

Objective: Implementing Object oriented constructs such as various class hierarchies, interfaces and exception handling

Inheritance: Types of Inheritance, Deriving classes using extends keyword, Method overloading, super keyword, final keyword, Abstract class

Interfaces, Packages and Enumeration: Interface-Extending interface, Interface Vs Abstract classes, Packages-Creating packages , using Packages, Access protection, java.lang package

Exceptions & Assertions - Introduction, Exception handling techniques-try...catch, throw, throws, finally block, user defined exception, Exception Encapsulation and Enrichment, Assertions

UNIT IV:

Objective: Understanding of Thread concepts and I/O in Java

MultiThreading : java.lang.Thread, The main Thread, Creation of new threads, Thread priority, Multithreading- Using isAlive() and join(), Syncronization, suspending and Resuming threads, Communication between Threads

Input/Output: reading and writing data, java.io package

UNIT V:

Objective: Being able to build dynamic user interfaces using applets and Event handling in java

Applets- Applet class, Applet structure, An Example Applet Program, Applet Life Cycle, paint(),update() and repaint()

Event Handling -Introduction, Event Delegation Model, java.awt.event Description,Sources of Events, Event Listeners, Adapter classes, Inner classes

UNIT VI:

Objective: Understanding of various components of Java AWT and Swing and writing code snippets using them

Abstract Window Toolkit

Why AWT?, java.awt package, Components and Containers, Button, Label, Checkbox, Radio buttons, List boxes, Choice boxes, Text field and Text area, container classes, Layouts, Menu, Scroll bar

Swing:

Introduction , JFrame, JApplet, JPanel, Components in swings, Layout Managers, JList and JScroll Pane, Split Pane, JTabbedPane, Dialog Box

Pluggable Look and Feel

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TEXT BOOKS:

1. The Complete Refernce Java, 8ed, Herbert Schildt, TMH
2. Programming in JAVA, Sachin Malhotra, Saurabh choudhary, Oxford.
3. JAVA for Beginners, 4e, Joyce Farrell, Ankit R. Bhavsar, Cengage Learning.
4. Object oriented programming with JAVA, Essentials and Applications, Raj Kumar Bhuyya, Selvi, Chu TMH
5. Introduction to Java rogramming, 7th ed, Y Daniel Liang, Pearson

REFERENCE BOOKS:

1. JAVA Programming, K.Rajkumar.Pearson
2. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech
3. Core JAVA for Beginners, Rashmi Kanta Das, Vikas.
4. Object Oriented Programming Through Java, P. Radha Krishna, Universities Press.

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ADVANCED DATA STRUCTURES

(Note: C++ and Java implementation is not included in the syllabus)

Objectives: Exposed to hashing approaches, variants of trees , heaps, queues, implementation of graph algorithms, analysis of sorting algorithms with respect to bounds and file organizations and operations

UNIT I :

Objectives: Comprehensive understanding of dictionaries, hashing mechanism which supports faster retrieval and skip lists

Dictionaries : Sets, Dictionaries, Hash Tables, Open Hashing, Closed Hashing (Rehashing Methods), Hashing Functions(Division Method, Multiplication Method, Universal Hashing), Skip Lists, Analysis of Skip Lists. (Reference 1)

UNIT II :

Objectives: Illustartion of Balanced trees and their operations

AVL Trees: Maximum Height of AVL Tree, Insertions and Deletions. 2-3 Trees : Insertion, Deletion.

UNIT III :

Objectives: Comprehension of heaps, queues and their operations

Priority Queues :

Binary Heaps : Implementation of Insert and Delete min, Creating Heap.

Binomial Queues : Binomial Queue Operations, Binomial Amortized Analysis, Lazy Binomial Queues

UNIT IV :

Objectives: Detailed knowledge of nonlinear data structures and various algorithms using them

Graph algorithms : Minimum-Cost Spanning Trees- Prim's Algorithm, Kruskal's Algorithm Shortest Path Algorithms: Dijkstra's Algorithm, All Pairs Shortest Paths Problem: Floyd's Algorithm, Warshall's Algorithm,

UNIT V :

Objectives: Analysis of complexities in various sorting techniques along with their lower bounds

Sorting Methods : Order Statistics: Lower Bound on Complexity for Sorting Methods: Lower Bound on Worst Case Complexity, Lower Bound on Average Case Complexity, Heap Sort, Quick Sort, Radix Sorting, Merge Sort.

UNIT VI :

Objectives: Illustration of tries which share some properties of table look up, various issues related to the design of file structures

Pattern matching and Tries : Pattern matching algorithms- the Boyer –Moore algorithm, the Knuth-Morris-Pratt algorithm

Tries: Definitions and concepts of digital search tree, Binary trie, Patricia , Multi-way trie

File Structures: Fundamental File Processing Operations-opening files, closing files, Reading and Writing file contents, Special characters in files.

Fundamental File Structure Concepts- Field and record organization, Managing fixed-length, fixed-field buffers.

(Reference 5)

Text Books :

1. Data Structures, A Pseudocode Approach, Richard F Gilberg, Behrouz A Forouzan, Cengage.
2. Fundamentals of DATA STRUCTURES in C: 2nd ed, , Horowitz , Sahani, Anderson-freed, Universities Press
3. Data structures and Algorithm Analysis in C, 2nd edition, Mark Allen Weiss, Pearson

Reference Books:

1. Web : http://lcm.csa.iisc.ernet.in/dsa/dsa.html
2. http://utubersity.com/?page_id=878
3. http://freevideolectures.com/Course/2519/C-Programming-and-Data-Structures
4. http://freevideolectures.com/Course/2279/Data-Structures-And-Algorithms
5. File Structures :An Object oriented approach with C++, 3rd ed, Michel J Folk, Greg Riccardi, Bill Zoellick

6. C and Data Structures: A Snap Shot oriented Treatise with Live examples from Science and Engineering. NB Venkateswarlu & EV Prasad. S Chand. 2010.

II Year – II SEMESTER

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COMPUTER ORGANIZATION

Objectives: Comprehensive knowledge of computer system including the analysis and design of components of the system

UNIT I :

Objectives: Gives a view of computer system from user's perspective, representation of data

BASIC STRUCTURE OF COMPUTERS : Computer Types, Functional unit, Basic Operational concepts, Bus structures,

Data Representation: Data types, Complements, Fixed Point Representation. Floating – Point Representation. Other Binary Codes, Error Detection codes.

UNIT II :

Objectives: Understanding RTL, Micro operations, ALU, Organization of stored program computer, types of instructions and design of basic components of the system

REGISTER TRANSFER LANGUAGE AND MICROOPERATIONS: Register Transfer language. Register Transfer Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.

BASIC COMPUTER ORGANIZATION AND DESIGN : Instruction codes, Computer Register Computer instructions, Timing and control, Instruction cycle, Memory – Reference Instructions. Input – Output and Interrupt, Design of basic computer, Design of Accumulator Logic.

UNIT III :

Objectives: Illustration of data paths and control flow for sequencing in CPUs, Microprogramming of control unit of CPU

CENTRAL PROCESSING UNIT : General Register Organization, STACK organization. Instruction formats. Addressing modes. DATA Transfer and manipulation. Program control. Reduced Instruction set computer.

MICRO PROGRAMMED CONTROL : Control memory, Address sequencing, micro program example, design of control unit

UNIT IV :

Objectives: Illustration of algorithms for basic arithmetic operations using binary and decimal representation

COMPUTER ARITHMETIC : Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations. Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT V :

Objectives: Description of different parameters of a memory system, organization and mapping of various types of memories

THE MEMORY SYSTEM : Memory Hierarchy, Main memory, Auxiliary memory, Associative Memory, Cache Memory, Virtual Memory.

UNIT-VI

Objectives: Describes the means of interaction devices with CPU, their characteristics, modes and introduction multiprocessors.

INPUT-OUTPUT ORGANIZATION : Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct memory Access.

MULTI PROCESSORS : Introduction, Characteristics or Multiprocessors, Interconnection Structures, Inter processor Arbitration.

TEXT BOOKS :

1. Computer System Architecture, M.Moris Mano, 3rd Edition, Pearson/PHI
2. Computer Organization , Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5th Edition, McGraw Hill.
3. Computer Architecture a quantitative approach, John L. Hennessy and David A. Patterson, Fourth Edition Elsevier

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REFERENCES :

1. Computer Organization and Architecture – William Stallings Sixth Edition, Pearson/PHI

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2. Structured Computer Organization – Andrew S. Tanenbaum, 4th Edition PHI/Pearson
3. Fundamentals or Computer Organization and Design. - Sivaraama Dandamudi Springer Int. Edition.

II Year – II SEMESTER

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FORMAL LANGUAGES & AUTOMATA THEORY

Objectives: Understanding of programming language construct, how input is converted into output from the machine hardware level

UNIT I:

Objectives: Analysis of Finite state machine, its representation and automata

Fundamentals of Automata- Computation, Finite State Machine, Components of Finite State Automata, Elements of Finite State System ,Mathematical representation of Finite State Machine, Automata Classification, Automata in Real World

UNIT II:

Objectives: Delineation of various components of formal languages and grammars.

Formal Language Theory- Symbols, Alphabets and Strings, Operations on Strings, Formal Languages, Operations on Languages,

Formal Languages/ Grammar Hierarchy: Formal Languages, Regular Language, Context-Free Language, Context-Sensitive Language, Recursive Language, Recursively Enumerable Language, Other Forms of Formal Languages, Relationship between Grammars and Languages

UNIT III:

Objectives: Description of finite automata, variants in it and their equivalence

Finite Automata: Introduction, Deterministic Finite Automata(DFA), Design of DFAs, Non Deterministic Finite Automata(NFA), Non-Deterministic Automata with Є-moves , Design of NFA- Є s, Advantages of Non-Deterministic Finite Automata, NFA Versus DFA

Equivalent Automata: Equivalent Finite-State Automata, Equivalence of NFA/NFA- ? and DFA, Equivalence of NFA, with Є moves to NFA, without Є - moves.

UNIT IV:

Objectives: Minimization, optimization of finite automata, regular expressions and equivalence of finite automata and regular expressions.

Minimization/ Optimization of DFA: Optimum DFA, Minimal DFA, Two way DFA, DFA Vs 2DFA

Regular Expressions and Languages: Regular languages, Regular expressions, Components of Regular Expression, Properties of Regular Expressions, Uses of Regular Expressions.

Finite Automata and Regular Expressions: Properties of Regular Sets and Regular Languages, Arden's Theorem, Equivalence of Finite Automata and Regular Expressions, Equivalence of DFA and Regular Expression, Equivalence of NFA and Regular Expression

UNIT V:

Objectives: Illustration about grammars, classification and simplification of grammaers

Transducers: Moore Machine, Mealy Machine, Difference between Moore and Mealy Machines, Properties / Equivalence of Moore and Mealy Machines.

Context-Free Grammars and Context-Free Languages: Types of Grammar, Ambiguous and Unambiguous Grammars, Noam Chomsky's Classification of Grammar and Finite Automata, Relation between Regular Grammar and Finite Automata.

Simplification of Context – Free Grammar: Simplification of Context-Free Grammars, Elimination of Є - Productions, Elimination of Unit Productions, Normal Forms for Context Free Grammars, Chomsky Normal Form, Greibach Normal Form, Chomsky Vs. Greibach Normal Form, Application of Context- Free Grammars

UNIT VI:

Objectives: Delineation of turing machines

Turing Machine: Introduction, Components of Turing Machine, Description of Turing Machine, Elements of TM, Moves of a TM, Language accepted by a TM, Role of TM's , Design of TM's

TM Extensions and Languages: TM Languages, Undecidable Problem, P and NP Classes of Languages

Text Books:

1. A Text Book on Automata Theory, Nasir S.F.B, P.K. Srimani, Cambridge university Press
2. Introduction to Automata Theory, Formal languages and computation, Shamalendu kandar, Pearson
3. Elements of Theory of Compuation, Harry R Lewis, Papdimitriou, PHI

4. Introduction to theory of computation, 2nd ed. Michel sipser, CENGAGE

Reference Books:

1. Formal Languages and automata theory, C.K. Nagpal, OXFORD
2. Theory of Computation , aproblem solving approach, kavi Mahesh, Wiley
3. Automata, computability and complexity, Theory and applications, Elaine rich, PEARSON
4. Theory of Computation, Vivek kulkarni, OXFORD

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II Year – II SEMESTER

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ADVANCED DATA STRUCTURES LAB

1. To implement functions of Dictionary using Hashing (division method, Multiplication method, Universal hashing)
2. To perform various operations i.e. insertions and deletions on AVL trees
3. To perform various operations i.e., insertions and deletions on 2-3 trees.
4. To implement operations on binary heap.
5. To implement operations on graphs
   i) vertex insertion
   ii) Vertex deletion
   iii) finding vertex
   iv)Edge addition and deletion
6. To implement Depth First Search for a graph non recursively.
7. To implement Breadth First Search for a graph non recursively.
8. To implement Prim's algorithm to generate a min-cost spanning tree.
9. To implement Krushkal's algorithm to generate a min-cost spanning tree.
10. To implement Dijkstra's algorithm to find shortest path in the graph.
11. To implement pattern matching using Boyer-Moore algorithm.
12. To implement Knuth-Morris-Pratt algorithm for pattern matching.

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II Year – II SEMESTER

T	P	C
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JAVA PROGRAMMING LAB

1. Write a JAVA program to display default value of all primitive data types of JAVA
2. Write a JAVA program that displays the roots of a quadratic equation ax2+bx+c=0. Calculate the discriminent D and basing on the value of D, describe the nature of roots.
3. Write a JAVA program to display the Fibonacci sequence
4. Write a JAVA program give example for command line arguments.
5. Write a JAVA program to sort given list of numbers.
6. Write a JAVA program to search for an element in a given list of elements (linear search).
7. Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
8. Write a JAVA program to determine the addition of two matrices.
9. Write a JAVA program to determine multiplication of two matrices.
10. Write a JAVA program to sort an array of strings
11. Write a JAVA program to check whether given string is palindrome or not.
12. Write a JAVA program for the following
    - 1. Example for call by value. 2. Example for call by reference.
13. Write a JAVA program to give the example for 'this' operator. And also use the'this' keyword as return statement.
14. Write a JAVA program to demonstrate static variables, methods, and blocks.
15. Write a JAVA program to give the example for 'super' keyword.
16. Write a JAVA program that illustrates simple inheritance.
17. Write a JAVA program that illustrates multi-level inheritance
18. Write a JAVA program demonstrating the difference between method overloading and method overriding.
19. Write a JAVA program demonstrating the difference between method overloading and constructor overloading.
20. Write a JAVA program that describes exception handling mechanism.
21. Write a JAVA program for example of try and catch block. In this check whether the given array size is negative or not.
22. Write a JAVA program to illustrate sub class exception precedence over base class.
23. Write a JAVA program for creation of user defined exception.
24. Write a JAVA program to illustrate creation of threads using runnable class.(start method start each of the newly created thread. Inside the run method there is sleep() for suspend the thread for 500 milliseconds).
25. Write a JAVA program to create a class MyThread in this class a constructor, call the base class constructor, using super and starts the thread. The run method of the class starts after this. It can be observed that both main thread and created child thread are executed concurrently
26. Write a JAVA program illustrating multiple inheritance using interfaces.
27. Write a JAVA program to create a package named pl, and implement this package in ex1 class.
28. Write a JAVA program to create a package named mypack and import it in circle class.
29. Write a JAVA program to give a simple example for abstract class.
30. Write a JAVA program that describes the life cycle of an applet.
    - Write a JAVA program to create a dialogbox and menu.
    - Write a JAVA program to create a grid layout control.
31. Write a JAVA program to create a border layout control.
32. Write a JAVA program to create a padding layout control.
33. Write a JAVA program to create a simple calculator.
34. Write a JAVA program that displays the x and y position of the cursor movement using Mouse.
35. Write a JAVA program that displays number of characters, lines and words in a text file.

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Compiler Design

Course Objectives: To make the student to understand the process involved in a compiler, create an overall view of various types of translators, linkers, loaders, and phases of a compiler, understand what is syntax analysis, various types of parsers especially the top down approach, awareness among students the various types of bottom up parsers, understand the syntax analysis and, intermediate code generation, type checking, the role of symbol table and its organization, Code generation, machine independent code optimization and instruction scheduling.

Course Outcomes:

1. To introduce the major concept areas of language translation and compiler design
2. To develop an awareness of the function and complexity of compilers.
3. To provide practical, hands on experience in compiler design
4. Identify the similarities and differences among various parsing techniques and grammar transformation techniques

Unit–I:

Overview of language processing – pre-processors – compiler – assembler – interpreters, pre-processors, – linkers & loaders - structure of a compiler – phases of a compiler (TEXT BOOK 2). Lexical Analysis – Role of Lexical Analysis – Lexical Analysis Vs. Parsing – Token, patterns and Lexemes – Lexical Errors – Regular Expressions – Regular definitions for the language constructs – Strings, Sequences, Comments – Transition diagram for recognition of tokens, Reserved words and identifiers, Examples.

Unit–II

Syntax Analysis – discussion on CFG, LMD,RMD, parse trees, Role of a parser – classification of parsing techniques – Brute force approach, left recursion, left factoring, Top down parsing – First and Follow- LL(1) Grammars, Non-Recursive predictive parsing – Error recovery in predictive parsing.

Unit–III

What is bottom up parsing approach, Types of Bottom up approaches; Introduction to simple LR – Why LR Parsers – Model of an LR Parsers – Operator Precedence- Shift Reduce Parsing – Difference between LR and LL Parsers, Construction of SLR Tables.

More powerful LR parses, construction of CLR (1), LALR Parsing tables, Dangling ELSE Ambiguity, Error recovery in LR Parsing. Comparison of all bottoms up approaches with all top down approaches

Unit–IV

Semantic analysis, SDT Schemes, evaluation of semantic rules. Intermediate code, three address code, quadruples, triples, abstract syntax trees. Types and declarations, type Checking.

Unit–V

Symbol tables: use and need of symbol tables. Runtime Environment: storage organization, stack allocation, access to non-local data, heap management, parameter passing mechanisms, introduction to garbage collection. Reference counting garbage collectors.

Code generation: Issues, target language, Basic blocks & flow graphs, Simple code generator, Peephole optimization, Register allocation and assignment.

Unit–VI

Machine independent code optimization – semantic preserving transformations, global common sub expression elimination, copy propagation, dead code elimination, constant folding, strength reduction, loop optimization. Instruction scheduling, inter procedural optimization.

TEXT BOOKS:

1. Compilers, Principles Techniques and Tools- Alfred V Aho, Monica S Lam, Ravi Sethi, Jeffrey D. Ullman,2nd ed, Pearson,2007.
2. Compiler Design, K.Muneeswaran, Oxford.

REFERENCE BOOKS:

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1. Engineering a compiler. 2nd edition. Keith D.Cooper & Linda Torezon. Morgan Kaufman.
2. http://www.nptel.iitm.ac.in/downloads/106108052/
3. Principles of compiler design. V. Raghavan. 2nd ed. TMH. 2011.
4. Compiler construction. Principles and Practice. Kenneth C Louden. CENGAGE
5. Implementations of Compiler. A new approach to Compilers including the algebraic methods. Yunlinsu. SPRINGER

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Database Management Systems

Course Objectives:

Provides students with theoretical knowledge and practical skills in the use of databases and database management systems in information technology applications. The logical design, physical design and implementation of relational databases are covered.

Course Outcomes:

- define a Database Management System
- give a description of the Database Management structure
- understand the applications of Databases
- know the advantages and disadvantages of the different models
- compare relational model with the Structured Query Language (SQL)
- know the constraints and controversies associated with relational database model.
- know the rules guiding transaction ACID
- understand the concept of data planning and Database design
- identify the various functions of Database Administrator

Syllabus:

Unit – I: INTRODUCTION

Database system, Characteristics (Database Vs File System), Database Users(Actors on Scene, Workers behind the scene), Advantages of Data base systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

Unit – II:

RELATIONAL MODEL : Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance

BASIC SQL : Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).

Unit – III:

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

SQL : Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

Unit – IV:

SCHEMA REFINEMENT (NORMALIZATION) : Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

Unit – V:

TRANSACTION MANAGEMENT AND CONCURRENCY CONTROL : Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and savepoint.

Concurrency control for lost updates, uncommitted data, inconsistent retrievals and the Scheduler. Concurrency control with locking methods : lock granularity, lock types, two phase locking for ensuring serializability, deadlocks, Concurrency control with time stamp ordering : Wait/Die and Wound/Wait Schemes, Database Recovery management : Transaction recovery.

SQL constructs that grant access or revoke access from user or user groups. Basic PL/SQL procedures, functions and triggers.

UNIT – VI:

STORAGE AND INDEXING : Database file organization, file organization on disk, heap files and sorted files, hashing, single and multi-level indexes, dynamic multilevel indexing using B-Tree and B+ tree, index on multiple keys.

Text Books :

1. Database Management Systems, 3/e Raghuram Krishnan, Johannes Gehrke, TMH
2. Database Management System, 6/e Ramez Elmasri, Shamkant B. Navathe, PEA
3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning.

Reference Books :

1. Database System Concepts, 5/e Silberschatz, Korth, TMH
2. Introduction to Database Systems, 8/e C J Date, PEA
3. The Database book principles & practice using Oracle/MySql Narain Gehani, University Press.

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III Year – I SEMESTER

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Operating Systems

Course Objectives:

To gain knowledge about the Operating Systems concepts such as process, main memory management, secondary memory management, CPU and disk scheduling etc

Course Outcomes:

By the end of the course student will be able to

- describe the general architecture of computers
- describe, contrast and compare differing structures for operating Systems
- understand and analyse theory and implementation of: processes, resource control (concurrency etc.), physical and virtual memory, scheduling, I/O and files

Syllabus:

UNIT-I:

Computer System and Operating System Overview: Overview of computer operating systems, operating systems functions, protection and security, distributed systems, special purpose systems, operating systems structures and systems calls, operating systems generation.

UNIT-II:

Process Management – Process concept- process scheduling, operations, Inter process communication. Multi Thread programming models. Process scheduling criteria and algorithms, and their evaluation.

UNIT-III:

Concurrency: Process synchronization, the critical- section problem, Peterson's Solution, synchronization Hardware, semaphores, classic problems of synchronization, monitors, Synchronization examples

UNIT-IV:

Memory Management: Swapping, contiguous memory allocation, paging, structure of the page table, segmentation

Virtual Memory Management:

virtual memory, demand paging, page-Replacement, algorithms, Allocation of Frames, Thrashing

UNIT-V:

Principles of deadlock – system model, deadlock characterization, deadlock prevention, detection and avoidance, recovery form deadlock,

UNIT-VI:

File system Interface- the concept of a file, Access Methods, Directory structure, File system mounting, file sharing, protection.

File System implementation- File system structure, allocation methods, free-space management

Mass-storage structure overview of Mass-storage structure, Disk structure, disk attachment, disk scheduling

TEXT BOOKS:

1. Operating System Concepts- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Operating Systems' – Internal and Design Principles Stallings, Sixth Edition–2005, Pearson education

REFERENCE BOOKS:

1. http://nptel.iitm.ac.in/courses/Webcourse-contents/IISc-BANG/ Operating%20Systems/New_index1.html
2. Operating systems- A Concept based Approach-D.M.Dhamdhere, 2nd Edition, TMH
3. Operating System A Design Approach-Crowley, TMH.
4. Modern Operating Systems, Andrew S Tanenbaum 3rd edition PHI.

III Year – I SEMESTER

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Compiler Design Lab

Course Objectives:
To enlighten the student with knowledge base in compiler design and its applications

Course Outcomes:
Demonstrate a working understanding of the process of lexical analysis, parsing and other compiler design aspects.

Lab Experiments:

1. Design a lexical analyzer for given language and the lexical analyzer should ignore redundant spaces, tabs and new lines
2. Simulate First and Follow of a Grammar.
3. Develop an operator precedence parser for a given language.
4. Construct a recursive descent parser for an expression.
5. Construct a LL(1) parser for an expression
6. Design predictive parser for the given language
7. Implementation of shift reduce parsing algorithm.
8. Design a LALR bottom up parser for the given language.
9. Implement the lexical analyzer using JLex, flex or lex or other lexical analyzer generating tools
10. Write a program to perform loop unrolling.
11. Convert the BNF rules into YACC form and write code to generate abstract syntax tree.
12. Write a program for constant propagation.

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III Year – I SEMESTER

T	P	C
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Operating System Lab

Objective :

- To provide an understanding of the design aspects of operating system

Recommended Systems/Software Requirements:

- Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and 100 MB free disk space

Lab Experiments:

1. Simulate the following CPU scheduling algorithms
   a) Round Robin b) SJF c) FCFS d) Priority

2. Loading executable programs into memory and execute System Call implementation-read(), write(), open () and close()

3. . Multiprogramming-Memory management- Implementation of Fork(), Wait(), Exec() and Exit() System calls

4. Simulate all File allocation strategies a) Sequenced b) Indexedc) Linked

5. Simulate MVT and MFT

6. Simulate all File Organization Techniques
   a) Single level directory b) Two level c) Hierarchical d) DAG

7. Simulate Bankers Algorithm for Dead Lock Avoidance

8. Simulate Bankers Algorithm for Dead Lock Prevention.

9. Simulate all page replacement algorithms.
   a) FIFO b) LRU c) LFU etc….

10. Simulate Paging Technique of memory management.

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Database Management Systems Lab

Objectives:

- To teach the student database design and query and PL/SQL.

System/Software Requirements:

- Intel based desktop PC
- Mysql /Oracle latest version Recommended

PROGRAMS LIST:

1) Creation, altering and droping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.

2) Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.
Example:- Select the roll number and name of the student who secured fourth rank in the class.

3) Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.

4) Queries using Conversion functions (to_char, to_number and to_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next_day, add_months, last_day, months_between, least, greatest, trunc, round, to_char, to_date)

5)
i)Creation of simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)

ii)Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.

6) Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.

7) Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE- APPLICATION ERROR.

8) Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.

9) Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.

10) Program development using creation of package specification, package bodies, private objects, package variables and cursors and calling stored packages.

11) Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.

12) Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers

TEXT BOOKS :

1) ORACLE PL/SQL by example. Benjamin Rosenzweig, Elena Silvestrova, Pearson Education 3rd Edition
2) ORACLE DATA BASE LOG PL/SQL Programming SCOTT URMAN, Tata Mc-Graw Hill.

III Year – I SEMESTER

T	P	C
0	3	2

Linux Programming Lab

Objectives:
To give a practical orientation of programming in Linux environment using system calls and advanced concepts in unix programming

PROGRAMS LIST:

1. Write C programs that uses open, read, write system calls.
2. Write C programs that differentiates FILE *(file stream pointers in C standard library) and file descriptors by using functions such as fdopen, fileno.
3. Write a C program which displays a given files meta data by using stat system call and st_mode structure.
4. Write a C program which lists all the files of current working directory whose size is more than given number of data blocks.
5. Write a C program which lists all the files of current working directory which contains hard link files.
6. Write a C program to emulates file system checking utility (fsck command) using system calls.
7. Example C program which supports that child process inherits environment variables, command line arguments, opened' files.
8. Simple C programs to have process trees and process chains.
9. Simple C program that demonstrates the failure of fork system call because of crossing system limits.
10. Simple C programs to demonstrate the use of pipe system call for inter process communication and also emulating piping in shell.
11. Simple C programs to demonstrate the use of popen standard library function call for inter process communication and also emulating piping in shell.
12. Simple C program to use named pipes for inter process communication.
13. Simple C programs to illustrate the use of exec family of functions.
14. Write a C program which emulates simple shell.
15. Write C program to create a thread using pthreads library and let it run its function.
16. Write a C program to illustrate concurrent execution of threads using pthreads library.
17. Write a C program to simulate ptrhead_create function failure by repeatedly calling the same.
18. Write a C program which creates a thread using pthread and passes arguments to the thread function.
19. Write C programs which uses sigset, sifillset, sigprocmask, related system calls and structures.
20. Write a C program to simulate memory segment violation run time error and implement a signal handler (both reliable and unreliable) which handles situation.
21. Write a C program to illustrate the use of sbrk system call.
22. Write a C program to illustrate inter process communication via message queues.
23. Write a C program to illustrate inter process communication via shared memory.
24. Write a C program to simulate producer and consumer problem using semaphores, shared memory, and fork.
25. Write a C program to simulate producer and consumer problem using semaphores, shared memory, and pthread_create.
26. Write a C program to simulate producer and consumer problem using muexes, shared memory, and threads.
27. Write socket Programs in C for Echo/Ping/Talk Commands.
28. Create a Socket (TCP) between two computers and enable file transfer between them.
29. Write a Program to implement Remote Command Execution.
30. Write a code simulating ARP/RARP.

III Year – I SEMESTER

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INTELLECTUAL PROPERTY RIGHTS AND PATENTS – I

Unit 1

Introduction to Intellectual Property Law – The Evolutionary Past - The IPR Tool Kit- Para -Legal Tasks in Intellectual Property Law – Ethical

Computer Networks

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Course Objectives:

At the end of the course, the students will be able to:

1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

Course Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

1. Independently understand basic computer network technology.
2. Identify the different types of network topologies and protocols.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.

Syllabus:

UNIT – I :

Introduction: OSI overview, TCP/IP and other networks models, Examples of Networks: Novell Networks, Arpanet, Internet, Network Topologies WAN, LAN, MAN.

UNIT – II :

Physical Layer and overview of PL Switching: Multiplexing: frequency division multiplexing, wave length division multiplexing, synchronous time division multiplexing, statistical time division multiplexing, introduction to switching: Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

UNIT – III:

Data link layer: Design issues, **Framing**: fixed size framing, variable size framing, flow control, error control, error detection and correction, CRC, Checksum: idea, one's complement internet checksum, services provided to Network Layer, **Elementary Data Link Layer protocols**: simplex protocol, Simplex stop and wait, Simplex protocol for Noisy Channel.

Sliding window protocol: One bit, Go back N, Selective repeat-Stop and wait protocol, Data link layer in HDLC: configuration and transfer modes, frames, control field, point to point protocol (PPP): framing transition phase, multiplexing, multi link PPP.

UNIT – IV :

Random Access: ALOHA, MAC addresses, Carrier sense multiple access (CSMA), CSMA with Collision Detection, CSMA with Collision Avoidance, Controlled Access: Reservation, Polling, Token Passing, Channelization: frequency division multiple access(FDMA), time division multiple access(TDMA), code division multiple access(CDMA).

Network Layer: Virtual circuit and Datagram subnets-Routing algorithm shortest path routing, Flooding, Hierarchical routing, Broad cast, Multi cast, distance vector routing.

UNIT –V :

IEEE Standards: – data link layer, physical layer, Manchester encoding, Standard Ethernet: MAC sub layer, physical layer, Fast Ethernet: MAC sub layer, physical layer, IEEE-802.11: Architecture, MAC sub layer, addressing mechanism, frame structure.

UNIT –VI :

Application layer (WWW and HTTP): ARCHITECTURE : Client (Browser) ,Server ,Uniform Resource Locator HTTP: HTTP Transaction, HTTP Operational Model and Client/Server Communication, HTTP Generic Message Format, HTTP Request Message Format, HTTP Response Message Format

The wireless web : WAP—The Wireless Application Protocol

TEXT BOOKS :

1. Data Communications and Networks – Behrouz A. Forouzan.Third Edition TMH.
2. Computer Networks, 5ed. David Patterson. Elsevier
3. Computer Networks — Andrew S Tanenbaum. 4th Edition. Pearson Education/PHI
4. Computer Networks, Mayank Dave. CENGAGE

REFERENCES :

1. An Engineering Approach to Computer Networks-S.Keshav. 2nd Edition, Pearson Education
2. Understanding communications and Networks, 3rd Edition, W.A. Shay, Thomson

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III Year – II SEMESTER

T	P	C
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Data Ware housing and Mining

Course Objectives:
Students will be enabled to understand and implement classical models and algorithms in data warehousing and data mining. They will learn how to analyze the data, identify the problems, and choose the relevant models and algorithms to apply. They will further be able to assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

Course Outcomes:

a) understand why there is a need for data warehouse in addition to traditional operational database systems;
b) identify components in typical data warehouse architectures;
c) design a data warehouse and understand the process required to construct one;
d) understand why there is a need for data mining and in what ways it is different from traditional statistical techniques;
e) understand the details of different algorithms made available by popular commercial data mining software;
f) solve real data mining problems by using the right tools to find interesting patterns

Syllabus:

UNIT –I:
Introduction : What Motivated Data Mining? Why Is It Important, Data Mining—On What Kind of Data, Data Mining Functionalities—What Kinds of Patterns Can Be Mined? Are All of the Patterns Interesting? Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or Data Warehouse System, Major Issues in Data Mining. **(Han & Kamber)**

UNIT –II:
Data Pre-processing : Why Pre-process the Data? Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation. **(Han & Kamber)**

UNIT –III:
Data Warehouse and OLAP Technology: An Overview : What Is a Data Warehouse? A Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, From Data Warehousing to Data Mining. **(Han & Kamber)**

UNIT –IV:
Classification : Basic Concepts, General Approach to solving a classification problem, Decision Tree Induction: Working of Decision Tree, building a decision tree, methods for expressing an attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.
Model Over fitting: Due to presence of noise, due to lack of representation samples, evaluating the performance of classifier: holdout method, random sub sampling, cross-validation, bootstrap. **(Tan & Vipin)**

UNIT –V
Association Analysis: Basic Concepts and Algorithms : Introduction, Frequent Item Set generation, Rule generation, compact representation of frequent item sets, FP-Growth Algorithm. **(Tan & Vipin)**

UNIT –VI
Cluster Analysis: Basic Concepts and Algorithms : What Is Cluster Analysis? Different Types of Clustering, Different Types of Clusters, K-means, The Basic K-means Algorithm, K-means: Additional Issues, Bisecting K-means, K-means and Different Types of Clusters, Strengths and Weaknesses, K-means as an Optimization Problem, Agglomerative Hierarchical Clustering, Basic Agglomerative Hierarchical Clustering Algorithm, Specific Techniques, DBSCAN, Traditional Density: Center-Based Approach, The DBSCAN Algorithm, Strengths and Weaknesses. **(Tan & Vipin)**

Text Books :

1. Introduction to Data Mining : Pang-Ning Tan & Michael Steinbach, Vipin Kumar, Pearson.
2. Data Mining concepts and Techniques, 3/e, Jiawei Han, Michel Kamber, Elsevier.

Reference Books :

1. Data Mining Techniques and Applications: An Introduction, Hongbo Du, Cengage Learning.
2. Data Mining : Introductory and Advanced topics : Dunham, Pearson.
3. Data Warehousing Data Mining & OLAP, Alex Berson, Stephen Smith, TMH.
4. Data Mining Techniques, Arun K Pujari, Universities Press.

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III Year – II SEMESTER

T	P	C
4	0	3

Design and Analysis of Algorithms

Course Objectives:

Upon completion of this course, students will be able to do the following:

- Analyze the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

Course Outcomes:

Students who complete the course will have demonstrated the ability to do the following:

- Analyze worst-case running times of algorithms using asymptotic analysis.
- Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it.
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it.
- Explain the major graph algorithms and their analyses. Employ graphs to model engineering problems, when appropriate. Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyze them.
- Explain the different ways to analyze randomized algorithms (expected running time, probability of error). Recite algorithms that employ randomization. Explain the difference between a randomized algorithm and an algorithm with probabilistic inputs.
- Analyze randomized algorithms. Employ indicator random variables and linearity of expectation to perform the analyses. Recite analyses of algorithms that employ this method of analysis.

Syllabus:

UNIT-I:
Introduction: Algorithm, Psuedo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, probabilistic analysis, Amortized analysis.

UNIT-II:
Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort

UNIT-III:

Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, spanning trees, Minimum cost spanning trees, Single source shortest path problem.

UNIT-IV:
Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT-V:
Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

UNIT-VI:
Branch and Bound: General method, applications - Travelling sales person problem,0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

TEXT BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.
2. Design and Analysis of Algorithms , S Sridhar, Oxford
3. Design and Analysis of Algorithms, Parag Himanshu Dave, Himansu BAlachandra Dave, 2ed,Pearson Education.

REFERENCE BOOKS:

1. Design and Analysis of algorithms, Aho, Ullman and Hopcroft,Pearson education.
2. Introduction to the Design and Analysis of Algorithms, Anany Levitin, PEA
3. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein,PHI Pvt. Ltd.
4. Algorithm Design, Foundation, Analysis and internet Examples, Michel T Goodrich, Roberto Tamassia, Wiley

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III Year –II SEMESTER

T	P	C
4	0	3

Software Engineering

Course Objectives:
The students will have a broad understanding of the discipline of software engineering and its application to the development of and management of software systems.

Course Outcomes:
1. knowledge of basic SW engineering methods and practices, and their appropriate application;
2. general understanding of software process models such as the waterfall and evolutionary models.
3. understanding of the role of project management including planning, scheduling, risk management, etc.
4. understanding of software requirements and the SRS document.
5. understanding of different software architectural styles.
6. understanding of implementation issues such as modularity and coding standards.
7. understanding of approaches to verification and validation including static analysis, and reviews.
8. understanding of software testing approachs such as unit testing and integration testing.
9. understanding of software evolution and related issues such as version management.
10. understanding on quality control and how to ensure good quality software.
11. understanding of some ethical and professional issues that are important for software engineers.
12. development of significant teamwork and project based experience

Syllabus:

UNIT I:
Introduction to Software Engineering: Software, Software Crisis, Software Engineering definition, Evolution of Software Engineering Methodologies, Software Engineering Challenges.
Software Processes: Software Process, Process Classification, Phased development life cycle, Software Development Process Models- Process, use, applicability and Advantages/limitations

UNIT II:
Requirements Engineering: Software Requirements, Requirements engineering Process, Requirements elicitation, Requirements Analysis, Structured Analysis, Data Oriented Analysis, Object oriented Analysis, Prototyping Analysis, Requirements Specification, Requirements Validation, requirement Management.

UNIT III:
Software Design: Software Design Process, Characteristics of Good Software Design, Design Principles, Modular Design, Design Methodologies, Structured Design, Structured Design Methodology, Transform Vs Transaction Analysis.
Object-Oriented Design: Object oriented Analysis and Design Principles

UNIT IV:
Implementation: Coding Principles, Coding Process, Code verification, Code documentation
Software Testing: Testing Fundamentals, Test Planning, Black Box Testing, White Box Testing, Levels of Testing, Usability Testing, Regression testing, Debugging approaches

UNIT V:
Software Project Management: Project Management Essentials, What is Project management, Software Configuration Management.
Project Planning and Estimation: Project Planning activities, Software Metrics and measurements, Project Size Estimation, Effort Estimation Techniques.

UNIT VI:
Software Quality: Software Quality Factors, Verification & Validation, Software Quality Assurance, The Capability Maturity Model
Software Maintenance: Software maintenance, Maintenance Process Models, Maintenance Cost, Reengineering, Reengineering activities, Software Reuse.

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TEXT BOOKS:

1. Software Engineering, concepts and practices, Ugrasen Suman, Cengage learning
2. Software Engineering, 8/e, Sommerville, Pearson.
3. Software Engineering, 7/e , Roger S.Pressman , TMH

REFERENCE BOOKS:

1. Software Engineering, A Precise approach, Pankaj Jalote, Wiley
2. Software Engineering principles and practice, W S Jawadekar, TMH
3. Software Engineering concepts, R Fairley, TMH

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III Year –II SEMESTER

T	P	C
4	0	3

Web Technologies

Course Objectives:
This course is designed to introduce students with no programming experience to the programming languages and techniques associated with the World Wide Web. The course will introduce web-based media-rich programming tools for creating interactive web pages.

Course Outcomes:

1. Analyze a web page and identify its elements and attributes.
2. Create web pages using XHTML and Cascading Styles sheets.
3. Build dynamic web pages .
4. Build web applications using PHP.
5. Programming through PERL and Ruby
6. write simple client-side scripts using AJAX

Syllabus:

UNIT-I:
HTML tags, Lists, Tables, Images, forms, Frames. Cascading style sheets. Introduction to Java script. Objects in Java Script. Dynamic HTML with Java Script

UNIT-II:
Working with XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX.

UNIT-III:
AJAX A New Approach: Introduction to AJAX, Integrating PHP and AJAX. Consuming WEB services in AJAX: (SOAP, WSDL,UDDI)

UNIT-IV:
PHP Programming: Introducing PHP: Creating PHP script, Running PHP script. **Working with variables and constants:** Using variables,Using constants,Data types,Operators.**Controlling program flow:** Conditional statements,Control statements,Arrays,functions.Working with forms and Databases such as mySql, Oracle, SQL Sever.

UNIT-V:
Introduction to PERL, Perl language elements, Interface with CGI- A form to mail program, Simple page search

UNIT-VI:
Introduction to Ruby, variables, types, simple I/O, Control, Arrays, Hashes, Methods, Classes, Iterators, Pattern Matching, Practical Web Applications

Text Books:

1. Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2. Web Technologies, Uttam K Roy, Oxford
3. The Web Warrior Guide to Web Programming, Bai, Ekedahl, Farrelll, Gosselin, Zak, Karparhi, MacIntyre, Morrissey, Cengage

Reference Books:

1. Ruby on Rails Up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006)
2. Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012)
3. Web Technologies, HTML< JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4. An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage

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III Year –II SEMESTER

T	P	C
0	3	2

Computer Networks & Network Programming Lab

Objectives:

- To teach students practicle orientation of f networking concepts
- To teach students various forms of IPC through Unix and socket Programming

PART – A

1. Implement the data link layer framing methods such as character stuffing and bit stuffing.
2. Implement on a data set of characters the three CRC polynomials – CRC 12, CRC 16 and CRC CCIP.
3. Implement Dijkstra's algorithm to compute the Shortest path thru a graph.
4. Take an example subnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm
5. Take an example subnet of hosts. Obtain broadcast tree for it.

PART – B

1. Implement the following forms of IPC.
   a)Pipes b)FIFO
2. Implement file transfer using Message Queue form of IPC
3. Write a programme to create an integer variable using shared memory concept and increment the variable
4. simultaneously by two processes. Use senphores to avoid race conditions
5. Design TCP iterative Client and server application to reverse the given input sentence
6. Design TCP iterative Client and server application to reverse the given input sentence
7. Design TCP client and server application to transfer file
8. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call "select"
9. Design a TCP concurrent server to echo given set of sentences using poll functions
10. Design UDP Client and server application to reverse the given input sentence
11. Design UDP Client server to transfer a file
12. Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.
13. Design a RPC application to add and subtract a given pair of integers

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III Year – II SEMESTER

T	P	C
0	3	2

Software Engineering Lab

Objective:

- The Software Engineering lab will facilitate the students to develop a preliminary yet practical understanding of software development process and tools

Experiments:

Take any real time problem and do the following experiments

1. Do the Requirement Analysis and Prepare SRS
2. Using COCOMO model estimate effort.
3. Calculate effort using FP oriented estimation model.
4. Analyze the Risk related to the project and prepare RMMM plan.
5. Develop Time-line chart and project table using PERT or CPM project scheduling methods.
6. Draw E-R diagrams, DFD, CFD and structured charts for the project.
7. Design of Test cases based on requirements and design.
8. Prepare FTR
9. Prepare Version control and change control for software configuration items.

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III Year –II SEMESTER

T	P	C
0	3	2

Web Technologies Lab

1. Design the following static web pages required for an online book store web site.

1) **HOME PAGE:**

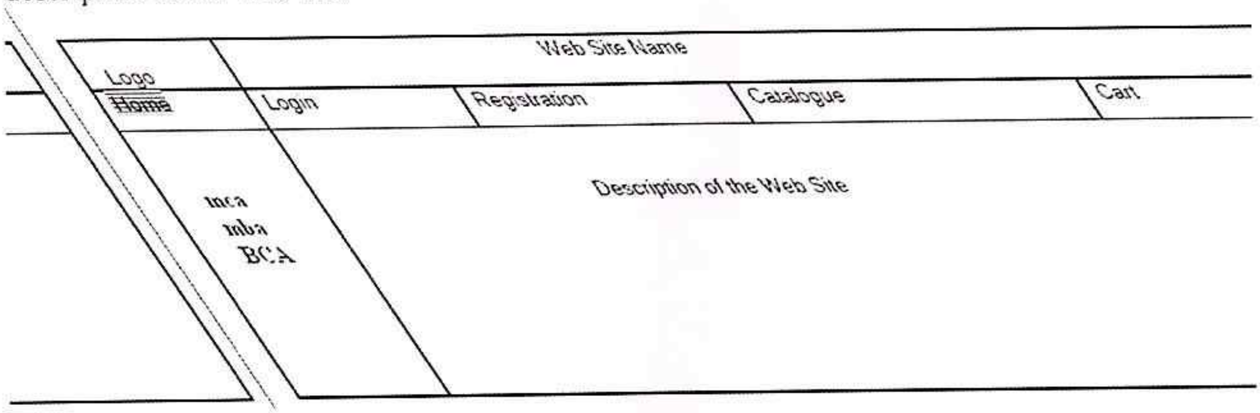
The static home page must contain three **frames**.

Top frame : Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

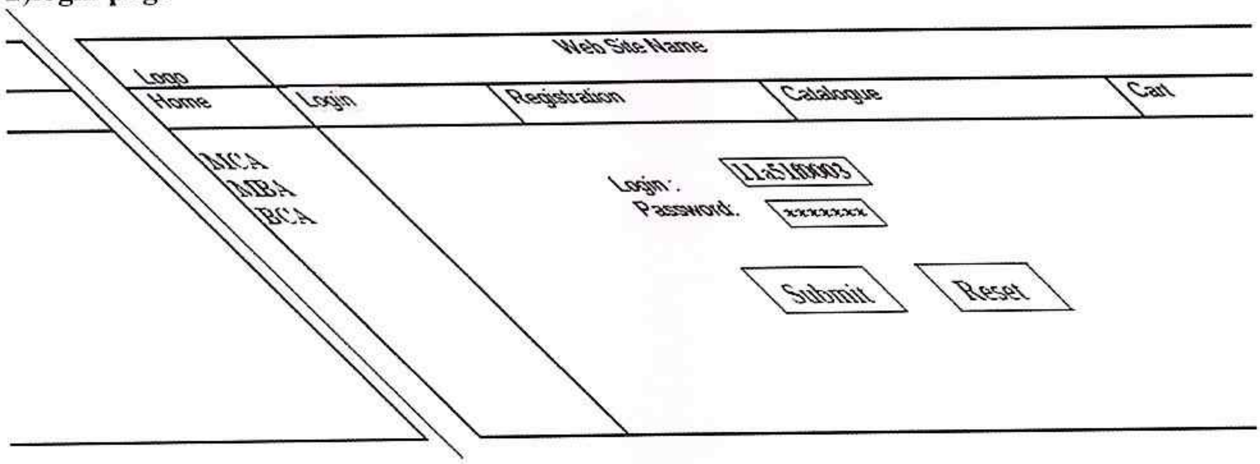
Left frame : At least four links for navigation, which will display the catalogue of respective links.

For e.g.: When you click the link **"MCA"** the catalogue for MCA Books should be displayed in the Right frame.

Right frame: The *pages to the links in the left frame must be loaded here*. Initially this page contains description of the web site.



2)**login page**



3) **CATOLOGUE PAGE:**

The catalogue page should contain the details of all the books available in the web site in a table.

The details should contain the following:

1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button.

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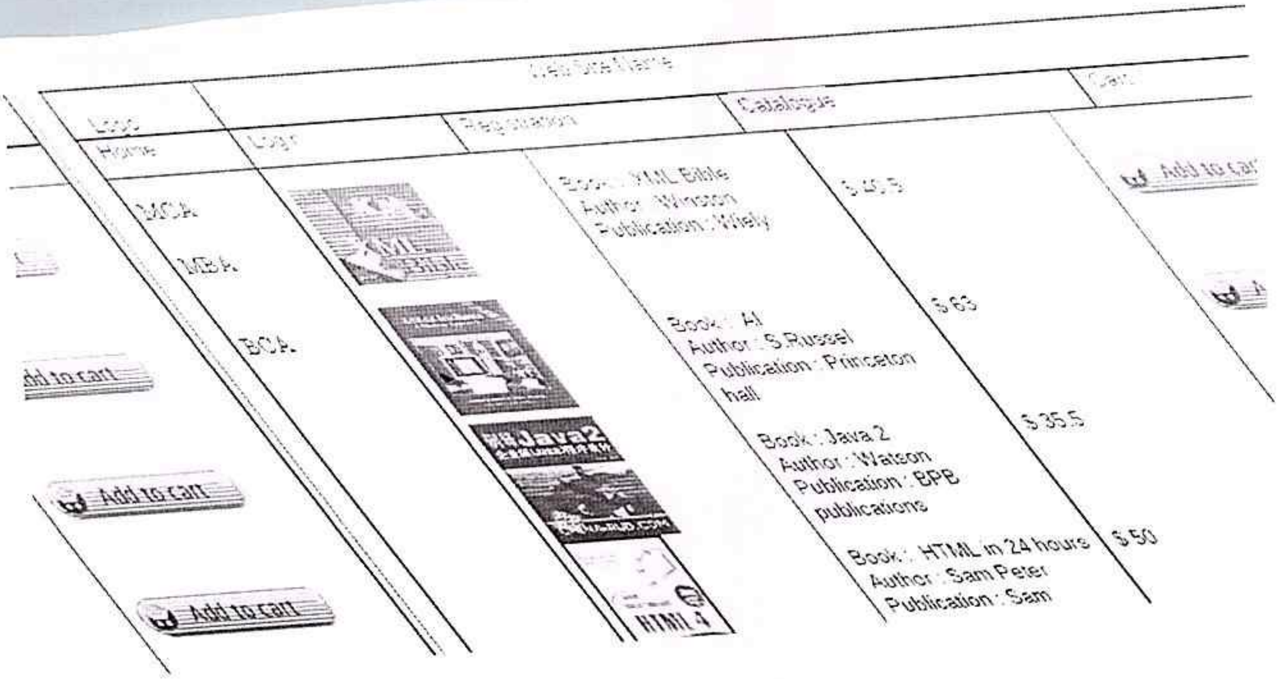

4. **REGISTRATION PAGE:**
Create a "*registration form* "with the following fields
1) Name (Text field)
2) Password (password field)
3) E-mail id (text field)
4) Phone number (text field)
5) Sex (radio button)
6) Date of birth (3 select boxes)
7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
8) Address (text area)

5. Design a web page using **CSS (C**ascading **S**tyle **S**heets**)** which includes the following:
1) Use different font, styles:
In the style definition you define how each selector should work (font, color etc.).
Then, in the body of your pages, you refer to these selectors to activate the styles

6. Write an XML file which will display the Book information which includes the following:
1) Title of the book
2) Author Name
3) ISBN number
4) Publisher name
5) Edition
6) Price
Write a Document Type Definition (DTD) to validate the above XML file.

7. Write Ruby program reads a number and calculates the factorial value of it and prints the same.

8. Write a Ruby program which counts number of lines in a text file using its regular expressions facility.

9. Write a Ruby program that uses iterator to find out the length of a string.

10. Write simple Ruby programs that uses arrays in Ruby.

11. Write programs which uses associative arrays concept of Ruby.

12. Write Ruby program which uses Math module to find area of a triangle.

13. Write Ruby program which uses tk module to display a window

14. Define complex class in Ruby and do write methods to carry operations on complex objects.

15. Write a program which illustrates the use of associative arrays in perl.

16. Write perl program takes a set names along the command line and prints whether they are regular files or special files

17. Write a perl program to implement UNIX `passwd' program

18. An example perl program to connect to a MySQl database table and executing simple commands.

19. Example PHP program for cotactus page.

20. User Authentication :
Assume four users user1,user2,user3 and user4 having the passwords pwd1,pwd2,pwd3 and pwd4 respectively. Write a PHP for doing the following.
1. Create a Cookie and add these four user id's and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.
If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display " You are not an authenticated user ".
Use init-parameters to do this.

21. Example PHP program for registering users of a website and login.

22. Install a database(Mysql or Oracle).
Create a table which should contain at least the following fields: name, password, email-id, phone number(these should hold the data from the registration form).
Write a PHP program to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.
Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

23. Write a PHP which does the following job:
Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).

24. Create tables in the database which contain the details of items (books in our case like Book name , Price, Quantity, Amount) of each category. Modify your catalogue page (week 2)in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using PHP

25. HTTP is a stateless protocol. Session is required to maintain the state.
The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time(i.e., from different systems in the LAN using the ip-address instead of localhost). This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method session.invalidate()).
Modify your catalogue and cart PHP pages to achieve the above mentioned functionality using sessions.

IV Year – I SEMESTER

T	P	C
4	0	3

Cryptography and Network Security

Course objectives:

The main objective of this course is to teach students to understand and how to address various software security problems in a secure and controlled environment. During this course the students will gain knowledge (both theoretical and practical) in various kinds of software security problems, and techniques that could be used to protect the software from security threats. The students will also learn to understand the "modus operandi" of adversaries; which could be used for increasing software dependability.

Course outcomes:

1. be able to individually reason about software security problems and protection techniques on both an abstract and a more technically advanced level.
2. be able to individually explain how software exploitation techniques, used by adversaries, function and how to protect against them.

Syllabus:

UNIT I : Classical Encryption Techniques
Objectives: *The Objectives of this unit is to present an overview of the main concepts of cryptography, understand the threats & attacks, understand ethical hacking.*

Introduction: Security attacks, services & mechanisms, Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Cyber threats and their defense(Phishing Defensive measures, web based attacks, SQL injection & Defense techniques)(TEXT BOOK 2), Buffer overflow & format string vulnerabilities, TCP session hijacking(ARP attacks, route table modification) UDP hijacking (man-in-the-middle attacks)(TEXT BOOK 3).

UNIT II: Block Ciphers & Symmetric Key Cryptography
Objectives: *The Objectives of this unit is to understand the difference between stream ciphers & block ciphers, present an overview of the Feistel Cipher and explain the encryption and decryption, present an overview of DES, Triple DES, Blowfish, IDEA.*

Traditional Block Cipher Structure, DES, Block Cipher Design Principles, AES-Structure, Transformation functions, Key Expansion, Blowfish, CAST-128, IDEA, Block Cipher Modes of Operations

UNIT III: Number Theory & Asymmetric Key Cryptography
Objectives: *Presents the basic principles of public key cryptography, Distinct uses of public key cryptosystems*

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms.
Public Key Cryptography: Principles, public key cryptography algorithms, RSA Algorithms, Diffie Hellman Key Exchange, Elgamal encryption & decryption, Elliptic Curve Cryptography.

UNIT IV : Cryptographic Hash Functions & Digital Signatures
Objectives: *Present overview of the basic structure of cryptographic functions, Message Authentication Codes, Understand the operation of SHA-512, HMAC, Digital Signature*

Application of Cryptographic hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC & CMAC. Digital Signatures, NIST Digital Signature Algorithm. Key management & distribution.

UNIT V: User Authentication, Transport Layer Security & Email Security

Objectives: *Present an overview of techniques for remote user authentication, Kerberos, Summarize Web Security threats and Web traffic security approaches, overview of SSL & TLS, Present an overview of electronic mail security.*

User Authentication: Remote user authentication principles, Kerberos

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell(SSH)

Electronic Mail Security: Pretty Good Privacy (PGP) and S/MIME.

UNIT VI: IP Security & Intrusion Detection Systems

Objectives: *Provide an overview of IP Security, concept of security association, Intrusion Detection Techniques*

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management.

Intrusion detection: Overview, Approaches for IDS/IPS, Signature based IDS, Host based IDS/IPS. (TEXT BOOK 2)

TEXT BOOKS:

1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC press
3. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

REFERENCE BOOKS:

1. Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford
2. Network Security & Cryptography, Bernard Menezes, Cengage,2010

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IV Year – I SEMESTER

T	P	C
4	0	3

UML & Design Patterns

Course Objectives:

The focus of this course is on design rather than implementation.

1. Introducing the Unified Process and showing how UML can be used within the process.
2. Presenting a comparison of the major UML tools for industrial-strength development.
3. introduction to design patterns, practical experience with a selection of central patterns.

Course Outcomes:

Students successfully completing this course will be able to:

1. identify the purpose and methods of use of common object-oriented design patterns
2. select and apply these patterns in their own designs for simple programs
3. represent the data dependencies of a simple program using UML
4. represent user and programmatic interactions using UML
5. create design documentation outlining the testable and complete design of a simple program
6. produce and present documents for the purpose of capturing software requirements and specification
7. produce plans to limit risks specific to software designed for use in a particular social context

Syllabus:

Unit I: Introduction : Introduction to OOAD; typical activities / workflows / disciplines in OOAD, Introduction to iterative development and the Unified Process, Introduction to UML; mapping disciplines to UML artifacts, Introduction to Design Patterns - goals of a good design, Introducing a case study & MVC architecture

Unit II: Inception: Artifacts in inception, Understanding requirements - the FURPS model, Understanding Use case model - introduction, use case types and formats, Writing use cases - goals and scope of a use case, elements / sections of a use case, Use case diagrams, Use cases in the UP context and UP artifacts, Identifying additional requirements, Writing requirements for the case study in the use case model

Unit III: Elaboration: System sequence diagrams for use case model, Domain model : identifying concepts, adding associations, adding attributes, Interaction Diagrams, Introduction to GRASP design Patterns ,Design Model: Use case realizations with GRASP patterns, Design Class diagrams in each MVC layer
Mapping Design to Code, Design class diagrams for case study and skeleton code

Unit 4: More Design Patterns: Fabrication, Indirection, Singleton, Factory, Facade, Publish-Subscribe

Unit 5: More UML diagrams : State-Chart diagrams, Activity diagrams, Component Diagrams, Deployment diagrams, Object diagrams

Unit 6: Advanced concepts in OOAD : Use case relationships, Generalizations
Domain Model refinements, Architecture, Packaging model elements

Textbooks:

1. 'Applying UML and patterns' by Craig Larman, Pearson
2. Object-Oriented Analysis & Design with the Unified Process by Satzinger, Jackson & Burd Cengage Learning
3. 'UML distilled' by Martin Fowler , Addison Wesley, 2003

Reference:

1. O'reilly 's 'Head-First Design Patterns' by Eric Freeman et al, Oreillly
2. UML 2 Toolkit, by Hans-Erik Eriksson, Magnus Penker, Brian Lyons, David Fado: WILEY-Dreamtech India Pvt. Ltd.

T	P	C
4	0	3

IV Year – I SEMESTER

Mobile Computing

Course Objective:

1) To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
2) To understand the typical mobile networking infrastructure through a popular GSM protocol
3) To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
4) To understand the database issues in mobile environments & data delivery models.
5) To understand the ad hoc networks and related concepts.
6) To understand the platforms and protocols used in mobile environment.

Course Outcomes:

1) Able to think and develop new mobile application.
2) Able to take any new technical issue related to this new paradigm and come up with a solution(s).
3) Able to develop new ad hoc network applications and/or algorithms/protocols.
4) Able to understand & develop any existing or new protocol related to mobile environment

Syllabus:

UNIT I

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

UNIT –II

(Wireless) Medium Access Control (MAC) : Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)

UNIT –III

Mobile Network Layer : IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

UNIT –IV

Mobile Transport Layer : Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues : Database Hoarding & Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT V

Data Dissemination and Synchronization : Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization – Introduction, Software, and Protocols.

UNIT VI

Mobile Ad hoc Networks (MANETs) : Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc. , Mobile Agents, Service Discovery.

Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, relating test life cycle to developmentlife cycle Software Testing Methodology.

UNIT II:

Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, How to verify code, Validation

Dynamic Testing I: Black Box testing techniques: Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing

UNIT III:

Dynamic Testing II: White-Box Testing: need, Logic coverage criteria, Basis path testing, Graph matrices, Loop testing, data flow testing, mutation testing

Static Testing: inspections, Structured Walkthroughs, Technical reviews

UNIT IV:

Validation activities: Unit testing, Integration Testing,. Function testing, system testing, acceptance testing

Regression testing: Progressives Vs regressive testing, Regression testability, Objectives of regression testing, When regression testing done?, Regression testing types, Regression testing techniques

UNIT V:

Efficient Test Suite Management: Test case deisgnWhy does a test suite grow, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite

Software Quality Management: Software Quality metrics, SQA models

Debugging: process, techniques, correcting bugs, Basics of testing management tools, test link and Jira

UNIT VI:

Automation and Testing Tools: need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools.

Testing Object Oriented Software: basics, Object oriented testing

Testing Web based Systems: Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems

Text Books:

1. Software Testing, Principles and Practices, Naresh Chauhan, Oxford
2. Foundations of Software testing, Aditya P Mathur, 2ed, Pearson
3. Software Testing- Yogesh Singh, CAMBRIDGE

Reference books:

1. *Software testing techniques - Baris Beizer, International Thomson computer press, second edition.*
2. Software Testing, Principles, techniques and Tools, M G Limaye, TMH
3. Effective Methods for Software testing, Willian E Perry, 3ed, Wiley

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Artificial Intelligence

Course Objectives:

1. To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.
2. To have an understanding of the basic issues of knowledge representation and blind and heuristic search, as well as an understanding of other topics such as minimax, resolution, etc. that play an important role in AI programs.
3. To have a basic understanding of some of the more advanced topics of AI such as learning, natural language processing, agents and robotics, expert systems, and planning

Course Outcomes:

After completing this course, students should be able to:

1. Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
2. Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
3. Implement basic AI algorithms (e.g., standard search algorithms or dynamic programming).
4. Design and carry out an empirical evaluation of different algorithms on a problem formalization, and state the conclusions that the evaluation supports.

Syllabus:

UNIT-I:

Introduction to artificial intelligence: Introduction ,history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of ai languages, current trends in AI

UNIT-II:

Problem solving: state-space search and control strategies : Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening a*, constraint satisfaction

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games

UNIT-III:

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

UNIT-IV:

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames **advanced knowledge representation techniques:** Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

UNIT-V:

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

UNIT-VI:

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory

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Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

TEXT BOOKS:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach , 2nd ed, Stuart Russel, Peter Norvig, PEA
3. Artificial Intelligence- Rich, Kevin Knight, Shiv Shankar B Nair, 3rd ed, TMH
4. Introduction to Artificial Intelligence, Patterson, PHI

REFERNCE BOOKS:

1. Atificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5th ed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

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Machine Learning

Course objectives:

The main objective of this course is for the students to achieve basic knowledge of artificial intelligence, a deepened technical understanding of machine learning research and theories, as well as practical experience of the use and design of machine learning and data mining algorithms for applications and experiments. The course has a strong focus towards applied IT. The student not only learns how to critically review and compare different algorithms and methods, but how to plan, design, and implement learning components and applications and how to conduct machine learning experiments.

Course outcomes:

- The student will be able evaluate and compare the performance or, other qualities, of algorithms for typical learning problems.
- The student will be able to design a supervised or unsupervised learning system.

Syllabus:

UNIT I: Introduction :
Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning. Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm, Remarks on version spaces and candidate elimination, Inductive bias.

UNIT II: Linear Regression & Logistic Regression:
Predicting numeric values: regression - Finding the best fit lines with linear regression, Locally weighted linear regression, Shrinking Coefficients, The bias / Variance tradeoff.
Logistic Regression: Classification with logistic regression and the sigmoid function, Using optimization to find the best regression coefficients.

UNIT III: Artificial Neural Networks:
Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm, Remarks on the back propagation algorithm, An illustrative example face recognition, Advanced topics in artificial neural networks

UNIT IV: Evaluation Hypotheses: Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

UNIT V: Support vector machines & Dimensionality Reduction techniques:
Separating data with the maximum margin, finding the maximum margin, efficient optimization with SMO algorithm, speeding up optimization with full platt SMO, Using Kernels for more Complex data.
Dimensionality Reduction techniques: Principal Component analysis, Example.

UNIT VI:
Instance-Based Learning- Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning.
Genetic Algorithms: Representing Hypotheses, Genetic Operators, Fitness Function and Selection, Illustrative Example.

TEXT BOOKS:
1. Machine Learning ,Tom M. Mitchell, MGH
2. Machine Learning in Action, Peter Harington, 2012, Cengage.

REFERENCE BOOKS:
1. Introduction to Machine Learning, Ethem Alpaydin, PHI, 2004

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IV Year – I SEMESTER

T	P	C
0	3	2

UML & Design Patterns Lab

(**Textbook no.2 i.e.** Object-Oriented Analysis & Design with the Unified Process by Satzinger, Jackson & Burd Cengage Learning will be the primary source for finding templates for developing different artifacts / diagrams)

Take three case studies:

- **Customer Support System (in the** Object-Oriented Analysis & Design with the Unified Process by Satzinger, Jackson & Burd Cengage Learning)
- **Point-Of-Sale Terminal (in Larman textbook)**
- **Library Management System (in the reference book no. 2 i.e. UML toolkit)**

Week 1:

Familiarization with Rational Rose or Umbrello

For each case study:

Week 2, 3 & 4:

For each case study:

a) Identify and analyze events
b) Identify Use cases
c) Develop event table
d) Identify & analyze domain classes
e) Represent use cases and a domain class diagram using Rational Rose
f) Develop CRUD matrix to represent relationships between use cases and problem domain classes

Week 5 & 6:

For each case study:

a) Develop Use case diagrams
b) Develop elaborate Use case descriptions & scenarios
c) Develop prototypes (without functionality)
d) Develop system sequence diagrams

Week 7, 8, 9 & 10:

For each case study:

a) Develop high-level sequence diagrams for each use case
b) Identify MVC classes / objects for each use case
c) Develop Detailed Sequence Diagrams / Communication diagrams for each use case showing interactions among all the three-layer objects
d) Develop detailed design class model (use GRASP patterns for responsibility assignment)
e) Develop three-layer package diagrams for each case study

Week 11 & 12:

For each case study:

a) Develop Use case Packages
b) Develop component diagrams
c) Identify relationships between use cases and represent them
d) Refine domain class model by showing all the associations among classes

Week 13 onwards:

For each case study:

a) Develop sample diagrams for other UML diagrams - state chart diagrams, activity diagrams and deployment diagrams

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IV Year – I SEMESTER

T	P	C
0	3	2

Mobile Application Development Lab

1. Write a J2ME program to show how to change the font size and colour.
2. Write a J2ME program which creates the following kind of menu.
    * cut
    * copy
    * past
    * delete
    * select all
    * unselect all
3. Create a J2ME menu which has the following options (Event Handling):
    - cut - can be on/off
    - copy - can be on/off
    - paste - can be on/off
    - delete - can be on/off
    - select all - put all 4 options on
    - unselect all - put all

4. Create a MIDP application, which draws a bar graph to the display. Data values can be given at int[] array. You can enter four data (integer) values to the input text field.

5. Create an MIDP application which examine, that a phone number, which a user has entered is in the given format (Input checking):
* Area code should be one of the following: 040, 041, 050, 0400, 044
* There should 6-8 numbers in telephone number (+ area code)

6. Write a sample program to show how to make a SOCKET Connection from J2ME phone. This J2ME sample program shows how to how to make a SOCKET Connection from a J2ME Phone. Many a times there is a need to connect backend HTTP server from the J2ME application. Show how to make a SOCKET connection from the phone to port 80.

7. Login to HTTP Server from a J2ME Program. This J2ME sample program shows how to display a simple LOGIN SCREEN on the J2ME phone and how to authenticate to a HTTP server. Many J2ME applications for security reasons require the authentication of the user. This free J2ME sample program, shows how a J2ME application can do authentication to the backend server. Note: Use Apache Tomcat Server as Web Server and MySQL as Database Server.

8. The following should be carried out with respect to the given set of application domains: (Assume that the Server is connected to the well-maintained database of the given domain. Mobile Client is to be connected to the Server and fetch the required data value/information)
    - Students Marks Enquiry
    - Town/City Movie Enquiry
    - Railway/Road/Air (For example PNR) Enquiry/Status
    - Sports (say, Cricket) Update
    - Town/City Weather Update
    - Public Exams (say Intermediate or SSC)/ Entrance (Say EAMCET) Results Enquiry

Divide Student into Batches and suggest them to design database according to their domains and render information according the requests.

9. Write an Android application program that displays Hello World using Terminal.

10. Write an Android application program that displays Hello World using Eclipse.

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11. Write an Android application program that accepts a name from the user and displays the hello name to the user in response as output using Eclipse.

12. Write an Android application program that demonstrates the following:

(i) LinearLayout
(ii) RelativeLayout
(iii) TableLayout
(iv) GridView layout

13. Write an Android application program that converts the temperature in Celsius to Fahrenheit.

14. Write an Android application program that demonstrates intent in mobile application development.

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IV Year – I SEMESTER

T	P	C
0	3	2

Hadoop & BigData Lab

Week 1,2:

1. Implement the following Data structures in Java

   a)Linked Lists b) Stacks c) Queues d) Set e) Map

Week 3, 4:

2. (i)Perform setting up and Installing Hadoop in its three operating modes:
   Standalone,
   Pseudo distributed,
   Fully distributed

   (ii)Use web based tools to monitor your Hadoop setup.

Week 5:

3. Implement the following file management tasks in Hadoop:
   - Adding files and directories
   - Retrieving files
   - Deleting files

   Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.

Week 6:

4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.

Week 7:

5. Write a Map Reduce program that mines weather data.

   Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.

Week 8:

6. Implement Matrix Multiplication with Hadoop Map Reduce

Week 9,10:

7. Install and Run Pig then write Pig Latin scripts to sort, group, join, project, and filter your data.

Week 11,12:

8. Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes

I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS							

COURSE OBJECTIVES:

- This course provides a comprehensive knowledge of data structures like Linked List, Priority Queues, Tree, Graph and ability to implement the same in software applications.

COURSE OUTCOMES:

After completion of this course, the students would be able to

- Understand basic concepts of data structures and general algorithmic problem types like sorting, searching and basic operations on Tree & Graph.
- Familiar with a variety of advanced Abstract Data Type (ADT) & Hashing technique and their Implementations.
- Distinguish among AVL tree, splay tree, B tree and B+ trees.
- Implement fundamental algorithms and data structures to real-world problems.

UNIT-I

Introduction to Data Structures, Singly Linked Lists, Doubly Linked Lists, Circular Lists Algorithms. Stacks and Queues: Algorithm Implementation using Linked Lists.

UNIT-II

Searching-Linear and Binary Search Methods. Sorting-Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort. Trees- Binary trees, Properties, Representation and Traversals (DFT, BFT), Expression Trees (Infix, prefix, postfix). Graphs-Basic Concepts, Storage Structures and Traversals.

UNIT-III

Dictionaries, ADT, The List ADT, Stack ADT, Queue ADT, Hash Table Representation, Hash Functions, Collision Resolution-Separate Chaining, Open Addressing-Linear Probing, Double Hashing.

UNIT-IV

Priority queues- Definition, ADT, Realising a Priority Queue Using Heaps, Definition, Insertion and Deletion.

UNIT-V

Search Trees- Binary Search Trees, Definition, ADT, Implementation, Operations-Searching, Insertion, Deletion.

UNIT-VI

Search Trees- AVL Trees, Definition, Height of AVL Tree, Operations, Insertion, Deletion and Searching.

Search Trees- Introduction to Red-Black and Splay Trees, B-Trees, Height of B-Tree, Insertion, Deletion and Searching, Comparison of Search Trees.

TEXT BOOKS:

1. Data Structures: A PseudoCode Approach, 2/e, Richard F.Gilberg. Behrouz A. Forouzon, Cengage.
2. Data Structures, Algorithms and Applications in java, 2/e, Sartaj Sahni, University Press.

REFERENCE BOOKS:

1. Data Structures and Algorithm Analysis, 2/e, Mark Allen Weiss, Pearson.
2. Data Structures and Algorithms, 3/e, Adam Drozdek, Cengage.
3. C and Data Structures: A Snap Shot Oriented Treatise Using Live Engineering Examples, N.B.Venkateswarulu, E. V. Prasad, S Chand & Co, 2009.
4. Data Structures, Algorithm and OOP, Heilman, TMH.
5. Introductions to Algorithms, 2/e, Cormen, PHI, 2001.
6. Fundamentals of Computer Algorithms, 2/e, Horowitz, Sahni, Rajasekaran, University Press.
7. Design and Analysis, Dave, Pearson, 2008.
8. Design and Analysis Algorithms, Panneerselvam, PHI,2007.
9. Data Structures, Seymour Lipschutz, Schaum's Outlines, TMH.

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I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
COMPUTER ORGANIZATION AND ARCHITECTURE							

COURSE OBJECTIVES:

- Comprehensive knowledge of computer system including the analysis and design of components of the system.
- Gives an overview of representation of data.
- Gives an overview of different digital electronic circuits.
- Describes different parameters of a memory system, organization and mapping of various types of memories.
- Illustrates algorithms for basic arithmetic operations using binary and decimal representation.
- Describes the means of interaction of devices with CPU, their characteristics and operating modes.
- Gives an introductory knowledge of architecture of 8086 microprocessor.

COURSE OUTCOMES:

After completion of this course, the students would be able to

- Number Systems and Arithmetic operations on all the number systems
- The organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit.
- Basic structure of a digital computer.
- Architecture of 8086 microprocessor.

UNIT I:

Basic Structure of Computers: Computer Types, Functional unit, Basic Operational concepts, Bus structures, Data Representation: Data types, Complements, Fixed Point Representation, Floating Point Representation, Other Binary Codes and Error Detection Codes.

UNIT II:

Register Transfer Language and Micro-operations: Register Transfer language, Register Transfer Bus and memory transfers, Arithmetic micro operations, Logical micro operations, Shift micro operations, Arithmetic logic shift unit.

Basic Computer Organization and Design: Instruction codes, Computer Registers, Computer instructions, Timing and control, Instruction cycle, Memory – Reference Instructions, Input – Output Instructions and Interrupts.

UNIT III:

Central Processing Unit: General Register Organization, STACK organization. Instruction formats, Addressing modes, Data Transfer and manipulation, Program control, Reduced Instruction Set Computer.

Micro Programmed Control Unit: Control memory, Address sequencing, Micro program example, Design of control unit

UNIT IV:

Computer Arithmetic: Addition and subtraction, multiplication Algorithms, Division Algorithms, Floating – point Arithmetic operations, Decimal Arithmetic unit, Decimal Arithmetic operations.

UNIT V:

The Memory System: Memory Hierarchy, Main memory, Auxiliary memory, Associative Memory, Cache Memory, Virtual Memory.

UNIT-VI:

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct memory Access.

Multi Processors: Introduction, Characteristics of Multiprocessors, Interconnection Structures, Inter processor Arbitration.

TEXT BOOKS:

1. Computer System Architecture, M. Morris Mano, Third Edition, Pearson.
2. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, Fifth Edition, McGraw Hill.
3. Computer Architecture: A Quantitative Approach, John L. Hennessy and David A. Patterson, Fourth Edition, Elsevier.

REFERENCE BOOKS:

1. Computer Organization and Architecture, William Stallings, Sixth Edition, Pearson/PHI.
2. Structured Computer Organization, Andrew S. Tanenbaum, Fourth Edition, PHI/Pearson.
3. Fundamentals of Computer Organization and Design, Sivarama P. Dandamudi, Springer.

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I M.TECH-I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
DATABASE MANAGEMENT SYSTEMS							

COURSE OBJECTIVES:

- Provides students with theoretical knowledge of databases.
- Develop practical skills in the use of databases and database management systems for information technology applications.
- Incorporate the required knowledge to design and implement relational databases.

COURSE OUTCOMES:

After completion of this course, the students would be able to

- Define a Database Management System and give a description of the Database Management structure.
- Understand the applications of Databases and know the advantages and disadvantages Of the different models.
- Compare relational model with the Structured Query Language (SQL) and know the
- Constraints associated with relational database model.
- Know the rules guiding transaction and identify the various functions of Database Administrator.

UNIT–I:

Introduction: Database system, Characteristics (Database vs. File System), Database Users (Actors on Scene, Workers behind the scene), Advantages of Data base systems, and Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

UNIT–II:

Entity Relationship Model: Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

Basic SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions (Date and Time, Numeric, String conversion).

UNIT–III:

SQL : Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.SQL constructs that grant access or revoke access from user or user groups.

Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance

UNIT–IV:
Schema Refinement (Normalization): Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3 NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

UNIT–V:
Transaction Management and Concurrency Control: Transaction, properties of transactions, transaction log, and transaction management with SQL using commit rollback and save point. Concurrency control for lost updates, uncommitted data, inconsistent retrievals and the Scheduler. Concurrency control with locking methods: lock granularity, lock types, two phase locking for ensuring serializability, deadlocks, Concurrency control with time stamp ordering:Wait/Die and Wound/Wait Schemes.

UNIT–VI:
Storage And Indexing: Database file organization, file organization on disk, heap files and sorted files, hashing, single and multi-level indexes, dynamic multilevel indexing using B-Tree and B+ tree, index on multiple keys.

TEXT BOOKS:

1. Database Management Systems, 3/e Raghuram Krishnan, Johannes Gehrke, TMH.
2. Database Management System, 6/e Ramez Elmasri, Shamkant B. Navathe, PEA.
3. Database Principles Fundamentals of Design Implementation and Management, Corlos Coronel, StevenMorris, Peter Robb, Cengage Learning.

REFERENCE BOOKS:

1. Database System Concepts. 5/e Silberschatz, Korth, TMH.
2. Introduction to Database Systems, 8/e C J Date, PEA.
3. The Database book principles & practice using Oracle/MySql Narain Gehani, University Press.

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	4	0	0	40	60	100	3
OPERATING SYSTEMS							

COURSE OBJECTIVES:

- To gain knowledge about the Operating Systems concepts such as process, main memory management, secondary memory management, CPU and disk scheduling etc.

COURSE OUTCOMES:

After completion of this course, the students would be able to

- Describe the general architecture of computers.
- Describe, contrast and compare differing structures for operating Systems.
- Understand various process management concepts including scheduling, synchronization and deadlocks.
- Understand and analysis and implementation of: processes, physical and virtual memory, scheduling, I/O and files.

UNIT-I

Overview of Operating System Introduction, Computer System Organization, Computer System Architecture, Operating Systems Services, Systems Calls and Types, Evolution of Operating Systems.

UNIT-II

Process Management

Process, Process States , Process Control Block ,Process Scheduling, Operations On Processes, Threads Concepts, Process Scheduling Concepts, CPU Scheduling Algorithms, Multiple Processor Scheduling.

UNIT-III

Synchronization

Importance of Synchronization, The Critical-Section Problem, Semaphores, Classic Problems of Synchronization, Monitors, Synchronization Examples.

PRINCIPLES OF DEADLOCK

Deadlock System Model, Deadlock Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Detection and Avoidance, Recovery Form Deadlock.

UNIT-IV

Memory Management Strategies & Virtual Memory Management

Concepts, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory, Demand Paging, Page-Replacement Algorithms, Thrashing.

Secondary-storage structures & I/O systems

Overview of Mass-Storage Structure, Disk Structure, Disk Scheduling, Disk Management, RAID Structure, I/O Hardware, Application Interface, Kernel I/O Subsystem.

UNIT-V

File System Interface And Implementation

The Concept of a File, Access Methods, Directory Structure, File System Structure, File System Implementation, File Sharing, Protection, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance.

UNIT-VI

Protection And Security

Principles of Protection, Security Problem, System and Network Threats, Denial Lock Service, Importance of Cryptography.

TEXT BOOKS:

1. Operating System Principles,7/E, Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, WILEY INDIA publications.
2. Operating Systems, 6/e, William Stallings, PHI/Pearson.

REFERENCES BOOK:

3. Operating Systems, 2/e, Dhamdhre.

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I M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
SOFTWARE ENGINEERING							

COURSE OBJECTIVES:

- This course is intended to provide the students with an overall view over Software Engineering discipline and with insight into the processes of software development.

COURSE OUTCOMES:

After completion of this course the students are able to:

- Learn about generic models of software development process.
- Understand fundamental concepts of requirements engineering and Analysis Modeling.
- Comparing different design techniques and their implementation.
- Learn various testing and maintenance measures

UNIT-I

Introduction to Software Engineering : The evolving role of software, Changing Nature of Software, Software myths.

A Generic view of process : Software engineering- A layered technology, a process framework, The Capability Maturity Model Integration (CMMI), Process patterns, process assessment, personal and team process models.

Process models : The waterfall model, Incremental process models, Evolutionary process models, The Unified process.

UNIT-II

Software Requirements: Functional and non-functional requirements, User requirements, System requirements, Interface specification, the software requirements document.

Requirements engineering process: Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management.

System models: Context Models, Behavioral models, Data models, Object models, structured methods.

UNIT-III

Design Engineering: Design process and Design quality, Design concepts, the design model.

Creating an architectural design: Software architecture, Data design, Architectural styles and patterns, Architectural Design.

UNIT-IV

Object-Oriented Design: Objects and object classes, An Object-Oriented design process, Design evolution.

Performing User interface design: Golden rules, User interface analysis and design, interface analysis, interface design steps, Design evaluation.

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UNIT-V

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, Black-Box and White-Box testing, Validation testing, System testing, the art of Debugging.

Product metrics: Software Quality, Metrics for Analysis Model, Metrics for Design Model, Metrics for source code, Metrics for testing, Metrics for maintenance.

UNIT-VI

Metrics for Process and Products: Software Measurement, Metrics for software quality.

Risk management: Reactive vs. Proactive Risk strategies, software risks, Risk identification, Risk projection, Risk refinement, RMMM, RMMM Plan.

Quality Management : Quality concepts, Software quality assurance, Software Reviews, Formal technical reviews, Statistical Software quality Assurance, Software reliability, The ISO 9000 quality standards.

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition. McGrawHill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson education.
3. Software Engineering, A Precise approach, Pankaj Jalote, Wiley.

REFERENCES BOOKS:

1. Software Engineering- K.K. Agarwal & Yogesh Singh, New Age International Publishers
2. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiely.
3. Systems Analysis and Design- Shely Cashman Rosenblatt,Thomson Publications.
4. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.

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I M.TECH-II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
DATA WAREHOUSING AND DATA MINING							

COURSE OBJECTIVES:

- How to analyze the data, identify the problems and choose the relevant models and algorithms in Data Warehousing and Data Mining.

COURSE OUTCOMES:

After completion of this course, the students would be able to

- To examine the types of data to be mined and extract knowledge using Data Mining Techniques.
- Identify components in typical Data Warehouse architectures.
- Analyze the different operations and techniques involved in Data Warehouse.
- Compare and contrast different dominant Data Mining Algorithms.

UNIT-I

Introduction to data mining: What is data mining, motivating challenges, origins of data mining, data mining tasks, types of data attributes and measurements, types of data sets, data quality.

UNIT-II

Data Pre-processing: Why Pre-process the data, Measures of similarity and dissimilarity: Basics, similarity and dissimilarity between simple attributes, dissimilarities between data objects, similarities between data objects, Examples of proximity measures: Similarity measures for binary data, Jaccard Coefficient, Cosine similarity, Extended Jaccard Coefficient, Correlation, Exploring data: Data set, Summary Statistics.

UNIT-III

Data Warehouse: Basic concepts, Data warehousing modelling: Data cube and OLAP, Data Warehouse Architecture, Data Warehouse implementation: Efficient data cube computation, partial materialization, indexing OLAP data, Efficient processing of OLAP queries.

UNIT-IV

Classification: Basic concepts, general approach for solving a classification problem, decision tree induction: working of decision tree, building a decision tree, methods for expressing attribute test conditions, measures for selecting the best split, Algorithm for decision tree induction.

Classification alternative techniques: Bayesian classifier, Bayes Theorem, Using Bayes theorem for classification, Naïve Bayesian classifier.

Model over fitting: Due to presence of noise, due to lack of representation samples, evaluating the performance of classifier: hold out method, random subsampling, cross validation, bootstrap.

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UNIT-V

Association analysis: Problem definition, frequent itemset generation: The Apriori principle, frequent item set generation in the Apriori algorithm, candidate generation and pruning, support counting, rule generation, compact representation of frequent item sets, FP-Growth algorithms. Handling categorical and continuous attributes.

UNIT-VI

Cluster Analysis: Basic concepts and Algorithms: What is Cluster Analysis? Different types of clustering, Different types of clusters, K-means, The Basic K-means Algorithm, K-means: Additional Issues, Bisecting K-means, K-means and different types of clusters, Strengths and weaknesses, Agglomerative hierarchical clustering, Basic Agglomerative hierarchical clustering algorithm, Specific techniques, DBSCAN, Traditional density, center based approach, Strengths and weaknesses.

TEXT BOOKS:

1. Introduction to Data Mining: Pang-Ning tan, Michael Steinbach, Vipin kumar, Addision- Wesley.
2. Data Mining: Concepts and Techniques, 2/e, Jiawei Han, Micheline Kamber, Elsevier, 2006.

REFERENCE BOOKS:

1. Data Mining: Introductory and Advanced Topics, Margaret H Dunham, Pearson, 2006.
2. Introduction to Data Mining with Case Studies: GK Gupta, PHI.
3. Fundamentals of Data Warehouses, 2/e , Jarke, Lenzerini, Vassiliou, Vassiliadis, Springer.
4. Insight into Data Mining: Theory and Practice Soman, Diwakar, Shyam, Ajay, PHI, 2006.

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	3	1	0	40	60	100	3

PRINCIPLES AND PRACTICE OF MANAGEMENT

COURSE OUTCOMES: The student is able to

CO1: Know the Management concepts and functions.

CO2: Apply the concepts of planning, decision making.

CO3: Define organisation and discuss the delegation of authority, decentralisation and departmentation in real life situations.

CO4: Evaluate the global context for taking managerial actions of staffing.

CO5: Analyse the various functions under the concept of staffing.

CO6: Understand the application of controlling principles and practices, Ethics and corporate social responsibility.

SYLLABUS:

UNIT-I

Management : Definition, Nature, Scope and Importance, Science, Art, Profession, Managerial roles and functions, Management skills, Evolution of management thought, early contributions, modern approaches, levels of management, challenges of manage, management Vs Administration.

UNIT-II

Planning : Nature and Importance of planning, - Principles – Steps in planning – Types of planning, Barriers to effective planning – Planning premises, - Forecasting techniques- Decision making role – Significance – Process of Decision making – techniques – MBO.

UNIT-III

Organizing: Concept, Nature, Principles, Theories of organization, Organisational structure basis, Departmentation, Span of management, power, Authority and Responsibility Relationship, Delegation, Centralization and decentralization of Authority.

UNIT-IV

Staffing: Concept, Factors of Staffing, Man power planning, process, Concept of job Analysis, Job rotation and Evaluation recruitment and Selection, Training and Development, Performance Appraisal.

UNIT-V

Directing: Fundamentals, Principles, Motivation and its theories, Leadership and theories, Styles, Communication, Concept, Process and types, Barriers, Essentials of Effective communication.

UNIT-VI

Controlling : Concepts, Steps, Design of effective control System, Types of Controlling Techniques, Co-ordination types and principles, Ethical Issues in Management, corporate Social Responsibility.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

Text Books:

1. Dr.P.SubbaRao and Prof. N.SambasivaRao:"**Management and organizational Behaviour- (Text and Cases)**", HimalayaPublishing House, Mumbai.
2. J S Chandan: "***Management Theory and Practice***", Vikas Publishing House Limited, 2009.
3. Gupta R S, Sharma B D Bhalla N S: "**Principles and Practice ofManagement**", Kalyani Publications, Hyderabad, 2008.

REFERENCES:

1. Koonz, Weihrich and Aryasri: "***Principles of Management***", Tata McGraw Hill, 2004.
2. William, Tripathy: "**MGMT (including instructor recourses)**", Cengage Learning, New Delhi, 2013.
3. Griffin, Moorhead: "Managing OrganisationalBehaviour", Cengage Learning, New Delhi.2013.
4. Jerald Greenberg and Robert A Baron: "***Behavior inOrganizations***", PHI Learning Private Limited, New Delhi, 2009.
5. Mullins, Laurie: "**Management and OrganisationalBehaviour**", Pearson Education, New Delhi, 2013
6. Jennifer M.George and Gareth R. Jones: "***Understanding andManaging Organizational Behavior***", Pearson Education, NewDelhi, 2009.
7. Meenakshi Gupta: "***Principles of Management***", PHI Private Limited, New Delhi, 2009.
8. Anil Bhat, Arya Kumar: "***Management***", Oxford University, New Delhi, 2008.
9. Jai B.P.Sinha: "***Culture and Organizational Behavior***", Sage Publication India Private Limited, New Delhi, 2008.
10. K.Aswathappa: "**Organizational Behavior-Text, Cases andGames**", Himalaya Publishing House, New Delhi, 2008,
11. PareekUdai: "*Understanding Organizational Behavior*", Oxford University Press, New Delhi, 2007.

I MBA-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
MANAGERIAL ECONOMICS							

COURSE OUTCOMES: The student is able to

CO1: Describe the importance of managerial economics and its contribution to decision making in different types of business organizations by the managerial economist.

CO2: Understand the basic principles of managerial economics.

CO3: Apply demand analysis concept in the real life business situations.

CO4: Understand the meaning and usefulness of the production function and cost function in analysing the firm's production activity.

CO5: Understand the importance of cost function in analysing the profitability of business.

CO6: Appraise the market structure and different types of markets and pricing policies.

SYLLABUS:

UNIT -I

Introduction to Managerial Economics: Types of Business Organizations-Definition, Approaches to Managerial Economics- wealth, welfare and scarcity approaches-Nature and Scope of Managerial Economics, Relationship with other areas of Economics, Role of managerial economist.

UNIT –II

Fundamentals of Economic Principles: Managerial theories of firm, basic economic principles- the opportunity cost, incremental concept, scarcity, marginalism, Equi-marginalism, time Perspective, Discounting Principle, Risk & uncertainty.

UNIT –III

Demand Analysis: Elasticity of demand, types and significance of Elasticity of Demand - Measurement of price Elasticity of Demand – Need for Demand forecasting, forecasting techniques, Law of Supply, Elasticity of Supply.

UNIT -IV

Production Analysis: Production function, Marginal Rate of Technical Substitution, Production functions with one/two variables, Cobb-Douglas Production Function, Returns to Scale and Laws of returns.

UNIT-V

Cost theory and estimation: Cost concepts, determinants of cost, cost – output relationship in the short run and long run – Modern development in cost theory – Saucer shaped short – run Average cost curves – Average total cost curve – Cost - Volume – Profit analysis

UNIT-VI

Market Structure and Pricing practices: Features and Types of different Markets – Price-Output determination in Perfect competition, Monopoly, Monopolistic competition and Oligopoly both in the long run and short run. Pricing methods in practice.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

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Text Books:

1. Mithani D M: ''**Managerial Economics**", Himalaya Publishing House, Mumbai, 2008.
2. Varshney, R.L and Maheswari, K L: ''**Managerial Economics**", Sultan Chand and Sons, New Delhi, 2002.

REFERENCES:

1. Paul, Koushil: "**Managerial Economics**", Cengage Learning, New Delhi,
2. Siddiqui S A,Siddiqui A S: "**Managerial Economics**", and Financial Analysis", New Age International Publishers, New Delhi, 2008.
3. VanitaAgarwal: "**Managerial Economics**", Pearson, New Delhi, 2013.
4. Dominick Salvatore: "**Managerial Economics**", Oxford University Press, New Delhi,2010.
5. D.L. Ahuja: "**Managerial Economics**", S. Chand & Company ltd,New Delhi-55.
6. O'Sullivan, Sheffrin, Perez "Micro Economics: Principles, Applications and Tools", Pearson Education.
7. Dwivedi D N: ''**Managerial Economics**", Vikas Publishing House Private Limited, New Delhi, 2009.
8. S.B. Srivastava: "**Engineering and Managerial Economics**", SCITECH Publication, New Delhi.
9. Atmanand: "**Managerial Economics**", Excel Publications. New Delhi, 2012.
10. Narayanan Nadar E, Vijayan S: ''**Managerial Economics**", PHI Private Limited, New Delhi,2009.
11. Hirscgey: "**Managerial Economics**", Cengage Learning, New Delhi, 2013.
12. P.N.Chopra: "**Managerial Economics**", Kalyani Publications, New Delhi, 2011.

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I MBA-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
ACCOUNTING FOR MANAGERS							

COURSE OUTCOMES: The student is able to

CO1: Understand the basic knowledge of accounting, bookkeeping, accounting Principles, accounting cycle.

CO2: Apply the concepts of journal, ledger and final accounts in preparation of financial statements of business.

CO3: Identify the nature of expenditure and revenue; evaluate the role of accounting policies like depreciation, inventory valuation and accounting standards.

CO4: Understand financial analysis and apply technique of ratio analysis.

CO5: Evaluate the concepts of funds flow analysis and cash flow analysis in estimating financial position of the business.

CO6: Analyse the various contemporary issues in accounting.

SYLLABUS:

UNIT-I

Introduction to Accounting: Definition Of Accounting, Accounting Cycle, Significance Of Accounting, Objectives Of Accounting, Accounting Equation, Users Of Accounting Information, Accounting Principles, Accounting Concept And Conventions (GAAP)

UNIT-II

Books of original entry: Journal- Ledger- Final Accounts with Simple Adjustments

UNIT-III

Measuring Business Income, Distinctions Between Capital And Revenue, Matching Revenue And Expenditure, Role Of Accounting Policies Like Depreciation And Inventory Valuation. Accounting standards –IAS- IFRS.

UNIT-IV

Financial Statement Analysis- Scope and Preparation of Financial Statement Analysis- ratio analysis-liquidity, activity, structural and leverage and profitability ratios. Significance and limitations of ration analysis (problems)

UNIT-V

Funds flow analysis- concepts of funds, ascertaining funds from operations , sources of funds, uses of funds- preparation and analysis of funds flow statement and cash flow statements (problems).

UNIT-VI

Contemporary Issues In Accounting: Inflation Accounting, Human Resource Accounting, Computerized Accounting, Responsibility Accounting, Zero Based Budgeting.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

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Text Books:

1. VijayaKumar.P, Ravindra P.S., Kiran Kumar V: "**Accountingfor Managers**", Himalaya Publishing House, New Delhi, 2013

2. Dr.JawaharLal: "**Accounting for management**", Himalaya Publishing house, NewDelhi, 2012.

3. G. Prasad, "Accounting for Manager", Jai Bharat Publications, Guntur, 2013.

REFERENCES:

1. Shankarnarayana, Ramanath: "**Finanacial Accounting forManagement**", Cengage Learning, New Delhi.

2. Ramachandran N, RamKumarKakani: **Financial Accountingfor Management**", McGraw Hill – 2013.

3. Maheshwari, Maheashwari and Maheshwari, "**FinancialAccounting**", Vikas publishing House, New Delhi,2013

4. AmberishGupta:"**Financial Accounting for Management**", Pearson Education, 2012.

5. Paresh Shah: "**Financial accounting for management**", Oxford University press, New Delhi, 2013.

6. Asish K. Bhattacharyya: "**Essentials of FinancialAccounting**", PHI Learning, New Delhi, 2012.

7. Dr.V.R.Palanivelu: "**Accounting for Management**". University Science Press, New Delhi, 2009.

8. Ashok Banerjee: "**Financial Accounting**", a managerial Emphasis, Excel books, New Delhi, 2012.

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	3	1	0	40	60	100	3
MANAGERIAL COMMUNICATIONS & SOFT SKILLS							

COURSE OUTCOMES: The student is able to

CO1: Understand the basic concepts, scope, process and challenges of communication.

CO2: Distinguish between different types of communication and its importance and implication strategies.

CO3: Interpret different forms of effective internal and external business correspondence.

CO4: Develop presentation skills.

CO5: Adapt report writing skills of different types on need basis.

CO6: Analyse the emerging issues in communication with respect to the impact of technology and soft skills etc.

SYLLABUS:

UNIT-I

Communication- definition- objectives-nature and scope- process of communication- media of communication, written, oral, audio-visual communication-Silence-developing LSR communication- problems and challenges of communication.

UNIT-II

Formal and informal communication- models of inter personal communication- Intra personal communication, Exchange theory- verbal and non-verbal communication.

UNIT-III

Significance of business correspondence- essentials of business correspondence- business letters and forms- telephone communication- uses of technology in communication.

UNIT-IV

Presentation skills- techniques of presentation- types of presentation- formal and informal presentation- Interview techniques- communication etiquettes.

UNIT-V

Report writing- meaning and significance- structure of reports- types of reports-formal and informal reports-essentials of good report writing.

UNIT-VI

Emerging issues in communication- yesterday, today and tomorrow,-Impact of technology- BPO- call centers-soft skills- ethical dimension- communication policies- communication change management.

Relevant cases have to be discussed in each UNIT and in examination case is compulsory from any UNIT.

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Text Books:

1. Kuberudu B and Srinivasa Krishna K: "***Business Communicationand Soft Skills***", Excel Books, 2008.

2. Urmilarai, ***"Business Communications"****, Himalya Publications, 2011.*

REFERENCES:

1. MallikaNawal: "Business Communication", Cengage Learning, New Delhi, 2012.

2. Meenakshi Rama: "***Business Communication***", Oxford University Press, New Delhi

3. C.S.G. Krishnamacharyulu and Dr.LalithaRamakrishnan, Business Communication, Himalaya Publishing House, Mumbai

4. Paul Turner: "***Organisational Communication***", JAICO Publishing House, New Delhi.

5. SathyaSwaroopDebasish, Bhagaban Das" "***BusinessCommunication***", PHI Private Limited, New Delhi, 2009.

6. R.K.Madhukar: "**Business Communication**", Vikas Publishing House, New Delhi, 2012.

7. Kelly M Quintanilla, Shawn T.Wahl:"**Business and ProfessionalCommunication**", SAGE, New Delhi, 2012.

8. Sangita Mehta, NeetyKaushish: "**Business Communication**", University Science Press, New Delhi, 2010.

9. Anjali Ghanekar: "**Business Communication Skills**", Everest Publishing House, New Delhi, 2011.

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	3	1	0	40	60	100	3
BUSINESS ENVIRONMENT							

COURSE OUTCOMES: The student is able to

CO1: Understand the nature and basic concepts of business environment and its components.
CO2: Analyse the structure of Indian economy.
CO3: List the components of fiscal policy and analyse balance of payments.
CO4: Evaluate different trade related policies like WTO, GATS, TRIMS and TRIPS.
CO5: Understand the environmental laws and consumer protection act 1985.
CO6: Analyse the codes and laws relating to corporate governance.

SYLLABUS:

UNIT – I

Business Environment: Importance at national and international level – problem and challenges – factors both internal and external influencing business environment. Industrial policies since independence and their significance – regulatory and promotional framework – Five – year plans and their importance.

UNIT – II

Structure of Indian economy – Nature and Significance – Economic Systems – Structure of Indian industry – Economic reforms in various sectors – nature – Challenges – Social justice – Disinvestment mechanism –Problems and procedures – Sickness in Indian industry, Competition Act 2002.

UNIT – III

Fiscal Policy: nature and significance – public revenues – expenditure – Debt, development activities allocation of funds – critical analysis of the recent fiscal policy of Government of India. Balance of payments: Nature – structure – major components – causes for disequilibrium in balance of payments – correction measures.

UNIT – IV

India's Trade policy: Nature – Magnitude and direction of Indian international trade – problems – bilateral and multilateral trade agreements. International business environment: Nature – significance – challenges and mechanisms. WTO: Agreements in the Uruguay round including TRIPS, TRIMS and GATS – disputes settlement mechanism – dumping and antidumping measures.

UNIT – V

Legal Frame work: Special features of the SICA (special provisions) 1985, BIFR, Consumer protection act 1986, Environmental laws (pertaining to the control and prevention of Air and Water pollution) and the Essential Commodities Act 1955.

UNIT –VI

Corporate Governance – Codes and laws – Sarbanes-Oxley Act- committees on corporate governance- Role and functions of Chairman and Managing Director –m Audit committee – remuneration committee – Business ethics – objectives – nature – Relationship between business ethics and business.

Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

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Text Books:

1. Aswathappa K: "**Essentials of Business Environment**", Himalaya Publishing House, New Delhi, 2011.

2. Francis Cherunilam: "***Business Environment-Text and Cases***", Himalaya Publishing House, Mumbai.

REFERENCES:

1. ShaikhSaleem: "**Business Environment**", Pearsons, New Delhi,

2. VeenaKeshavPailwar: "**Economic Environment of Business**", PHI Learning, New Delhi, 2012

3. Rosy Joshi, SangamKapoor: "**Business Environment**", Kalyani Publishers, New Delhi, 2011.

4. Vivek Mittal: "**Business Environment Text and Cases**", Excel Books New Delhi, 2011.

5. Sundaram and Black: "***International Business Environment Text and Cases***", PHI Private Limited, New Delhi.

6. Avid W Conklin: "***Cases in Environment of Business***", Sage Publication India Private Ltd, New Delhi.

7. Raj Kumar: "**International Business Environment**", Excel Publication, New Delhi, 2012.

8. Palle Krishna Rao: "***WTO-Text and Cases***", Excel Publication, New Delhi.

9. Government of India, ***Latest Economic Survey Report***.

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	3	1	0	40	60	100	3
QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS							

COURSE OUTCOMES: The student is able to

CO1: Apply Mathematical techniques like elementary operations on matrices, regression analysis, and probability distribution in problem solving.

CO2: Identify and apply linear programming techniques in finding optimal solutions.

CO3: Apply Game theory in finding solutions with saddle point and without saddle point.

CO4: Apply different techniques like least cost, matrix minima Vogel's method in finding the optimal solutions of transportation and assignment problems.

CO5: Solve replacement problem and identify the replacement of items with time.

CO6: Select PERT and CPM models for Network analysis, resources analysis and allocations.

SYLLABUS:

UNIT-I

BASIC MATHEMATICAL TECHNIQUES: Matrices, Elementary operations of matrices. Measures of Central Tendency, Measures of Dispersion, Simple Correlations and Regression Analysis. Permutations and combinations, Probability Rules, Conditional probability, Baye's theorem, probability Distributions, Binomial, Poisson, Normal Probability Distributions.

UNIT-II

LINEAR PROGRAMMING: Introduction, Linear Programming, General statement of Linear Programming Problems, Solution to linear programming problems- Graphic Method, Some special cases. Simplex Method, Solution of Maximisation Problems, Solution to Minimisation Problems. Big-M Method.

UNIT-III

GAME THOERY: Introduction, Two Person Zero-Sum Games, Pure Strategies, Games with Saddle point, mixed strategies, Rules of dominance, Solution Methods of Games without Saddle point, Algebraic, Matrix and arithmetic methods.

UNIT-IV

TRANSPORTATION MODELS: Introduction, Mathematical formulation, Definitions, Optimal solutions: North-West Corner Rule, Least Cost or Matrix Minima method, Vogel's approximation Method (VAM), Optimality Test: MODI method.

ASSIGNMENT PROBLEMS: Definition, Mathematical Formulation of an Assignment Problem, Difference between Transportation and Assignment problems, Hungarian Method Procedure, Unbalanced Assignment Problem, Travelling Salesman Problem.

UNIT-V

REPLACEMENT MODELS: Introduction, Replacement of items that deteriorate with time, Replacement of items that fail suddenly, Staff Replacement.

UNIT-VI

& C.P.M Models: Introduction, PERT & CPM Network, Networks analysis, Resource analysis and allocation, Programme Evaluation and review Technique(PERT) Difference between PERT AND CPM.

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Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

TEXT BOOKS:

1. N.D. Vohra, "Quantitative techniques in management", TataMcGraw Hill private Limited, New Delhi, 2011.
2. Sancheti, Dc and VK Kapoor, "Business Mathematics", S. Chand and Sons, New Delhi.
3. Anand Sharma, "Quantitative Techniques for Decision Making", Himalaya Publishers, New Delhi, 2012.

REFERENCES

1. N.D.Vohra: "***Quantitative Techniques in Management***", Tata-McGraw Hill Private Limited, New Delhi, 2011.
2. J. K. Sharma, "***Operations Research: Theory and Applications***", Macmillan Gupta S.P: "***Statistical Methods***", S. Chand and Sons, New Delhi,
3. Anand Sharma: "**Quantitative Techniques for Business decisionMaking**", Himalaya Publishers, New Delhi,2012;
4. D P Apte: "***Operation Research and Quantitative Techniques***", Excel Publication, New Delhi, 2013
5. Hamdy, A.Taha: "***Operations Research: An Introduction***", Prentice-Hall of India, New Delhi 2003.
6. Anderson: "**Quantitative Methods for Business**", Cengage Learning, New Delhi 2013
7. Sancheti, Dc & VK Kapoor, "**Business Mathematics**", S Chand and Sons, New Delhi
8. R.B.Khanna: "**Quantitative Techniques for Managerial Decision**", PHI Learning, New Delhi, 2012.
9. Keller, G, "**Statistics for Management**", 2009, 1st Ed, Cengage Learning.
10. Amir D. Aczel and JayavelSounderpandian, "**Complete BusinessStatistics**", TMH,
11 C.R.Kothari: "**Quantitative Techniques**", Vikas Publishing House, New Delhi, 2010
11. 12 L.C.Jhamb: "**Cases and Problems in Quantitative Techniques**", Everest Publishing House, New Delhi,

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	0	0	4	40	60	100	2

IT-WORKSHOP

COURSE OUTCOMES: The student is able to

CO1: Design and perform documentation.
CO2: Understand the basics of hardware, software and components of computer system.
CO3: Apply the knowledge of computer in social networking.
CO4: Create and use spread sheets with macros, charts and filters.
CO5: Create presentations with animations, auto slide transition.
CO6: Configure Wi-Fi of laptop/tab/mobile to access.

Exercise-I

Introduction to Computer Concepts – Elements of computer – Characteristics of a Computer – Classification of Computers – Basic Computer Architecture – Input-output Devices, Types of software – Software: its nature and qualities — Windows Operating System Functions .

Exercise-II

Hardware, Software, Operating Systems, Printer, Scanner, Pen drive, DVD, Web cam. File Sharing, Device Sharing, Blue Tooth, WI-FI, Internet, Web site, Domain, Search- Engine. Dos commands.

Exercise-III

Electronic mail, Outlook Configuration, Skype, Hangouts, Facebook, Twitter Twitter, (Social Networks), Cloud Storage (Google drive, one drive), Mobile Tablets, Laptops, Mobile Apps.

Exercise-IV

MS Office- Applications of MS Word in Business Correspondence: letters, tables, mail merge, labels.

Exercise-V

Applications of MS Excel: Graphs and Charts – Calculation of various financial functions - Ms Access: Tables and Queries.

Exercise-VI

MS Power Point: Introduction – Toolbar, their Icons and Commands – Navigating in Power point - Creation of slides, animation, and templates - Designing Presentations – Slide show controls – Making notes on Pages and Handouts – Printing Presentations – Customizing Presentations - Auto content Wizard.

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TEXT BOOKS:

1. Sanjay Saxena and Prathpreet Chopra, Computer Applications in Management, Vikas, New Delhi.

2. The Compact guide to Microsoft office, Mansfield Rom, BPB Publications, Delhi.

REFERENCES:

1. Aksoy, Introduction to Information Technology, Cengage, ND.

2. Parameswaran: Computer Application in Business – S Chand, New Delhi.

3. Management Information Systems by MahadeoJaiswal, Monika Mittal, Oxford University Press.

4. PS Gill, Database Management Stystems, IK Int Pub House, New Delhi.

5. Management Information Systems by D.P. Goyal, MacMillan Publishers.

6. Sudalaimuthu& Anthony Raj, Computer Applications in Business, Himalaya, Mumbai.

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I MBA-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3

FINANCIAL MANAGEMENT

COURSE OUTCOMES: The student is able to

CO1: Understand the basic concepts of Financial Management

CO2: Comprehend the various methods of Investment Analysis and apply various techniques of capital budgeting.

CO3: Assimilate the concepts of leverage, capital structure and its effect on the long term survival of the firm.

CO4: Appraise various methods of computation of cost of capital.

CO5: Understand the valuation methods of dividends and the dividend policies of Indian corporates.

CO6: Assess the working capital requirement of a firm and comprehend the nitty-gritty of current assets management.

SYLLABUS:

UNIT -I

The Finance function: Nature -Scope and objective, Profit or Wealth Maximization and EPS Maximization, Evolution of finance function, Role of finance manager, Time value of money, future value of money and the basic valuation models- Risk-return trade off.

UNIT-II

Investment Decision: Investment decision process – Project generation, project evaluation, project selection and project implementation-Project Evaluation techniques-traditional and modern methods, analysis of project evaluation techniques, concept of capital budgeting decision under conditions of risk and uncertainty.

UNIT-III

Capital structure Decisions: Sources of finance - a brief survey of financial instruments. Capital structure vs. financial structure - Capitalisation, financial leverage, operating leverage and composite leverage. EBIT-EPS Analysis, Indifference Point/Break even analysis of financial leverage, Capital structure theories (relevant theories)-case study.

UNIT-IV

Cost of Capital: Concept and measurement of cost of capital, Debt vs. Equity, cost of equity, preference shares, equity capital and retained earnings, weighted average cost of capital and marginal cost of capital. Importance of cost of capital in capital budgeting decisions.

UNIT-V

Dividend Decisions: Dividends and value of the firm - Relevance of dividend theory, Factors determining Dividend Policy-dividends and valuation of the firm-the basic models. Declaration and payment of dividends. Bonus shares. Rights issue, share-splits, Walter Model and Gordon Model.

UNIT-VI

Working Capital Management, components of working capital, gross vs. net working capital, determinants of working capital needs, and the operating cycle approach, Planning of working capital, .Financing of working capital through Bank finance and Trade Credit. Management of current assets – Cash, Receivables and Inventory.

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Relevant cases have to be discussed in each unit and in examination case is compulsory from any unit.

TEXT BOOKS:

1. P.Vijaya Kumar, P.S.Ravindra, V. Kirankumar "**FinancialManagement"**, Himalaya Publishing House, New Delhi,2013.

2. G. Sudarshan Reddy, **"Financial Management"**, Himalaya Publishing House, New Delhi,2012.

3. D. Chandra Bose, **"Fundamentals of Financial Management"**, PHI Publications, New Delhi,2012.

REFERENCES:

1. Rajiv Srivastava, Anil Misra: "**Financial Management**", Oxford University Press, New Delhi,2012

2. Brigham,E.F: "**Financial Management Theory and Practice**", Cengae Learning, New Delhi, 2013

3. Prasanna Chandra: "**Financial Management Theory and Practice**", Tata McGrawHill 2011.

4. I.M. Pandey: "**Financial Management",**Vikas Publishers, New Delhi, 2013.

5. RM Srivastava, Financial Management, Himalaya Publishing house, 4 edition.

6. Khan and Jain: Financial Management, Tata McGraw Hill, New Delhi,

7. Pradip Kumar Sinha: "**Financial Management**", Excel Books, New Delhi, 2009.

8. A.P.Rao: "**Fundamentals of Financial Management**". Everest Publishing House, New Delhi.

9. VyuptakeshSharan: "**Fundamentals Financial Management**", Pearson, New Delhi, 2012.

10. ShashiK.Gupta: "**Financial Services**", Kalyani Publishers, New Delhi, 2012.

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	3	1	0	40	60	100	3
HUMAN RESOURCE MANAGEMENT							

COURSE OBJECTIVES: The student is able to

CO1: Outline the principles of HRM and also understand the principles of HRM.

CO2: Understand different functions of HR manager.

CO3: Apply the uses of job analysis, job description, job specification, ergonomics in industry and the methods of job evaluation.

CO4: Utilize the various methods of performance appraisal.

CO5: Develop a sound compensation mechanism at global level, determinants of payment of wages and incentive plans.

CO6: Examine the role of trade unions, Grievance Handling Procedures, Industrial Disputes Resolution Mechanisms and stress management at work place.

SYLLABUS:

UNIT -1

Introduction to HRM– Definition & functions – Evolution of HRM – Principles of HRM – Ethical aspects of HRM – Role of Position of HRM. – HRM at global perspective – differences between PM & HRM- Challenges of HRM.

UNIT-2

Investment Perspectives of HRM- HR Planning – Recruitment & Selection – Sources of Recruitment, Selection Procedure – Selection tests – Interview Techniques – Training Methods – Executive development methods. Introduction and placement.

UNIT-3

Job Analysis & Design- Job Analysis- Process of Job analysis – Job description and Job Specification – Flexible Job Enrichment – Job Sharing – Tele Community – Ergonomics – Job Design and Job Evaluation.

UNIT-4

Mechanisms- Importance of Performance Appraisal – Traditional and Modern methods of PA – Latest trends in PA – Compensation concepts – Influence factors – current trends – methods of payment – Compensation mechanisms at Global level.

UNIT-5

Wage and Salary System & Welfare Management- Concept of Wage – Wage Structure – Wage and Salary policies – legal Frame work – determinants of payments of wages – Wage differentials – Incentive payment systems. Welfare Management: Nature and Concepts – Statutory and Non-statutory welfare measures.

UNIT-6

Industrial Relations & Contemporary issues in HRM- Trade Unions – Employee Participation schemes – Grievance handling- Collective bargaining –Industrial Disputes Resolution Mechanisms – Statutory provisions of Industrial safety – Stress Management at Work place – HR Auditing – HRIS methods.

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TEXT BOOKS:

1. K Aswathappa: "*Human Resource and Personnel Management*", Tata McGraw Hill, New Delhi, 2013

2. SubbaRao P: "*Personnel and Human Resource Management-Text and Cases*", Himalaya Publications, Mumbai, 2013.

REFERENCES:

1. N.SambasivaRao and Dr.Nirmal Kumar: "**Human ResourceManagement and Industrial Relations**", Himalaya PublishingHouse, Mumbai

2. Mathis, Jackson,Tripathy:"***Human Resource Management:Asouth-Asin Perspective***", Cengage Learning, New Delhi, 2013

3. MadhurimaLall, SakinaQasimZasidi: "**Human ResourceManagement**", Excel Books, New Delhi, 2010

4. Muller_Camen. Croucher and Leigh: "***Human ResourceManagement- A Case Study Approach***", JAICO Publishing, Delhi.

5. S.Seetharaman, B.VenkateswaraPrased: "***Human ResourceManagement***", SCITECH Publication (India) Limited, Hyderabad,2009.

6. Gary Dessler, BijuVrkkey: "***Human Resource Management***", Pearson Education, New Delhi, 2011

7. Uday Kumar Haldar: "***Human Resource Development***", Oxford University Press,New Delhi, 2012.

8. NarendarSingh:"***Human Resource Management***", Universities Press (India) Private Limited, Hyderabad, 2011.

9. B.B.Mahapatro:"***Human Resource Management***", New Age International Publishers, New Delhi, 2011

10.R.S.Dwivedi: "***Human Relations and OrganisationalBehaviour",*** MacMillan Business Books, New Delhi, 2013.

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	3	1	0	40	60	100	3
MARKETING MANAGEMENT							

COURSE OUTCOMES: The student is able to

CO1: Understand the concepts of marketing and importance of marketing information system.

CO2: Know the segmentation, targeting and positioning in marketing.

CO3: Analyse various phases of product life cycle.

CO4: Evaluate various methods of pricing and identify the best pricing strategy.

CO5: Define and evaluate marketing communication strategies.

CO6: Formulate the controlling techniques of marketing.

SYLLABUS:

UNIT –I

Introduction to Marketing: Needs, Wants, Demands, Products, Exchange, Transactions, Market, Marketing, Production Concept, Product Concept, Sales Concept, Marketing Concept, Societal Marketing Concept, Indian Marketing Environment. Marketing Information System- Internal reporting – Marketing Intelligence, MR and Decision Support System.

UNIT -II

Market Segmentation and Targeting: Identification of Market Segments, - Consumer and Institutional/corporate Clientele - Segmenting Consumer Markets, Segmentation Basis, Selecting Target Markets, Segmentation and Targeting as a Basis for Strategy Formulation. Developing and Communicating a Positioning Strategy. Consumer and organizational behavior.

UNIT -III

Product Strategy: Product Classification – Consumer, Industrial, services, Organisational ideas, places- Levels of product – Core, augmented, actual, New Product Development – Process – Branding –n Strategies, Importance, packaging – Strategies- Importance. PLC – stages& strategies.

UNIT –IV

Pricing Strategy: Objectives of pricing, Methods of pricing, Selecting the final price, Adopting price, initiating the price cuts, imitating price increases, Responding to Competitor's price changes.

UNIT-V

Marketing Communication: the communication process , Communication mix, Managing advertising sales promotion , Public relations and Direct Marketing. Sales force Objectives, Sales force structure and size, Sales force Compensation. Managing Advertising, Objectives, Budgets, Messages, Media, Evaluation.

UNIT-VI

Marketing Organization and Control: Evolution of Marketing Department, Organizing the Marketing Department, Marketing Implementation, Control of Marketing Performance, Annual Plan Control, Profitability Control, Efficiency Control, Strategic Control.

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TEXT BOOKS:

1. RajanSexena: "**Marketing Management**", Tata McGraw Hill, New Delhi, 2012.
2. Sontakki C.N.: "**Marketing Management**". Kalyani Publishers, New Delhi, 2012.

REFERENCES:

1. Lamb, Hair, Sharma: "**MKTG**" Cengage Learning , New Delhi, 2013
2. Phillip Kotler: "**Marketing Management** ", Pearson Publishers, New Delhi, 2013.
3. R.Srinivasan: "**Case Studies in Marketing**", PHI Learning, New Delhi, 2012
4. Tapan K Pand: "**Marketing Management**", Excel Books, New Delhi, 2012
5. Paul Baines, Chris Fill, Kelly Page Adapted by Sinha K: "**Marketing**", Oxford University Press, Chenni, 2013.
6. Arun Kumar, Meenakshi N: "**Marketing Management**", Vikas Publishing House, New Delhi, 2012.
7. Kenneth E, Clow, Donald Baack: "**Cases in Marketing**", SAGE ,New Delhi, 2012.
8. Dilip M, Sarwate: "**Indian Cases in MarketingManagement**", Everest Publishing House, New Delhi,

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PRODUCTION AND OPERATIONS MANAGEMENT							

COURSE OUTCOMES: The student is able to

CO1: Understand the basic concepts of production and operations management and identify types of manufacturing processes.
CO2: Define and explain concept of production planning and control.
CO3: Decide effective plant location and plant layout.
CO4: Define strategies to improve productivity.
CO5: Evaluate purchasing function and inventory management function.
CO6: Evaluate the quality control system and develop the quality control strategies.

SYLLABUS:

UNIT -I

Introduction: Overview & Definition of production and operations management. Nature and Scope of Production and Operations Management, functions of POM–Role & responsibilities of the production manager,types of manufacturing processes, recent trends and challenges of POM.

UNIT -II

Production Planning and Control: Stages in PPC-functions of PPC – PPC in Mass, Batch, and Job Order Manufacturing- Aggregate planning and Master Scheduling, MRP, CRP, Capacity planning. Maintenance management & Industrial Safety (problems on scheduling).

UNIT –III

Plant Location & Layout Planning- Factors influencing location - types of layouts. Work Design: Method Study and Work Measurement - Work Sampling.

UNIT -IV

Productivity Management: Factors affecting productivity and their measurements- total productivity, tools and techniques for improving productivity - Modern productivity Management Tools: JIT, FMS, CIM, TQM, Kaizen, BRP (Business process reengineering).

UNIT –V

Purchasing & Inventory Management: Purchase function, procedures, economic order quantity, Wilson lot size formula, assumptions in the equation- Inventory Control Methods: ABC, VED, XYZ methods-Inventory valuation methods: periodic and perceptual systems, FIFO, LIFO, Average cost and weighted average cost methods.

UNIT -VI

Quality Management: Basic concepts, dimensions of quality, inspection, deming, juran concepts, quality as cost and quality as profit. Total quality management- Statistical Quality Control: Control charts- exercises- Concept of Quality Assurance: principles of ISO and BIS, ISO standard and certification process 9000-2000, six sigma.

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TEXT BOOKS:

1. PannerSelvem: "**Production and Operation Management**", Prentice Hall of India, NewDelhi, 2012.
2. K.Aswathappa, K. Shridhara: "**Production &OperationManagement**", Himalaya Publishing House, New Delhi, 2012.

REFERENCES:

1. Ajay K Garg: "**Production and Operation Management**", TMH, New Delhi,2012
2. Deepak Kumar Battacharya: "**Production & Operation Management**", University Press, New Delhi, 2012
3. AlanMuhlemann,JohnOakland,jastiKatyayani: "**Production and Operation Management**", Pearson, New Delhi,2013
4. Gagan Deep &Mandeep : "**Production and operations Management**", Kalyani publishers, New Delhi, 2010
5. UpendraKachru: "**Production and Operations Management**", Excel Books, New Delhi, 2013.
6. L.C. Jhamb: "**Production and Operations Management**", Everest Publishing House, New Delhi, 2013.
7. Kaushal: "**Case Studies solutions in Production and Operations Management**", MacMillan, New Delhi, 2012.
8. P.Ram Murthy: "**Production and Operations Management**", New Age International Publishers, New Delhi, 2009.

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	3	1	0	40	60	100	3
ORGANISATIONAL BEHAVIOUR							

COURSE OUTCOMES: The student is able to

CO1: Summarize fundamentals of organization and its basic behavioural elements.
CO2. Identify different organisational structures.
CO3: Understand factors of organisational behaviour.
CO4: Measure and evaluate personality with respect to organisational behaviour.
CO5: Awareness on groups and teams and its behaviour.
CO6: Understand and analyses organisational conflicts and create suitable solutions for organisational conflicts.

SYLLABUS:

UNIT-1

OrganisationalBehaviour : Definition, Nature, Scope, Importance, Linkages with other social sciences – Foundations perspectives of OB- Models of OB – Individual roles &Organisational Goals.

UNIT-2

Organisational Structure: Concept, Elements, Determinants – Forms of OS, Principles – Organisational climate –concept – Developing a sound climate – Organisational Culture – Implications of OC.

UNIT-3

Individual factors: Individual Differences – Models of Man- Perception -Process – Applications – Learning – Factors – Theories – Applications – Motivation concept – Important elements of a sound Motivation system – Attitudes – concept- Theories – Factors-values.

UNIT-4

Personality – concept- Theories – Determinants – Stages- Johari window- transactional Analysis – Organisational applications of personality – Creativity & Creative Thinking – Interpersonal Conflicts.

UNIT-5

Group Dynamics: Concept of Group, Types of Groups, Theories of Group formation, Group Behaviour, Group norms, Group cohesiveness, Group DM, Group conflicts.

UNIT-6

Organisational conflicts: Goal conflict- Role- Organisational level of conflict – Group level – Conflict Management – Organisational effectiveness – concept – Approaches – Factors – Organisational change,-Nature – Factors – Process- Organisational growth & Change Agents-OD- concept, Process and Techniques.

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Text Books:

1. K.Aswathappa: "**Organizational Behavior-Text, Cases and Games**", Himalaya Publishing House, New Delhi, 2008.

2. Luthans: "**Organizational Behavior-Text, Cases and Games**" REFERENCES:

3. Steven L McShane, Mary Ann Von Glinow, Radha R Sharma: "***Organizational***

4. ***Behavior***", Tata McGraw Hill Education, New Delhi, 2008.

5. Jerald Greenberg and Robert A Baron: "***Behavior in Organizations***", PHI Learning Private Limited, New Delhi, 2009.

6. PareekUdai: "***Understanding Organizational Behavior***", Oxford University Press, New Delhi, 2007.

7. Jai B.P.Sinha: "***Culture and Organizational Behavior***", Sage Publication India Private Limted, New Delhi, 2008.

8. Sharma VS, Veluri: "***Organizational Behavior***", JAICO Publishing House, New Delhi, 2009.

9. Slocum,nHelireigel: "***Fundamentals of Organizational Behavior***", Cengage Learning India, New Delhi, 2009.

10. Jennifer M.George and Gareth R. Jones: "***Understanding and Managing Organizational Behavior***", Pearson Education, New Delhi, 2009.

11. Schermerhorn, Hunt and Osborn: "***Organizational Behavior***", Wiley India Limted, New Delhi, 2007.

12. GregoryMoor head, Ricky W.Grif fin: "***Organizational Behavior***", Biztantra, New Delhi, 2009.

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<table>
<tr><td rowspan="2">I MBA-II-SEMESTER</td><td>L</td><td>T</td><td>P</td><td>INTERNAL MARKS</td><td>EXTERNAL MARKS</td><td>TOTAL MARKS</td><td>CREDITS</td></tr>
<tr><td>0</td><td>0</td><td>4</td><td>40</td><td>60</td><td>100</td><td>2</td></tr>
<tr><td colspan="8">E-BUSINESS</td></tr>
</table>

COURSE OUTCOMES: The student is able to

CO1: Understand the overview of ERP and systematically plan the mechanisms in an enterprise.

CO2: Develop the relationship among the components in an ERP

CO3: Identify the ERP vendors in the market.

CO4: Understand the overview of E-commerce

CO5: Design the model of E-commerce.

CO6: Analyse security issues and develop technologies to secure transactions.

SYLLABUS:

UNIT-I

Introduction to ERP: Defining ERP, Origin and Need for an ERP System, Benefits of an ERP System, Reasons for the Growth of ERP Market, ERP life cycle – ERP implementation Life Cycle.

UNIT-II

ERP Vendors & Consultants: Vendors- Role of the Vendor – Products and technology R/3 overview: SAP advantage, Baan Company, Oracle Application, Vertical solutions, Microsoft Corporation, Ramco System, System software Associates Inc.-QAD-Consultants: Types of consultants – Role of a consultant.

UNIT III

ERP BUSINESS MODULES– Business Modules – Finance: Features of ERP financial module, Benefits of ERP financial module– Human Resources: Functions, features & benefits of human resource management module– Sales &Distribution: Functions, features & benefits of sales & distribution.

UNIT IV

Introduction to E-commerce : Introduction, E-commerce or Electronic Commerce- An overview, Electronic Commerce – History of Electronic Commerce, Advantages and disadvantages of E-commerce, Roadmap of E-commerce in India.

UNIT-V

E-commerce Models: Business-to-Business-Hubs, Market Places, Business-to-Business Exchange, Business-to-Consumer, Consumer-to-consumer, Business-to-Government, Government-to-Government.

UNIT-VI

Electronic Payment Systems: Electronic Payment Systems, Electronic cash, Smart cards and Electronic Payment Systems, Credit card based electronic payment systems, Risks and electronic payment systems

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TEXT BOOKS:

1. "Enterprise Resource Planning", Alexleon,TMH, New Delhi, 2011.
2. E-Commerce, A Managerial Perspective, Turba E. Lee J. King, Chung H.M. PEA, 2001

REFERENCES

3. Singla: "Enterprise Resource Planning", Cengage Learning, New Delhi, 2013
4. MahadeoJaiswal, Ganesh Vanapalli: "Enterprise Resource Planning", MacMillon, New Delhi, 2013
5. N.Venkateswaran: "Enterprise Resource Planning", SCITECH Publiscation, NewDelhi, 2009
6. S.Kesharwani, SBodduluri, M Ashok Kumar: "Enterprise Resource Planning", Paramount Publishing House, New Delhi, 2012.
7. E-Commerce An Indian Perspective, 3/e, P.T. Joseph, PHI, 2009.
8. E-Commerce, S.Jaiswal ,Galgotia.
9. Electronic Commerce, Gary P.Schneider, Thomson.

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	3	1	0	-	50	50	3
BUSINESS LAB							

COURSE OUTCOMES: The student is able to

CO1: Know the basic of SQL.
CO2: Apply different types of functions on tables.
CO3: Know the basics of PL/SQL.
CO4: Understand the ERP modules and E-payments.
CO5: Apply the cursors and trigger on various business decisions.
CO6: Understand the online trading system and develop the real time applications.

SYLLABUS:

Exercise-I: Introduction to SQL, DDL, DML, DCL, TCL, Constraints-Not null, Unique, Primary key, Foreign key, Check.

Exercise-II: Functions-Single row, Group, Sub queries, Operators, Joins, Views

Exercise-III: Introduction to PL/SQL, Cursors-Implicit cursors, explicit cursors

Exercise-IV: Exception Handling, Introduction to Triggers-Row-level trigger, Statement-level trigger.

Exercise-V: Financial modelling like present value of cash flows, valuations, financial ratio analysis, forecasting, trend analysis of data, random input generations- ERP Modules – E-payments.

Exercise-VI: Introduction of online financial services example online trading systems.

References:

1. Scott Urman, "*Oracle 8i-PL SQL Programming*", TMH, 2000.
2. Loney, "*Oracle 8i—The Complete Reference*", TMH, 2000.
3. Loney, "*Oracle 9i—The Complete Reference*", TMH, 2002.
4. Bayross, "*Oracle Teach Yourself SQL / PL SQL using Oracle 8i and 9i with SQLj*", BPB, 2002.
5. Abbey, "*Oracle 8i—A beginner's Guide*", TMH, 2000.
6. Courter, "*Mastering Microsoft Project*", BPB, 2002.
7. Pyron, "*Using MS Projec"t,* Techmedia, 2002.
8. Bayross, "*PL SQL the Programming Language of Oracle*", BPB, 2002.
9. Mansfield, MS Office, TMH, New Delhi 1999.
10. Prowess- Corporate Database, Centre for Monitoring Indian Economy(CMIE), Ph.No.040- 55466091-6,email-cmie.hyd@cmie.com www.cmie.com/products.

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I MCA I SEMESTER SYLLABUS

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	4	-	-	40	60	100	4
C PROGRAMMING AND DATA STRUCTURES							

Course Objectives

1. Formulating algorithmic solutions to problems and implementing algorithms.
2. To understand the various steps in Program development.
3. To understand the basic concepts in Program.
4. Comprehensive knowledge of data structures and ability to implement the same in software applications.

Course Outcomes

1. Demonstrate the basic knowledge of computer hardware and software.
2. Ability to problem solving and logical skills in programming.

UNIT I

Introduction to Computers, HW and SW concepts, Algorithm, pseudo code, flowchart, program development steps, Introduction to various IDE's and their use in C program development, structure of C program, A Simple C program, identifiers, basic data types and sizes, Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation. Control structures such as if, goto, labels, and switch statements.

UNIT II

Loops- while, do-while and for statements, break, continue, Arrays – concepts, declaration, definition, accessing elements, storing elements, Strings and string manipulations, 1- D arrays other than strings, 2-D character arrays – 2-D arrays other than character arrays – Multidimensional arrays.

UNIT III

Functions: basics, parameter passing, storage classes- extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, header files, C pre-processor. Passing 1-D arrays, 2-D arrays , and functions.

Pointers: concepts, initialization of pointer variables, pointers and function arguments, passing by address –dangling memory, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays, dynamic memory management functions, command line arguments.

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Derived types: structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to

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structures, self-referential structures, unions, typedef, bit-fields, Input and output – concept of a file, text files and binary files, Formatted I/o, file I/o operations

UNIT V

Data Structures: Introduction to Data Structures – Time Complexity – Space Complexity – Pattern matching – naive method – Robin Karp Algorithm - Searching – Linear and binary search methods, sorting – Bubble sort, selection sort, Insertion sort, Quick sort, merge sort.

UNIT VI

Single linked lists, doubly linked lists, circular list, representing stacks and queues in C using arrays and linked lists, infix to post fix conversion, postfix expression evaluation. Trees-Binary tress, terminology, representation, traversals, Graphs - terminology, representation, graph traversals (dfs & bfs) – Warshalls – Dijkstra – Kruskal – Prims Algorithms.

TEXT BOOKS

1. Computer science, A structured programming approach using C, B.A.Forouzan and R.F. Gilberg, Third edition, Thomson.

REFERENCE BOOKS

1. Fundamentals of Data Structures in C , Horowitz, Sahni, Anderson-Freed, 2nd ed, Universities Press, 2008.
2. Classic Data Structures, Samanta, 2nd ed, PHI, 2009.
3. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/ Pearson.
4. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
5. DataStructures Using C , A.S.Tanenbaum, Y. Langsam, and M.J. Augenstein, Pearson.
6. Programming in C , Stephen G. Kochan, III Edition, Pearson .
7. Data Structures and Program Design in C, R.Kruse, Tondo, Leung, Shashi M, 2nd Edition, Pearson.
8. Data Structures and Algorithms, Aho, Hopcroft, Ullman, Pearson ,2006
9. C and Data Structures, Ashok N. Kamthane, Pearson.
10. C Programming and Data Structures, E Balaguruswamy, TMH, 2008.

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I MCA I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	4
COMPUTER ORGANIZATION							

Course Objective

Comprehensive knowledge of computer system including the analysis and design of components of the system.

Course Outcomes

At the end of the course student will be able to

1. The basic components of a computer, including CPU, memories, and input/output, and their organization representation of data, addressing modes, instructions sets.
2. Discriminate different register transfer micro operations, Principles of hardwired and micro programmed control.
3. Demonstrate various fixed and floating point arithmetic operations, performing the Arithmetic operations of binary number systems and formulating the arithmetic functions and solve scientific problems by means of a numerical analysis method.
4. Extrapolate memory organization and input, output organizations.
5. Generalize pipe line and vector processing, multi processors and its applications.

UNIT I

Objective: Gives a view of computer system from user's perspective, representation of numbers employed in arithmetic operations and design of digital systems constructed with individual gates and maps.

BASIC STURCTURE OF COMPUTERS: Computer Types, Functional Units, Basic Operational concepts, Bus Structures.

NUMBER SYSTEM AND COMPUTER ARITHMATIC:

Signed, Unsigned numbers, Addition and Subtraction, Multiplication, Division, Floating point representation, Logic operations, Gray Code, BCD Codes, Error Detecting Codes, Boolean Algebra, Simplification of Boolean Expressions, K-Maps.

UNIT II

Objective: Describes the necessary background for understanding the digital circuits with the help of gates and flip flops.

COMBINATION AND SEQUENTIAL CIRCUITS:

Decoders, Encoders, Multiplexers, Half and Full Adders, Sequential Circuits, Flip flops, Registers.

UNIT III

Objective: Understanding type of instructions, designing the basic components of the system and designing of hardwired control and illustration of data path and control flow for sequencing.

BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, Computer registers, Computer instructions, Timing and control, Instruction cycle, Memory – Reference Instruction, Input – Output and Interrupt.

CENTRAL PROCESSING UNIT: General Register Organization, Stack organization, Instruction formats, Addressing modes, Data Transfer and manipulation, Program control.

UNIT IV

Objective: Register transfer language , how it is used to express micro operations in a symbolic form, Symbols are defined for arithmetic, logic and shift micro operations, hardware design of micro operations with the help of arithmetic logic shift unit.

REGISTER TRANSFER LANGUAGE AND MICRO OPERATIONS: Register transfer language, Register transfer, Bus and Memory transfers, Arithmetic Micro operations, Logical Micro operations, Shift Micro operations, Arithmetic logic shift unit.

UNIT V

Objective: Understanding of Microprogramming of control unit of CPU.

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, Micro program example, design of control unit.

UNIT VI

Objective: Description of different parameters of a memory system, organization and mapping of various types of memories and Describe the means of interaction devices with CPU, their characteristics and modes of data transmission.

THE MEMORY SYSTEM: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

Objective: Describe the means of interaction devices with CPU, their characteristics and modes of data transmission.

INPUT-OUTPUT ORGANIZATION: Peripheral devices, Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupts, Direct Memory Access.

TEXT BOOKS

1. Computer System Architecture, M.Moris Mano, 3rd Edition, Pearson/PHI
2. Digital Logic and Computer Organization, Rajaraman, Radhakrishnan, PHI, 2006
3. Digital Logic Design, Moriss Mano, PHI

REFERENCES

1. Computer Organization, 5 th ed., Hamacher, Vranesic and Zaky, TMH, 2002.
2. Computer System Organization & Architecture, John D. Carpinelli, Pearson, 2008.
3. Computer System Organization, Naresh Jotwani, TMH, 2009.
4. Computer Organization & Architecture: Designing for Performance, 7th edition.

I MCA I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	4
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE							

Course Objective

This course will discuss fundamental concepts and tools in discrete mathematics with emphasis on their applications to computer science.

Course Outcomes

1. Student will be able to demonstrate skills in solving mathematical problems.
2. Student will be able to comprehend mathematical principles and logic.
3. Student will be able to demonstrate knowledge of mathematical modelling.
4. Student will be able to formulate logic expressions for a variety of applications.

UNIT I

Objective: Ability to solve limitations of Mathematical & Predicate logic.

Mathematical Logic: Statements and notations, Connectives, Well-formed formulas, Truth Tables, tautology, equivalence implication, Normal forms, Theory of inference for the statement calculus, Rules of inference, Consistency of premises and indirect method of proof, Automatic Theorem Proving.

Predicate calculus: Predicates, statement functions, variables and quantifiers, predicate formulas, free & bound variables, universe of discourse, inference theory of predicate calculus

Outcome: After completion of this unit, student will be able to know the Foundations of Mathematical logic and Automatic theorem, Predicate formulas, Universal and Existential quantifiers.

UNIT II

Objective: Ability to solve the problems of sets, functions and relations.

Set theory & Relations: Introduction, Relations and ordering, Properties of binary Relations, Equivalence, Compatibility Relations, Partial ordering, Hasse diagram.

Functions: composition of functions, Inverse Function, Recursive Functions, Lattice and its Properties, Pigeon hole Principles and its application.

Outcome: After completion of this unit, student will be able to solve Set theory, Relations, Functions and related problems.

UNIT III

Objective: Ability to solve the problems of group theory.

Algebraic structures: Algebraic systems. Examples and general properties. Semi groups and monoids. groups. sub groups. Definitions. Examples. homomorphism. Isomorphism and related problems.

Outcome: After completion of this unit, student will get the knowledge of Groups, Subgroups. Monoids, Isomorphism & Homomorphism.

UNIT IV

Objective: Ability to solve permutations and combinations problems in computer applications.

Elementary Combinatorics: Basis of counting, Enumeration of Combinations & Permutations, Enumerating of Combinations & Permutations with repetitions and constrained repetitions, Binomial Coefficients, Binomial, Multinomial theorems, principles of Inclusion – Exclusion.

Outcome: After completion of this unit, student will be able to know the basics of permutations and combinations, binomial and multinomial theorems.

UNIT V

Objective: Ability to solve different recurrence relations in computer applications.

Recurrence Relations: Generating Function of Sequences, Calculating Coefficient of generating functions, Recurrence relations, Solving recurrence relation by substitution and Generating functions, The method of Characteristic roots, Solution of Inhomogeneous Recurrence Relation.

Outcome: After completion of this unit, student will be able to understand first, second and higher order homogeneous and inhomogeneous recurrence relations.

UNIT VI

Objective: Ability to represent and Apply Graph theory in solving computer science problems related to trees and graphs.

Graph Theory: Representation of Graph, Spanning Trees, BFS, DFS, Prim's, Kruskals Algorithm, Binary trees, Planar Graphs.

Graph Theory and Applications: Basic Concepts, Isomorphism and Sub graphs, Multi graphs and Euler circuits, Hamiltonian graphs, Chromatic Numbers.

Outcome: After completion of this unit, student will be able to solve the basic problems of graph theory like finding shortest paths.

TEXT BOOKS

1. Discrete Mathematical Structures with Applications to computer science J.P Tremblery, R. Manohar, TMH.
2. Discrete Mathematical structures for computer Scientists & Mathematicians " L. Molt, A. Andel, T.P.Baker, PHI.

REFERENCE TEXT BOOKS

1. Discrete Mathematics, J K Sharma, 2nd ed., Macmillan, 2005.
2. Discrete Mathematics for computer science, Bogart, Stein and Drysdale, Springer, 2005.
3. Discrete Mathematics and its Applications, Rosen, 5th ed, T M Graw-Hill ed, 2006.
4. Discrete Mathematics for Computer Science, Gary Haggard, John Schlipf, Sue Whitesides, Cengage.,2006.
5. Discrete Mathematical Structures, Jayant Ganguly, Sanguine, 2007.
6. Discrete Mathematics and Combinatorics, Sengadir, Pearson, 2009.
7. Discrete Mathematical Structures, Kolman, Busby, Ross, 6th ed., PHI, 2009.
8. Discrete Mathematics with Combinatorics and Graph Theory, Santha, Cengage Learning, 2009.
9. Mathematical Foundations of Computer Science, Rajendra Prasad, Rama Rao et al., USP, 2009.
10. Discrete structures and Graph theory, GSS Bhisma Rao.
11. Mathematical Foundations of Computer Science, Dr.D.S. Chandrasekhar.

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I MCA I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	4
PROBABILITY AND STATISTICAL APPLICATIONS							

Course Outcomes

At the end of the course student will be able to

1. Examine, analyze, and compare probability distributions.
2. Construct confidence intervals for population parameters.
3. Formulate null and alternative hypothesis and test its validity based on random sample.

UNIT I

Objective: To know the fundamental concepts in Probability.

Probability Theory: Motivation, Probability models, Sample space, Events, Probability models; Probability Axioms, Union, Intersection and compliments of events; independent events, Conditional Probability; Baye's theorem.

UNIT II

Objective: To assign a numerical value to sample points in a Sample space

Random variables, Functions of Random variables; Probability mass function, Probability distributive function; cumulative distributive function; Discrete Probability Distributions, Binomial ,Poisson

Continuous Probability distribution: Normal

UNIT III

Objective: focus on sampling from populations

Sampling Distributions: Populations and samples-Sampling distribution of mean (known and unknown), Proportions, Sums and differences.

Point and Interval estimators for means and proportions, Bayesian Estimation

UNIT IV

Objective: To accept or reject a statement about the parameter (Large Samples).

Introduction, Type I and Type II errors, one tail, two tail tests-Test concerning one mean and proportion, Two means, Proportions and their differences using Z-Test

UNIT V

Objective: To accept or reject a statement about the parameter (Small Samples).

Student t test, F-test and Chi-square test-ANOVA-for one way and two way classifications

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UNIT VI

Objective: The objective of a queuing model is to find out the optimum service rate and the number of servers so that the average cost of being in queuing system and the cost of service are minimised

Queuing theory: Queue description, characteristics of a queuing model, study state solutions of M/M/1: α Model, M/M/1 ; N Model

TEXT BOOKS

1. Probability, Statistics and Random Process: Dr. K. Murugesan & P. Gurusamy by Anuradha Agencies, Deepthi Publications.
2. Probability, Statistics and Random Process: T. Veerarajan, TMH, India.

REFERENCE BOOKS

1. Probability & Statistics for Engineers: Miller and Freund, PHI
2. "Fundamentals of Mathematical Statistics", 9^{th} Edition, S.C. Guptha and V.K. Kapoor, Sultan Chand & Sons Educational Publishers, 2007.

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I MCA I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	4
ACCOUNTS AND FINANCIAL MANAGEMENT							

Course Objective

To provide familiarity with the accounting concepts which will help in preparation of various accounting records

Course Outcome

By this subject student gets the knowledge on how to make the accounts in any organization &how to record the transactions in order to evaluate the profit or loss accounts.

UNIT I

Introduction to Accounting- Single Entry System- Objectives- Generally Accepted Accounting Principles- Systems of Accounting- Single Entry- Double Entry- Introduction to Basic Books of Accounts- Journal- Ledger.

UNIT II

Preparation of Trail Balance – Final Accounts with Simple Adjustments – Users of Accounting Information – Role of Accountant in Modern Business Organizations.

UNIT III

Introductions to Financial Management - Meaning – Scope – Role – Objectives – Time Value of Money – Over Capitalization – Under Capitalization – Profit Maximization – Wealth Maximization – EPS Maximization – Ratio Analysis – Different Types of Ratios – Advantages – Disadvantages.

UNIT IV

Costing – Nature – Importance – Basic Principles – Elements of Cost – Absorption Costing Vs Marginal Costing – Financial Accounting Vs Cost Accounting Vs Management Accounting – Marginal Costing and Break Even Analysis – Nature – Importance – Scope – CBP Analysis – Simple Problems.

UNIT V

Standard Costing and Budgeting – Nature – Scope – Computation Analysis – Material Variances – Labour Variances – Budgeting – Definition – Types of Budgets – Cash Budget – Flexible Budget – Sales Budget – Simple Problems.

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UNIT VI

Introduction to Computerized Accounting System – Coding – Logic and Codes – Master Files – Transaction Files - Introduction to Documents Used for Data Collection – Process of Document Files and Outputs Obtained.

REFERENCE BOOKS

1. Accounting for Managers, G. Prasad, Himalaya Publications.
2. Accounting for Management, Vijay Kumar, Tata McGraw Hill.
3. Financial Accounting, S. N. Maheswari and S. K. Maheswari, Vikas Publications.
4. Cost and Management Accountancy, M.N. Arora, Himalaya Publishing House.
5. Financial Analysis and Accounting, P. Premchand Babu and M. Madan Mohan, Himalaya Publishing House.
6. Essentials of Financial Accounting, Ashish. K and Ballacharya, Prentice Hall of India.

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I MCA I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	-	-	-	-
VERBAL ABILITY							

Course Objectives

1. To make students understand the usage of words, relationships; the alternatives and their Meanings.
2. To give fair idea about understanding and comprehension skills.
3. To make students understand arguments, draw conclusions and to deal in critical manner.
4. To teach students-ways to overcome the confusions related to Grammar and Vocabulary.

Course Outcomes

At the end of the course Students will be able to
1. Use appropriate words effectively in their communication
2. Identify and correct Grammar and vocabulary related errors
3. Construct the sentences effectively using appropriate verbal reasoning abilities
4. Demonstrate understanding and comprehensive skills
5. To clear written test in campus placements as well as various competitive

Unit-I :	**Vocabulary Building**
Unit-II :	**Sentence construction, correction and Jumbled Paragraphs**
Unit-III :	**English Usage, Grammar & Meaning Usage match**
Unit-IV :	**Analogies, Reverse Analogies, Cloze Passage & Fill in the blanks**
Unit-V :	**Reading Comprehension, Summary Questions**
Unit-VI :	**Fact, Inferences & Judgments**

TEXT BOOKS

1. 30 Days to a More Powerful Vocabulary by Funk.
2. Practical English Usage by Michael Swan.
3. Practice & Pass Professional: Verbal Reasoning Tests: Practice Questions and Expert Coaching to Help You Pass by Alan Redman.
4. Kaplan MCAT Verbal Reasoning and Writing Review.
5. The Verbal Reasoning Test Workbook: Unbeatable Practice for Verbal Ability by Mike Bryon.
6. Understanding and Using English Grammar by Betty Schrampfer Azar.

REFERENCE BOOKS

1. http://www.verbalreasoningtest.org/
2. https://www.bond11plus.co.uk/verbal-reasoning
3. http://www.studyguidezone.com/mcat_verbalreasoning.htm
4. http://www.varsitytutors.com/mcat_verbal-practice-tests
5. https://www.khanacademy.org/test-prep/mcat

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I MCA I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	4	40	60	100	2
C PROGRAMMING AND DATA STRUCTURES LAB							

Course Objectives

1. To learn/strengthen a programming language like C, To learn problem solving techniques
2. To introduce the student to simple linear and nonlinear data structures such as lists, stacks, queues etc.,

Exercise 1

a) Write a C program to find the sum of individual digits of a positive integer.
b) A Fibonacci Sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.
c) Write a C program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
d) Write a program which checks a given integer is Fibonacci number or not.

Exercise 2

a) Write a C program to calculate the following Sum: Sum=1-x2/2! +x4/4!-x6/6!+x8/8!-x10/10!
b) Write a C program to find the roots of a quadratic equation.
c) Write a C program to implement Newton Raphson method for a quadratic equation
d) Write a C program to implement Newton Raphson method for a general purpose algebriac equation

Exercise 3

a) Write C programs that use both recursive and non-recursive functions
   i) To find the factorial of a given integer.
   ii) To find the GCD (greatest common divisor) of two given integers.
   iii) To solve Towers of Hanoi problem.
   iv) Write program to calculate probability of head/tail by generating random numbers using random() function.

Exercise 4

a) The total distance travelled by vehicle in 't' seconds is given by distance = ut+1/2at2 where 'u' and 'a' are the initial velocity (m/sec.) and acceleration (m/sec2). Write C program to find the distance travelled at regular intervals of time given the values of 'u' and 'a'. The program should provide the flexibility to the user to select his own time intervals and repeat the calculations for different values of 'u' and 'a'.
b) Write a C program, which takes two integer operands and one operator form the user, performs the operation and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

Exercise 5

a) Write a C program to find both the larges and smallest number in a list of integers.
b) Write a C program that uses functions to perform the following:
   i) Addition of Two Matrices
   ii) Multiplication of Two Matrices
   iii) Checking symmetricity of a square matrix.
   iv) Calculating transpose of a matrix in-place manner.

Exercise 6

a) Write a C program that uses functions to perform the following operations:

i) To insert a sub-string in to given main string from a given position.

ii) To delete n Characters from a given position in a given string.

b) Write a C program to determine if the given string is a palindrome or not

Exercise 7

a) Write a C program that displays the position/ index in the string S where the string T begins, or –1 if S doesn't contain T.

b) Write a C program to count the lines, words and characters in a given text.

Exercise 8

a) Write a C program to generate Pascal's triangle.

b) Write a C program to construct a pyramid of numbers.

Exercise 9

Write a C program to read in two numbers, x and n, and then compute the sum of this geometric progression: 1+x+x2+x3+............+xn

For example: if n is 3 and x is 5, then the program computes 1+5+25+125. Print x, n, the sum Perform error checking. For example, the formula does not make sense for negative exponents – if n is less than 0. Have your program print an error message if n<0, then go back and read in the next pair of numbers of without computing the sum. Are any values of x also illegal ? If so, test for them too.

Exercise 10

a) 2's complement of a number is obtained by scanning it from right to left and complementing all the bits after the first appearance of a 1. Thus 2's complement of 11100 is 00100. Write a C program to find the 2's complement of a binary number.

b) Write a C program to convert a Roman numeral to its decimal equivalent.

Exercise 11

Write a C program that uses functions to perform the following operations using Structure:

i) Reading a complex number

ii) Writing a complex number

iii) Addition of two complex numbers

iv) Multiplication of two complex numbers

Exercise 12

a) Write a C program which copies one file to another.

b) Write a C program to reverse the first n characters in a file.

(Note: The file name and n are specified on the command line.)

Exercise 13

a) Write a C program that uses functions to perform the following operations on singly linked list.:

i) Creation ii) Insertion iii) Deletion iv) Traversal

b) Adding two large integers which are represented in linked list fashion.

Exercise 14

Write a C program that uses functions to perform the following operations on doubly linked list.

i) Creation ii) Insertion iii) Deletion iv) Traversal in both ways

Exercise 15

a.) Write C programs that implement stack (its operations) using

i) Arrays ii) Pointers iii) linked list.

Exercise 16

a. Write C programs that implement Queue (its operations) using

i) Arrays ii) Pointers iii) linked lists.

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Exercise 17

Write a C program that uses Stack operations to perform the following:
i) Converting infix expression into postfix expression ii) Evaluating the postfix expression

Exercise 18

a. Write a C program that uses functions to perform the following:
   i) Creating a Binary Tree of integers
   ii) Traversing the above binary tree in preorder, inorder and postorder.
b. Program to check balance property of a tree.
c. Program to check for its strictness.

Exercise 19

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a Key value in a given list of integers : i) Linear search ii) Binary search

Exercise 20

Write C programs that implement the following sorting methods to sort a given list of integers in ascending order:
i) Bubble sort ii) Quick sort

Exercise 21

a. Write C programs that implement the following sorting methods to sort a given list of Integers in ascending order:
   i) Insertion sort ii) Bubble sort.
b. Recursive implementation of sorting algorithms.

Exercise 22

Write C programs to implement the Lagrange interpolation and Newton- Gregory forward interpolation.

Exercise 23

a. Program to calculate mean and standard deviation of a population.
b. Write C programs to implement the linear regression and polynomial regression algorithms.

Exercise 24

a. Write C programs to implement Trapezoidal and Simpson methods.
b. Program for Calculating pi value.

REFERENCE BOOKS

1. Digital Fundamentals, Floyd, Jain, 8th ed , Pearson
2. Digital Logic and Computer Organization, Rajaraman, Radhakrishnan, PHI, 2006

I MCA I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	4	40	60	100	2
INFORMATION TECHNOLOGY WORKSHOP							

Course Objective

The objective of this course is to provide an insight into basic features of Computer Systems and their Applications in day to day professional work.

Course Outcomes

1. The student will be able to perform documentation.
2. The student will be able to create and use spread sheets with macros, charts, filters etc.
3. The student will be able to create presentations with animations, auto slide transition etc.
4. The student will be able to configure Wi-Fi of laptop/tab/mobile to access internet.
5. The student will be able to configure laptop/tab/mobile e-mail clients (SMTP& POP3/IMAP).
6. The student will be able to share files and printers over LAN.

Exercise - I

Introduction to Computer Concepts – Elements of computer – Characteristics of a Computer – Classification of Computers – Basic Computer Architecture – Input-output Devices, Types of software – Software: its nature and qualities — Windows and Linux Operating System Functions .

Exercise - II

Hardware, Software, Operating Systems, Printer, Scanner, Pen drive, DVD, Web cam, LAN File Sharing, Device Sharing, Blue Tooth, WI-FI, Internet, Web site, Domain, Search-Engine, Windows and Linux commands.

Exercise- III

Electronic mail, Outlook Configuration, Skype, Hangouts, Facebook, Twitter,(Social Networks), Cloud Storage(Google drive, One drive), Mobile, Tablets, Laptops, Mobile Apps.

Exercise - IV

MS Office- Applications of MS Word in Business Correspondence: letters, tables, mail merge, labels.

Exercise - V

Applications of MS Excel: Graphs and Charts – Calculation of various financial functions - Ms Access: Tables and Queries

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Exercise - VI

MS Power Point: Introduction – Toolbar, their Icons and Commands – Navigating in Power point - Creation of slides, animation, and templates - Designing Presentations – Slide show controls – Making notes on Pages and Handouts – Printing Presentations – Customizing Presentations - Auto content Wizard.

REFERENCE BOOKS

1. Sanjay Saxena and Prathpreet Chopra, Computer Applications in Management, Vikas, New Delhi
2. Aksoy, Introduction to Information Technology, Cengage, ND
3. Parameswaran: Computer Application in Business – S Chand, New Delhi.
4. Management Information Systems by Mahadeo Jaiswal, Monika Mittal, Oxford University Press.
5. PS Gill, Database Management Stystems, IK Int Pub House, New Delhi
6. Management Information Systems by D.P. Goyal, MacMillan Publishers.
7. The Compact guide to Microsoft office, Mansfield Rom, BPB Publications, Delhi.
8. Sudalaimuthu&Anthony Raj, Computer Applications in Business, Himalaya, Mumbai

I MCA II SEMESTER SYLLABUS

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	4	-	-	40	60	100	4
DATABASE MANAGEMENT SYSTEM							

Course Objective

The objective of the course is to enable students to understand and use a relational database system. Introduction to Databases, Conceptual design using ERD, Functional dependencies and Normalization, Relational Algebra are covered in detail. Students learn how to design and create a good database and use various SQL operations. The course concludes with an overview of transaction management and introduction to advanced and non-relational databases.

Course Outcomes

1. Able to master the basic concepts and understand the applications of database systems.
2. Able to construct an Entity-Relationship (E-R) model from specifications and to transform to relational model.
3. Able to construct unary/binary/set/aggregate queries in Relational Algebra.
4. Understand and apply database normalization principles.
5. Able to construct SQL queries to perform CRUD operations on database. (Create, Retrieve, Update, Delete)
6. Understand principles of database transaction management, database recovery, security.
7. Be aware of non-relational databases and applications.

UNIT I

Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction, Instances and Schemas, Data Models – the ER Model, Relational Model, Other Models – Database Languages – DDL, DML, Database Access from Applications Programs, Transaction Management, Data Storage and Querying, Database Architecture, Database Users and Administrators, History of Data base Systems. Introduction to Data base design, ER diagrams, Beyond ER Design, Entities, Attributes and Entity sets, Relationships and Relationship sets, Additional features of ER Model, Conceptual Design with the ER Model, Conceptual Design for Large enterprises. Relational Model: Introduction to the Relational Model – Integrity Constraints Over Relations, Enforcing Integrity constraints, Querying relational data, Logical data base Design, Introduction to Views – Destroying /altering Tables and Views.

UNIT II

Relational Algebra and Calculus: Relational Algebra – Selection and Projection, Set operations, Renaming, Joins, Division, Examples of Algebra Queries, Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

Form of Basic SQL Query – Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set – Comparison Operators, Aggregate Operators, NULL values – Comparison using Null values – Logical connectives – AND, OR and NOT –

Impact on SQL Constructs, Outer Joins, Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT III

Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition, Functional Dependencies - Reasoning about FDS, Normal Forms – FIRST, SECOND,THIRD Normal forms – BCNF –Properties of Decompositions-Loss less-join Decomposition, Dependency preserving Decomposition, Schema Refinement in Data base Design – Multi valued Dependencies – FOURTH Normal Form, Join Dependencies, FIFTH Normal form, Inclusion Dependencies.

UNIT IV

Overview of Transaction Management: The ACID Properties, Transactions and Schedules, Concurrent Execution of Transactions – Lock Based Concurrency Control, Deadlocks – Performance of Locking – Transaction Support in SQL.

Concurrency Control: Serializability, and recoverability – Introduction to Lock Management – Lock Conversions, Dealing with Dead Locks, Specialized Locking Techniques – Concurrency Control without Locking.

Crash recovery: Introduction to Crash recovery, Introduction to ARIES, the Log, Other Recovery related Structures, the Write-Ahead Log Protocol, Check pointing, recovering from a System Crash, Media recovery

UNIT V

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing, Comparison of File Organizations.

Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks.

UNIT VI

Tree Structured Indexing: Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM)

B+ Trees: A Dynamic Index Structure, Search, Insert, Delete.

Hash Based Indexing: Static Hashing, Extendable hashing, Linear Hashing, Extendible vs. Linear Hashing.

TEXT BOOKS

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3 rd Edition,2003.
2. Data base System Concepts, A.Silberschatz,H.F. Korth, S.Sudarshan,McGraw hill, VI edition,2006.
3. Fundamentals of Database Systems 5th edition., Ramez Elmasri, Shamkant B.Navathe,Pearson Education,2008.

REFERENCE BOOKS

1. Database Management System Oracle SQL and PL/SQL.P.K.DasGupta,PHI.
2. Database System Concepts,Peter Rob & Carlos Coronel,Cengage Learning,2008.
3. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg,Pearson education.
4. Database Principles, Programming, and Performance, P.O'Neil, E.O'Neil, 2 nd ed.,ELSEVIER
5. Fundamentals of Relational Database Management Systems,S.Sumathi,S.Esakkirajan, Springer.
6. Introduction to Database Management,M.L.Gillenson and others,Wiley Student Edition.
7. Database Development and Management,Lee Chao,Auerbach publications,Taylor & Francis Group.
8. Introduction to Database Systems,C.J.Date,Pearson Education.

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I MCA II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	4
OOPS THROUGH JAVA							

Course Objectives

1. To understand the difference between Procedure Oriented Programming and Object Oriented Programming.
2. Understand the importance of Exception Handling and create robust programs in Java which can withstand runtime errors.
3. To learn how to create Graphical User Interface applications in Java.
4. To learn how to create lightweight multithreaded applications with synchronization.
5. To learn how to develop web applications using java Applets.

Course Outcomes

1. To be able to analyses the real world problems in an Object Oriented way.
2. Apply Encapsulation, Inheritance and Polymorphism features of Java appropriately to solve problems.
3. To be able to create Java console, GUI and Web applications in Java.

UNIT I

Basics of Object Oriented Programming(OOP): Problems with Procedure Oriented Programming and Need for OO paradigm. A way of viewing world-Agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overridding and exceptions, summary of oops concepts, coping with complexity, abstraction mechanisms.

UNIT II

Java Basics: Data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, classes and objects - concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing , recursion, string handling.

UNIT III

Packages, Interfaces and Inheritance: Defining, creating and accessing a package, understanding CLASSPATH, importing packages. Differences between classes and interface. Defining an interface, applying interfaces, variables in interface and extending interfaces. Hierarchical abstraction, base class objects, Subclass, sub type, substitutability, forms of inheritance, Specialization, specification, construction extension,limitation,combination, benefits of inheritance, costs of inheritance. Member access rules, Super uses, using final with inheritance, polymorphism, abstract classes.

UNIT IV

Exception handling and Multithreading: Concept of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, Usage of try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

Differences between multithreading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

UNIT V

Event Handling, AWT and Swings: Events, Event sources, Event classes, Event listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy, user interface components – labels, button, canvas, scrollbars, text components, checkbox, checkbox groups, choice, lists, panels- scroll pane, dialogs, menu bar, graphics, layout manager - layout manager types - border, grid, flow, card and grid bag.

UNIT VI

Applets and Swings: Concepts of applets, differences between applets and applications, life cycle of an applet, types of applets, creating applets, passing parameter to applets. Limitation of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and Component, Icons and Labels, text fields, buttons - The JButton class, Check boxes,Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees, and Tables.

TEXT BOOKS

1. Java-The complete reference,7/e, Herbert schildt, TMH.

REFERENCE BOOKS

1. JAVA:How to program, 8/e, Dietal , Dietal,PHI.
2. Introduction of programming with JAVA,S.Dean,TMH.
3. Introduction to Java programming, 6/e, Y.Daniel Liang, Pearson.
4. Core Java 2, Vol 1(Vol 2) Fundamentals(Advanced), 7/e, Cay.S.Horstmann,Gary Cornell,Pearson.
5. Big Java2,3/e, Cay.S. Horstmann,Wiley.
6. Object Oriented Programming through Java, P.Radha Krishna, University Press.
7. JAVA&Object Orientation an Introduction, 2/e, John Hunt, Springer.
8. Introduction to JAVA Programming, 7/e, Y.Daniel Liang, Pearson.
9. AVA Programming and OO Application Development , Johnson, Cengage Learning.
10. First Encounter with JAVA, S.P.Bhuta, SPD
11. JAVA for Professionals , B.M.Harwani, SPD.
12. Program with JAVA, Mahesh Bhave, Palekan, Pearson.
13. Programming with JAVA, 3/e, E.Balaguruswamy, TMH.

Web Links:

1. http://www.w3schools.in/java/
2. https://docs.oracle.com/javase/tutorial/
3. https://docs.oracle.com/javase/tutorial/java/

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OPERATING SYSTEMS							

Course Objective

Operating systems are an essential part of any computer system. It provides a clear description of the concepts that underlie operating systems.

Course Outcomes

At the end of the course the student will be able to

1. Classify different types of systems like distributed system, special purpose system and the working principle of system calls.
2. Compute the waiting time and turnaround time of different CPU scheduling algorithms and comparison among all the CPU scheduling algorithms.
3. Examine the page faults for different Page Replacement algorithms and comparison among all the Page Replacement algorithms, and methods to handle deadlocks.
4. Differentiate among different File System implementation and directory implementation.
5. Assess different types of disk scheduling algorithms, distinguish different protection and security mechanisms

UNIT I

Objective: Gives a view of what operating systems are, what they do, how they are designed and constructed.

INTRODUCTION: Operating system structures – simple batch, Multi programmed, Time shared, Personal computer, Parallel, Distributed systems, Real time systems, system components, Operating System services, System calls, Virtual machines, System Design and Implementation.

UNIT II

Objective: It describes the process concept, communication between processes and concurrency are heart of the modern operating systems.

PROCESS SCHEDULING:

Process Concept: Overview – Process Scheduling – Operations on Processes – co-operating processes, Inter process Communication – Examples of IPC Systems – Communication in Client and Server Systems. Threads: Overview, Multi-threading models, Threaded Libraries, Java Threads, Threading issues, case studies of UNIX, LINUX, Windows.

UNIT III

Objective: Illustration of scheduling algorithms with preemptive and non-preemptive nature and various algorithms for handling deadlock problems.

CPU SCHEDULING: Basic concepts, Scheduling criteria, Scheduling algorithms: FCFS scheduling, SJF, SRTF, Priority Scheduling, Round Robin scheduling, Multilevel queue scheduling, Multilevel feedback queue scheduling, Multiprocessor scheduling.

DEADLOCKS: System Model, Deadlock Characterization, Methods for handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.

UNIT IV

Objective: Description of process coordination and Concurrent access to shared data may result in data inconsistency. There are various mechanisms to ensure the orderly execution processes that share a logical address space, so data consistency is maintained.

PROCESS MANAGEMENT AND SYNCHRONIZATION: The critical - section problem, Peterson's solution, Synchronization hardware, Semaphores, Classic problems of Synchronization, Monitors, Synchronization examples.

UNIT V

Objective: Describe the main memory management during the execution of a process. To improve the utilization of CPU and the speed of its response to its users, the computer must keep several processes in memory. So, illustration of various algorithms for managing memory effectively. Introduction to how the file system and Directories are handled in computer system.

MEMORY MANAGEMENT AND VIRTUAL MEMORY: Logical versus Physical Address space, Swapping, Contiguous Allocation, paging, Segmentation, Segmentation with Paging, Demand Paging, Copy-on-Write, Page replacement algorithms, Allocation of Frames, Thrashing.

FILE SYSTEM INTERFACE AND IMPLEMENTATION: File Concept, Access Methods, Directory Structure, File System Mounting, File Sharing, Protection, File System Structure, Allocation Methods, Free Space Management, Directory Management, Directory Implementation, Efficiency and Performance, Recovery, Log structured File System.

UNIT VI

Objective: Introduction to how the Secondary storage is handled in a modern computer system. And discuss the processes in an operating system that must be protected from one another's activities. Security protects the information stored in system, physical resources of the computer system, and from unauthorized access.

MASS STORAGE STRUCTURE: Disk structure, Disk Scheduling, Disk and Swap Space Management, RAID Structure, Stable Storage structure.

PROTECTION : Goals of protection, Principles of protection, Domain of protection, Implementation of Access Matrix, Revocation of Access Rights, Capability Based Systems.

SECURITY: Introduction part of Security problem, Program Threats, System and Network Threats, Cryptography.

TEXT BOOKS

1. Operating System Concepts, 7/e, Abraham Silberschatz, Peter Galvin, Greg Gagne.

REFERENCE BOOKS

1. Operating Systems, 6/e , William Stalling s, PHI/ pearson.
2. Operating Systems Design and Implementation, 3/e, Tanenbaum, WoodHull.

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	3	1	-	40	60	100	4
OPTIMIZATION TECHNIQUES							

UNIT I

Objective: To solve a problem by using scientific approach, OT techniques.

The origin of OR, the nature of OR, the impact of OR, Definition, Characteristics and Phrases, scientific method. Types of models, general methods for solving, operations research models.

UNIT II

Objective: To learn how to convert the data into mathematical form and solution by LPP.

Allocation, Introduction, linear programming formulation graphical solution, simplex methods, artificial variable technique, duality principle.

UNIT III

Objective: To transport various quantities in such a way that the total transportation cost is minimum.

Transportation problem: Formulation, optimal solution, unbalanced transportation, assignment problem: formulation , optimal solution, variations problem, degeneracy i.e. non square (MXN) matrix, restrictions.

UNIT IV

Objective: To understand the study of need of replacement due to deteriorating efficiency, failure or breakdown.

Replacement: Introduction, replacement of items that deteriorate when money value is not counted and replacement of items that fail completely (i.e.) group replacements.

UNIT V

Objective: To learn decision making in a competitive situation.

Theory of Games: Introduction, minmax(maximum),criterion and optimal strategy solution of games with saddle points, rectangular without saddle points. Sequencing: Introduction, optimal solution for processing each of n jobs through three machines, travelling salesman problem(i.e.) shortest acyclic route models.

UNIT VI

Objective: To learn planning and scheduling large projects in a smooth manner by determining critical factors and co-ordinating various parts of overall job.

Project Management: PERT and CPM , difference between PERT and CPM, PERT/CPM network components and precedence relations, Time Estimates for activities.

TEXT BOOKS

1. Operations Research, S.D.Sharma, Ramnath,& Kedarnath co,Meerut.
2. Operations Research, An introduction , 8/e, Taha, Pearson.

REFERENCE BOOKS

1. Operations Research, P.K.Gupta, D.S. Hira, S.Chand.
1. Operations Research, R.D.Asrhedkar, R.V.Kulkarni.
2. Operations Research, Problems & sollutons, 3/e, JKSharma, Macmillan.
3. Operations Research, 8/e, Hillier, Liberman, TMH.
4. Operations Research, 2/e, Panneerselvam.

I MCA II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
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ORGANIZATIONAL STRUCTURE AND PERSONNEL MANAGEMENT							

Course Objective

To equip the student with the basic structure of organisation and to provide knowledge relating to recruitment, selection, training and motivation of employees in the organisation.

Course Outcome

The outcome of this program is that the student learns necessary skills in the area of people management.

UNIT I

Introduction to management- concepts, nature, definition, Importance of management-Principles of management-levels of management-evolution of management- Management Vs Administration-managerial roles and functions.

UNIT II

Organisational design- nature, importance of organising, types of organisational structures, theories of organisation, formal and informal organisations, difficulties due to informal organisation.

UNIT III

Human Resource management- objectives, functions of hrm, duties and responsibilities of hr managers, recruitment, sources of recruitment, selection procedure, tests and interview techniques, training and development- methods of training, transfer, promotion and its policies.

UNIT IV

Strategic management- Introduction- study of strategic management- corporate planning-environmental scanning- SWOT analysis- challenges in LPG

UNIT V

Motivation- need, importance, theories of motivation,-Principles of motivation- types of motivation-communication- concept-need-importance-process- barriers of communication-types and methods of communication-essentials of effective communication.

UNIT VI

Contemporary Issues- HRIS, BPO, HR Outsourcing, Exit interviews, HRD, JIT, TQM, bench marking, value chain analysis, cross culture in HRM.

REFERENCE BOOKS

1. Organization Structure and personal Management, 2/e, Subbarao.P, HPH.
2. Personal and Human Resource Management, Recenzo, Robins, PHI.
3. Business Communications and soft skills, kuberudu B, and Krishna K.s, Excel publications.
4. Management process and Organizational Behaviour, karam pal, I.k.int.
5. Management process an d Organizational Behaviour, karam pal, I.K int.
6. Human Resource Management Jyothoi, Oxford.
7 Organizations and Management, Agarwal, TMH.
8. Fundamentals of HRM, David A. Decenzo, Stephen R. Robins, Wiley India.at es
9. Organizational Structure and Human Resurce management, Varaprasad, SciTech.
10. Human Resource Management, Chabra. T.N, Dhanpat Rai.
11. Personal Management and Human Resources, Venkat Ratnam, TMH,

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	3	-	-	-	-	-	-
QUANTITATIVE APTITUDE AND REASONING							

Course Objectives

1. To train students in analysing real life scenarios considering all factors
2. To educate the students on principles of mathematical problems and problem solving methods.
3. To train students for campus placements.

Course Outcomes

After thorough learning of Quantitative Aptitude and Reasoning, a student:
1. Will be able to prepare well for clearing Quantitative Aptitude and Reasoning tests for campus placements
2. Will be able to critically evaluate various real life situations by resorting to Analysis of key issues and factors.
3. Will be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

SYLLABUS FOR QUANTITATIVE APTITUDE-1

Unit I: Simple equations, Ratio, Proportion, Variation, Percentages

1. **Simple equations**
   a. Definition of Linear Equations
   b. Formation of simple equations
   c. Problems on Ages, Fractions and Digits
   d. Indeterminate system of equations
   e. Special cases in indeterminate system of equations

2. **Ratio and proportion**
   a) Definition of Ratio
   b) Properties of Ratios
   c) Comparison of Ratios
   d) Problems on Ratios
   e) Compound Ratio
   f) Problems on Proportion, Mean proportional and Continued Proportion

3. **Variation**
   a) Direct variation
   b) Inverse variation
   c) Joint variation
   d) Problems on Variations

Unit II: Percentages, Profit and loss, Partnership, Simple interest and Compound interest, Quadratic equations, Progressions

1. **Percentages**
   a) Introduction

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b) Converting a percentage into decimals
c) Converting a Decimal into a percentage
d) Percentage equivalent of fractions
e) Problems on percentages

2. Profit And Loss

a) Problems on Profit and Loss percentage
b) Relation between Cost Price and Selling price
c) Discount and Marked Price
d) Two different articles sold at same Cost Price
e) Two different articles sold at same Selling Price
f) Gain% / Loss% on Selling Price

3. Partnership

a) Introduction
b) Relation between capitals, Period of investments and Shares

Simple Interest

a) Definitions
b) Problems on interest and amount
c) Problems when rate of interest and time period are numerically equal

4. Compound Interest

a) Definition and formula for amount in compound interest
b) Difference between simple interest and compound interest for 2 years on the same principle and time period

5. Quadratic equations

a) General form of Quadratic equations
b) Finding the roots of Quadratic equations
c) Nature of the roots
d) Relation between the roots
e) Maximum and minimum value of Quadratic Expression

6. Progressions

a) Arithmetic Progression
b) Geometric Progression
c) Harmonic Progression
d) Arithmetic Mean, Geometric Mean and Harmonic Mean and their relation.

SYLLABUS FOR REASONING-1

UNIT III: Deductions & Connectives

1. Deductions

a) Finding the conclusions using Venn diagram method
b) Finding the conclusions using syllogism method

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2. Connectives

   a) Definition of a simple statement
   b) Definition of compound statement
   c) Finding the Implications for compound statements
   d) Finding the Negations for compound statements

UNIT IV: Analytical Reasoning puzzles

   a) Problems on Linear arrangement
   b) Problems on Circular arrangement
   c) Problems on Double line-up
   d) Problems on Selections
   e) Problems on Comparisons

UNIT V: Clocks, Calendars & Blood relations

1. **Clocks**

   a) Finding the angle when the time is given
   b) Finding the time when the angle is known
   c) Relation between Angle, Minutes and Hours
   d) Exceptional cases in clocks

2. **Calendars**

   a) Definition of a Leap Year
   b) Finding the number of Odd days
   c) Framing the year code for centuries
   d) Finding the day of any random calendar date

3. **Blood relations**

   a) Defining the various relations among the members of a family
   b) Solving Blood Relation puzzles
   c) Solving the problems on Blood Relations using symbols and notations

SYLLABUS FOR QUANTITATIVE APTITUDE-2

Unit I: Numbers, Time and Distance, Time and work, Averages, Mixtures and Allegations

Numbers

a) Classification of numbers
b) Divisibility rules
c) Finding the units digit
d) Finding remainders in divisions involving higher powers
e) LCM and HCF Models

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1. Time and Distance

a) Relation between speed, distance and time
b) Converting km/h into m/s and vice versa
c) Problems on average speed
d) Problems on relative speed
e) Problems on trains
f) Problems on boats and streams
g) Problems on circular tracks
h) Problems on races

2. **Time and Work**

a) Problems on Unitary method
b) Relation between Men, Days, Hours and Work
c) Problems on Man-Day-Hours method
d) Problems on alternate days
e) Problems on Pipes and Cisterns

3. **Averages, Mixtures and Allegations**

a) Definition of Average
b) Rules of Average
c) Problems on Average
d) Problems on Weighted Average
e) Finding average using assumed mean method
f) Problems on mixtures
g) Allegation rule
h) Problems on Allegation

Unit II: Data Interpretation, Data Sufficiency, Mensuration, Permutation and Combinations, Probability

1. **Data Interpretation**

a) Problems on tabular form
b) Problems on Line Graphs
c) Problems on Bar Graphs
d) Problems on Pie Charts

2. **Data Sufficiency**

a) Different models in Data Sufficiency
b) Problems on data redundancy

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3. Mensuration
   a) Formulas for Areas
   b) Formulas for Volumes of different solids
   c) Problems on Areas
   d) Problems on Volumes
   e) Problems on Surface Areas

4. Permutation and Combinations

   a) Definition of permutation
   b) Problems on Permutations
   c) Definition of Combinations
   d) Problems on Combinations

5. Probability

   a) Definition of Probability
   b) Problems on coins
   c) Problems on dice
   d) Problems on Deck of cards
   e) Problems on Years

SYLLABUS FOR REASONING-2

Unit III: Cubes, Venn diagrams, Binary Logic

1. Cubes
   a) Basics of a cube
   b) Formulae for finding volume and surface area of a cube
   c) Finding the minimum number of cuts when the number of identical pieces are
   d) Finding the maximum number of pieces when cuts are given
   e) Problems on painted cubes of same and different colors
   f) Problems on cuboids
   g) Problems on painted cuboids
   h) Problems on diagonal cuts

2. Venn diagrams

   a) Representing the given data in the form of a Venn diagram
   b) Problems on Venn diagrams with two sets
   c) Problems on Venn diagrams with three sets
   d) Problems on Venn diagrams with four sets

3. Binary Logic
   a) Definition of a truth-teller
   b) Definition of a liar

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c) Definition of an alternator
d) Solving problems using method of assumptions
e) Solving analytical puzzles using binary logic

Unit IV: Number and letter series, Number and letter Analogies, Odd man out

1. Number and letter series

   a) Difference series
   b) Product series
   c) Squares series
   d) Cubes series
   e) Alternate series
   f) Combination series
   g) Miscellaneous series
   h) Place values of letters

2. **Number and Letter Analogies**

   a) Definition of Analogy
   b) Problems on number analogy
   c) Problems on letter analogy
   d) Problems on verbal analogy

3. **Odd man out**

   a) Problems on number Odd man out
   b) Problems on letter Odd man out
   c) Problems on verbal Odd man out

Unit IV: **Coding and decoding, Direction sense, Critical Reasoning, Lateral reasoning puzzle**

1. **Coding and decoding**

a) Coding using same set of letters
b) Coding using different set of letters
c) Coding into a number
d) Problems on R-model

2. **Direction sense**

a) Solving problems by drawing the paths
b) Finding the net distance travelled
c) Finding the direction
d) Problems on clocks
e) Problems on shadows
f) Problems on damaged compass
g) Problems on direction sense using symbols and notations

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3. Critical Reasoning

a) Problems on assumption
b) Problems on conclusions
c) Problems on inferences
d) Problems on strengthening and weakening of arguments
e) Problems on principle
f) Problems on paradox

4. Lateral reasoning puzzle

a) Problems on common balance
b) Problems on digital balance
c) Problems on coins
d) Problems on lockers
e) Problems on heights
f) Digit puzzles using basic arithmetic operations

TEXT BOOKS

1. GL Barrons, Mc Graw Hills, Thorpe's verbal reasoning, LSAT Materials
2. R S Agarwal, S.Chand , 'A modern approach to Logical reasoning'
3. R S Agarwal, S Chand, 'Quantitative Aptitude'
4. Quantitative Aptitude - G. L BARRONS
5. Quantitative Aptitude - Abhijit Guha Mc Graw Hills

REFERENCE BOOKS

1. www.careerbless.com/**aptitude**/qa/home.php
2. www.affairscloud.com/**quantitative-aptitude**-questions
3. www.careerafter.com/rs-aggarwal-**quantitative-aptitude**-pdf/
4. www.amazon.in/**Quantitative-Aptitude**-Competitive-Examinations.../8121924987
5. www.indiabix.com
6. www.practice**aptitude**tests.com/numerical-**reasoning**-tests

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I MCA II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	4	40	60	100	2
DATABASE MANAGEMENT SYSTEM LAB							

1. Execute a single line and group functions for a table.
2. Execute DCL and TCL Commands.
3. Create and manipulate various DB objects for a table.
4. Create views, partitions and locks for a particular DB.
5. Write PL/SQL procedure for an application using exception handling.
6. Write PL/SQL procedure for an application using cursors.
7. Write a DBMS program to prepare reports for an application using functions.
8. Write a PL/SQL block for transaction operations of a typical application using triggers.
9. Write a PL/SQL block for transaction operations of a typical application using package.
10. Design and develop an application using any front end and back end tool (make use of ER diagram and DFD).
11. Create table for various relation Implement the query in sql for
    a) insertion b) retrieval c) updation d) deletion
12. Creating Views
13. Writing Assertion
14. Writing Triggers
15. Implementing operation on relation using PL/SQL
16. Creating Forms
17. Generating Reports
18. Typical Applications – Banking, Electricity Billing, Library Operation, Pay roll, Insurance, Inventory etc.

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OOPS Through JAVA Lab							

Note: 1) Use JDK 1.5 or above on any platform e.g. Windows or Unix.
2) Student is expected to complete any 16 programs.

1. The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1,1.every subsequent value is the sum of the 2 values preceding it. Write A Java Program (WAJP) that uses both recursive and nonrecursive functions to print the nth value of the Fibonacci sequence.

2. WAJP to demonstrate wrapper classes and to fix the precision.

3. WAJP that prompts the user for an integer and then prints out all the prime numbers upto that Integer.

4. WAJP that checks whether a given string is a palindrome or not.
Ex. MALAYALAM is a palindrome.

5. WAJP for sorting a given list of names in ascending order.

6. WAJP to check the compatibility for multiplication , if compatible multiply two matrices and find its transpose.

7. WAJP that illustrates how runtime polymorphism is achieved.

8. WAJP to create and demonstrate packages.

9. WAJP, using String Tokenizer class, which reads a line of integers and then displays each integer and the sum of all integers.

10. WAJP that reads on file name form the user then displays information about whether the file exists, whether the file is readable/writable, the type of file and the length of the file in bytes and display the content of the using FileInputStream class.

11. WAJP that displays the number of characters, lines and words in a text/text file.

12. Write an Applet that displays the content of a file.

13. WAJP that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +-*?% operations. Add a text field to display the result.
14. WAJP for handling mouse events.

15. WAJP demonstrating the life cycle of a thread.

16. WAJP that correctly implements Producer-Consumer problem using the concept of Inter Thread Communication.
17. WAJP that lets users create Pie charts. Design your own user interface(with Swings & AWT).

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18. WAJP that allows user to draw lines, rectangles and ovals.

19. WAJP that implements a simple client/server application. The client sends data to a server.
The server receives the data, uses it to produce a result and then sends the result back to the client. The client displays the result on the console. For ex: The data send form the client is the radius of a circle and the result produced by the server is the area of the circle.

20. WAJP to generate a set of random numbers between two numbers x1 and x2, and x1>0.

21. WAJP to create an abstract class named shape, that contains an empty method named numberOfSides(). Provide three classes named Trapezoid, Triangle and Hexagon, such that each one of the classes contains only the method numberOfSides(), that contains the number of sides in the given geometrical figure.

22. WAJP to implement a Queue, using user defined Exception Handling (also make use of throw, throws).

23. WAJP that creates 3 threads by extending Thread class. First thread displays "Good Morning" Every 1 sec, the second thread displays "Hello" every 2 seconds and the third displays "Welcome" every 3 seconds. (Repeat the same by implementing Runnable).

24. Create an inheritance hierarchy of Rodent, Mouse, Gerbil, Hamster etc. In the base class Provide methods that are common to all Rodents and override these in the derived classes to perform different behaviors, depending on the specific type of Rodent. Create an array of Rodent, fill it with different specific types of Rodents and call your base class methods.

III	L	P	Credits
	4	-	-
DATA BASE MANAGEMENT SYSTEMS			

UNIT I

Database System Applications, Purpose of Database Systems, View of Data – Data Abstraction, Instances and Schemas,Data Models – the ER Model,Relational Model,Other Models – Database Languages – DDL,DML,Database Access from Applications Programs,Transaction Management, Data Storage and Querying,Database Architecture,Database Users and Administrators, History of Data base Systems.Introduction to Data base design,ER diagrams,Beyond ER Design,Entities, Attributes and Entity sets,Relationships and Relationship sets,Additional features of ER Model,Conceptual Design with the ER Model,Conceptual Design for Large enterprises. Relational Model: Introduction to the Relational Model – Integrity Constraints Over Relations, Enforcing Integrity constraints,Querying relational data, Logical data base Design, Introduction to Views – Destroying /altering Tables and Views.

UNIT II

Relational Algebra and Calculus: Relational Algebra – Selection and Projection,Set operations, Renaming,Joins,Division,Examples of Algebra Queries,Relational calculus – Tuple relational Calculus – Domain relational calculus – Expressive Power of Algebra and calculus.

Form of Basic SQL Query – Examples of Basic SQL Queries, Introduction to Nested Queries, Correlated Nested Queries, Set – Comparison Operators, Aggregate Operators,NULL values – Comparison using Null values – Logical connectives – AND, OR and NOT – Impact on SQL Constructs, Outer Joins,Disallowing NULL values, Complex Integrity Constraints in SQL Triggers and Active Data bases.

UNIT III

Introduction to Schema Refinement – Problems Caused by redundancy, Decompositions – Problem related to decomposition,Functional Dependencies - Reasoning about FDS,Normal Forms – FIRST, SECOND, THIRD Normal forms – BCNF –Properties of Decompositions- Loss less-join Decomposition, Dependency preserving Decomposition,Schema Refinement in Data base Design – Multi valued Dependencies – FOURTH Normal Form,Join Dependencies,FIFTH Normal form,Inclusion Dependencies.

UNIT IV

Overview of Transaction Management: The ACID Properties,Transactions and Schedules, Concurrent Execution of Transactions – Lock Based Concurrency Control,Deadlocks – Performance of Locking – Transaction Support in SQL.

Concurrency Control: Serializability, and recoverability – Introduction to Lock Management – Lock Conversions,Dealing with Dead Locks, Specialized Locking Techniques – Concurrency Control without Locking.

Crash recovery: Introduction to Crash recovery, Introduction to ARIES,the Log , Other Recovery related Structures, the Write-Ahead Log Protocol,Check pointing,recovering from a System Crash, Media recovery

UNIT V

Overview of Storage and Indexing: Data on External Storage, File Organization and Indexing – Clustered Indexes, Primary and Secondary Indexes, Index data Structures – Hash Based Indexing, Tree based Indexing, Comparison of File Organizations.

Storing data: Disks and Files: -The Memory Hierarchy – Redundant Arrays of Independent Disks.

Tree Structured Indexing: Intuitions for tree Indexes,Indexed Sequential Access Methods (ISAM) B+ Trees: A Dynamic Index Structure,Search,Insert,Delete.

Hash Based Indexing: Static Hashing,Extendable hashing, Linear Hashing, Extendble vs.Linear Hashing.

TEXT BOOKS:

1. Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, TMH, 3rd Edition,2003.
2. Data base System Concepts, A.Silberschatz,H.F. Korth, S.Sudarshan,McGraw hill, VI edition,2006.

3. Fundamentals of Database Systems 5th edition., Ramez Elmasri, Shamkant B.Navathe,Pearson Education,2008.

REFERENCE BOOKS:

1. Database Management System Oracle SQL and PL/SQL,P.K.Das Gupta,PHI.
2. Database System Concepts,Peter Rob & Carlos Coronel,Cengage Learning,2008.
3. Database Systems, A Practical approach to Design Implementation and Management Fourth edition, Thomas Connolly, Carolyn Begg, Pearson education.
4. Database Principles, Programming, and Performance, P.O'Neil, E.O'Neil, 2nd ed.,ELSEVIER
5. Fundamentals of Relational Database Management Systems,S.Sumathi,S.Esakkirajan, Springer.
6. Introduction to Database Management,M.L.Gillenson and others,Wiley Student Edition.
7. Database Development and Management,Lee Chao,Auerbach publications,Taylor & Francis Group.
8. Introduction to Database Systems,C.J.Date,Pearson Education.

III	L	P	Credits
	4	-	-

COMPUTER COMMUNICATIONS

UNIT-I

Network Hardware reference model: Transmission media, Narrowband ISDN, Broad band ISDN, ATM.

The data Link layer : Design Issues, Error detection and correction, Elementary Data Link Protocols, Sliding window protocols : Data link layer in HDLC, Internet and ATM.

UNIT-II

Channel allocation methods: TDM, FDM, ALOHA, Carrier sense Multiple access protocols, Collision Free protocols – IEEE standard BO2 for LANS – Ethernet, Token Bus, Token ring, Bridges.

Network lyer Routing Algorithms: Shortest path, Flooding, Flow based Distance vector, Link state, Hierarchical, Broadcast routing, Congestion Control algorithms-General principles of congestion control, Congestion prevention polices, Choke packets and Load shedding.

UNIT-III

Internet Working : Tunneling, internetworking, Fragmentation, network layer in the internet – IP protocols, IP address, Subnets, Internet control protocols, DSPF, BOP, Internet multicasting, Mobile IP. Network layer in the ATM Networks – cell formats, connection setup, routing and switching, service categories, and quality of service, ATM LANs.

UNIT-IV

The Transport Layer: Elements of transport protocols – addressing, establishing a connection, releasing connection, flow control and buffering and crash recovery, end to end protocols : UDP, reliable Byte Stream (TCP) end to end format, segment format, connection establishment and termination, sliding window revisited, adaptive retransmission, TCP extension, Remote Procedure Call – BLAST, CHAN, SELECT, DCE.

UNIT-V

Application Layer: Network Security, Cryptographic Algorithms: DES, RSA. Security Mechanisms : Authentication Protocols, Firewalls. Name service (DNS) Domains Hierarchy, Name servers. Traditional Applications : SMTP, MIME, World Wide Web : HTTP, Network Management : SNMP.

TEXT BOOKS :

1. Computer Networks and rew, Tanenbaum, 4/e, Pearson
2. Data and computer communications, stallings, 8/e, PHI

REFERENCE BOOKS

1. Data communications and networking Forouzan, 4/e, TMH
2. Computer Networks – A System Approach , Peterson ,Bruce Davie,2/ e,Harcourt Asia
3. Compute communications and networking technologies, Gallo, Hancock,Cengage
4. An Engineering approach to compute networking, Kesha ,Pearson
5. Communication networks, 2/e , Leon-Garcia, TMH
6. Computer networks , Anuranjan Misra, ACME Learning
7. Computer networks, C R Sarma, Jaico, Understanding data communications, Held, 7/e , Pearson

III	L	P	Credits
	4	-	-

UNIX PROGRAMMING

UNIT-I

Review of Unix Utilities and Shell Programming: -File handling utilities, security by file permissions, process utilities, disk utilities, networking commands, backup utilities, text processing utilities, Working with the Bourne shell-, What is a shell, shell responsibilities, pipes and input redirection, output redirection, here documents, the shell as a programming language, shell meta characters, shell variables, shell commands, the environment, control structures, shell script examples.

UNIT-II

Unix Files: Unix file structure, directories, files and devices, System calls, library functions, low level file access, usage of open, creat, read, write, close, lseek, stat, fstat, octl, umask, dup, dup2. The standard I/O (fopen, fclose, fflush, fseek, fgetc, getc, getchar, fputc, putc, putchar, fgets, gets), formatted I/O, stream errors, streams and file descriptors, file and directory maintenance (chmod, chown, unlink, link, symlink, mkdir, rmdir, chdir, getcwd), Directory handling system calls (opendir, readdir, closedir, rewinddir, seekdir, telldir)

UNIT-III

Unix Process: Threads and Signals: What is process, process structure, starting new process, waiting for a process, zombie process, process control, process identifiers, system call interface for process management, -fork, vfork, exit, wait, waitpid, exec, system, Threads, -Thread creation, waiting for a thread to terminate, thread synchronization, condition variables, cancelling a thread, threads vs. processes, Signals-, Signal functions, unreliable signals, interrupted system calls, kill and raise functions, alarm, pause functions, abort, sleep functions.

UNIT-IV

Data Management: Management Memory (simple memory allocation, freeing memory) file and record locking (creating lock files, locking regions, use of

read/ write locking, competing locks, other commands, deadlocks).
Interprocess Communication: Introduction to IPC, IPC between processes on a single computer system, IPC between processes on different systems, pipes, FIFOs, streams and messages, namespaces, introduction to three types of IPC (system-V)- message queues, semaphores and shared memory.
Message Queues-: IPC, permission issues, Access permission modes, message structure, working message queues, Unix system-V messages, Unix kernel support for messages, Unix APIs for messages, client/server example.

UNIT- V

Semaphores: -Unix system-V semaphores, Unix kernel support for semaphores, Unix APIs for semaphores, file locking with semaphores.
Shared Memory: -Unix system-V shared memory, working with a shared memory segment, Unix kernel support for shared memory, Unix APIs for shared memory, semaphore and shared memory example.
Sockets: Berkeley sockets, socket system calls for connection oriented protocol and connectionless protocol, example- client/server program, advanced socket system calls, socket options.

TEXT BOOKS:

1. Unix and shell Programming, N B Venkateswarlu, Reem
2. Unix Concepts and Applications, 3/e, Sumitabha Das, TMH

REFERENCE BOOKS:

1. Unix and shell Programming, Sumitabha Das, TMH
2. A Beginner's Guide to Unix, N.P.Gopalan, B.Sivaselva, PHI
3. Unix Shell Programming, Stephen G.Kochan, Patrick Wood, 3/e, Pearson
4. Unix Programming, Kumar Saurabh, Wiley,India
5. Unix Shell Programming, Lowell Jay Arthus & Ted Burns,3/e, GalGotia
6. Nix Concepts and Applications, Das, 4/e, TMH

III	L	P	Credits
	4	-	-
MANAGEMENT INFORMATION SYSTEMS			

UNIT-I

Management Information Systems: A Framework: Importance of MIS , MIS: A Definition

ature and Scope of MIS , **Structure and Classification of MIS :** Structure of MIS, MIS Classification

Information and System Concepts: Information: A Definition, Types of Information, Dimensions of Information, System: A Definition, Kinds of Systems, System Related Concepts, Elements of a System, Human as an Information Processing System

Information Systems for Competitive Advantage: Introduction, Changing concepts of Information System, Competitive Advantage, Information systems Strategies for Dealing with competitive Force, Porter's Value Chain Model, Strategic Information Systems (SIS)

UNIT–II

BUSINESS APPLICATIONS OF IS

e – Commerce : Introduction, e – Commerce

ERP Systems : Introduction, Enterprise Information Systems

Decision – Support Systems: Decision – Making: A Concept, Simon's Model of Decision - Making

Types of Decisions, Methods for Choosing Among Alternatives, Decision – Making and MIS, Decision Support Systems – Why?, Decision Support Systems: A framework, Characteristics and Capabilities of DSS

Business Intelligence and knowledge Management System : Business Intelligence, Knowledge Management System

UNIT – III

Information System Planning : Information System Planning: WHY?, Planning Terminology

Information System Planning, The Nolan Stage Model, The Four – Stage Model of is planning

Selecting A Methodology, Information Resources Management (IRM), Organisation Structure and Location of MIS

System Acquisition : Acquisition of Information Systems , Acquisition of Hardware and Software

UNIT – IV

System Implementation: IMPLEMENTATION PROCESS, Organisational Change

Evaluation & Maintenance of IS : Evaluation of MIS , System Maintenance

IS Security and Control: IS Security Threats, Protecting Information System, IS Security Technology

The Disaster Recovery Plan

UNIT – V

BUILDING OF IS

System Development Approaches: System Development Stages, System Development Approaches

System Analysis and Design: SYSTEM ANALYSIS - Introduction, Requirement Determination, Strategies for Requirement Determination, Structured Analysis Tools

SYSTEMS DESIGN: Design Objectives , Conceptual Design , Design Methods, Detailed System Design

TEXT BOOKS:

1. Management Information System, Managerial Perspecives, D P Goyal, 3 ed, McMillan Publications

III	L	P	Credits
	4	-	-

DESIGN AND ANALYSIS OF ALGORITHMS

UNIT-I:

Introduction: Algorithm, Psuedo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, probabilistic analysis, Amortized analysis.

Disjoint Sets- disjoint set operations, union and find algorithms, spanning trees, connected components and bi-connected components.

UNIT-II:

Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Strassen's matrix multiplication.

Greedy method: General method, applications-Job sequencing with deadlines, 0/1 knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT-III:

Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

UNIT-IV:

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

UNIT-V:

Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem- LC Branch and Bound solution, FIFO Branch and Bound solution.

~~NP-Hard and~~ NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem.

TEXT BOOKS:

1. Fundamentals of Computer Algorithms, Ellis Horowitz, Satraj Sahni and Rajasekharam, Universities Press.
2. The Algorithm Design Manual, 2nd edition, Steven S. Skiena, Springer.
3. Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson, R.L.Rivest and C.Stein,PHI Pvt. Ltd.

REFERENCE BOOKS:

1. Introduction to the Design and Analysis of Algorithms, Anany Levitin, PEA
2. Design and Analysis of Algorithms, Parag Himanshu Dave, Himansu BAlachandra Dave, Pearson Education.
3. Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T. Lee, S.S.Tseng, R.C.Chang and T.Tsai, Mc Graw Hill.
4. Design and Analysis of algorithms, Aho, Ullman and Hopcroft,Pearson education.

III	L	P	Credits
	-	3	-

DBMS Lab

1. Execute a single line and group functions for a table.
2. Execute DCL and TCL Commands.
3. Create and manipulate various DB objects for a table.
4. Create views, partitions and locks for a particular DB.
5. Write PL/SQL procedure for an application using exception handling.
6. Write PL/SQL procedure for an application using cursors.
7. Write a DBMS program to prepare reports for an application using functions.
8. Write a PL/SQL block for transaction operations of a typical application using triggers.
9. Write a PL/SQL block for transaction operations of a typical application using package.
10. Design and develop an application using any front end and back end tool (make use of ER diagram and DFD).
11. Create table for various relation
12. Implement the query in sql for a) insertion b) retrieval c) updation d) deletion
13. Creating Views
14. Writing Assertion
15. Writing Triggers
16. Implementing operation on relation using PL/SQL
17. Creating Forms
18. Generating Reports

Typical Applications – Banking, Electricity Billing, Library Operation, Pay roll, Insurance, Inventory etc.

III	L	P	Credits
	-	3	-

UNIX PRGRAMMING LAB

1. Program using basic network commands
2. Program using system calls : create, open, read, write, close, stat, fstat, lseek
3. Program to implement inter process communication using pipes
4. Program to perform inter process cots : sniffer
5. Program using TCP sockets (Client and Server)
6. Program using UDP sockets (Client and Server)
7. Program using URL class to download webpages
8. Write a shell script for sorting, searching and insertion/deletion of elements in a list
9. Create two processes to run a for loop, which adds numbers 1 to n, say one process adds odd numbers and the other even
10. By creating required number of processors, simulate a communication between them as below:
11. Create a file that is shared among some users, write a program that finds whether a specific user has created read and write operations on the file
12. Create a shared lock and exclusive lock among some number of processes, say 1 to 10 on any data of 100 elements. For example, process 5 wants a shared lock on elements 5 to 50 or process 8 wants exclusive lock on elements 32 to 45. Create access violations on the locks and show what occurs, then.
13. Write a program demonstrating semaphore operation on a shared file for reading but not writing
14. Create a distributed key among some processes which exchange messages of the form (m, Ti, I) for resource sharing, where m=request, reply, release, Ti=time stamp and I=process id
15. Write a program demonstrating mutual exclusion principle
16. Write a program which reads a source file name and destination file

name using command line arguments and then converts into specified format (i.e. either from lower case to upper case or upper case to lower case or inverse of each)

17. Write a program which takes a set of filenames alongwith the command line and print them based on their size in bytes either ascending or descending order
18. Write a program which takes directory name along the command line and displays names of the files which are having more than one link
19. Write a program to demonstrate the use of temporary files
20. Write a program to demonstrate the use of exec family functions
21. Write a program to display the good morning, good afternoon, good evening and good night depending on the users log on time
22. Write a program to demonstrate the working of simple signal handler that catches either of the two user defined signals and prints the signal number
23. Write a program to demonstrate the locking mechanism while accessing the shared files
24. Write a shell script containing a function mycd() using which, it is possible to shuttle between directories
25. write a shell script which works similar to the wc command. This script can receive the option -l, -w, -c to indicate whether number of lines/ words/characters
26. Write a program to print prime numbers between x and y Write a shell script which deletes all lines containing the word
27. Write a shell script which deletes all lines containing the word "UNIX" in the files supplied as arguments to this shell script
28. Write a shell script which displays a list of all files in the current directory to which you have read, write and execute permissions
29. Write a menu-driven program which has the following options:
30. Write a shell script for renaming each file in the directory such that it will have the current shell's PID as an extension. The shell script should ensure that the directories do not get renamed
31. Write a program which demonstrates the shared memory functions

IV	L	P	Credits
	4	-	-

SOFTWARE ENGINEERING

UNIT – I

Introduction to Software Engineering:

The evolving role of software, Changing Nature of Software, Software myths. (Text Book 3)

The software problem: Cost, schedule and quality, Scale and change.

UNIT – II

Software Process:

Process and project, component software process, Software development process models : Waterfall model, prototyping, iterative development, relational unified process, time boxing model, Extreme programming and agile process, using process models in a project. Project management process.

UNIT - III

Software requirement analysis and specification: Value of good SRS, requirement process, requirement specification, functional specifications with use-cases, other approaches for analysis, validation.

Planning a software project: Effort estimation, project schedule and staffing, quality planning, risk management planning, project monitoring plan, detailed scheduling.

UNIT – IV

Software Architecture: Role of software architecture, architecture views, components and connector view, architecture styles for C & C view, documenting architecture design, evaluating architectures.

Design: Design concepts, function-oriented design, object oriented design, detailed design, verification, metrics

UNIT- V

Coding and Unit testing: Programming principles and guidelines, incrementally developing code, managing evolving code, unit testing, code inspection, metrics.

Testing: Testing concepts, testing process, black-box testing, white-box testing, metrics.

TEXT BOOKS:

1. A Concise introduction to software engineering (undergraduate topics in computer science), Pankaj Jalote, Springer International Edition.
2. Software Engineering, A Precise approach, Pankaj Jalote, Wiley
3. Software Engineering, 3/e ,& 7e Roger S.Pressman , TMH

REFERENCE BOOKS:

1. Software Engineering, 8/e, Sommerville, Pearson.
2. Software Engineering principles and practice, W S Jawadekar, TMH
3. Software Engineering concepts, R Fairley, TMH

IV	L	P	Credits
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ADVANCED JAVA FOR WEB TECHNOLOGIES

UNIT-I

Review of HTML4 : Common tags ,HTML Tables and formatting internal linking, Complex HTML forms.

Introduction to Scripting Languages: Java Scripts, Control structures, functions, arrays & objects, DHTML, CSS, event model, filters & transitions.

UNIT-II

Review of Applets, Class, Event Handling, AWT Programming:

Introduction to Swing: Japplet, Handling Swing Controls like Icons, Buttons, Text Boxes, Combo Boxes, Tabbed Pains, Scroll Pains, Trees, Tables, Differences between AWT Controls & Swing Controls, Developing a Home page using Applets & Swing.

UNIT-III

Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK, Introspection, Using Bound properties, Bean Info Interface, Constrained properties, Persistence, Customizers, Java Beans API.

Introduction to Servelets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading Initialization Parameters, The javax.servlet.HTTP package, Handling, Http Request & responses, Using Cookies, Session Tracking, Security Issues.

UNIT-IV

Introduction to JSP: The Problem with Servelets, The Anatomy of a JSP Page, JSP Processing, JSP Application Design with MVC.

Setting Up the JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat.

JSP Application Development: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing – Displaying Values, Using an Expression to Set an Attribute, Declaring Variables and Methods, Error Handling and Debugging, Sharing Data Between JSP Pages, Requests, and Users, Passing Control and Data Between Pages – Sharing Session and Application Data Memory Usage Considerations.

UNIT-V

Database Access: Database Programming using JDBC, Studying Javax.sql.* package. Accessing a Database from a JSP Page, Application – Specific Database Actions Deploying JAVA Beans in a JSP Page.

TEXT BOOKS:

1. Internet and World Wide Web: How to program,6/e, Dietel, Dietel, Pearson.
2. The Complete Reference Java2, 8/e, Patrick Naughton, Herbert Schildt, TMH.
3. Java Server Faces, Hans Bergstan, O'reilly.

REFERENCE BOOKS:

1. Web Programming, building internet applications, 2/e, Chris Bates, Wiley Dreamtech
2. Programming world wide web, Sebesta, PEA
3. Web Tehnologies, 2/e, Godbole, kahate, TMH
4. An Introduction to web Design , Programming ,Wang,Thomson

IV	L	P	Credits
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DATA WAREHOUSING AND DATA MINING

UNIT- 1

Introduction to Data mining, types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity, Exploring Data: Data Set, Summary Statistics, Visualization, OLAP and multi dimensional data analysis.

UNIT-II

Classification: Basic Concepts, Decision Trees and model evaluation: General approach for solving a classification problem, Decision Tree induction, Model over fitting: due to presence of noise, due to lack of representation samples, Evaluating the performance of classifier.Nearest Neighborhood classifier, Bayesian Classfier, Support vector Machines: Linear SVM, Separable and Non Separable case.

UNIT -III

Association Analysis: Problem Definition, Frequent Item-set generation, rule generation, compact representation of frequent item sets, FP-Growth Algorithms. Handling Categorical , Continuous attributes, Concept hierarchy, Sequential , Sub graph patterns

UNIT-IV

Clustering: Over view, K-means, Agglomerative Hierarchical clustering, DBSCAN, Cluster evaluation: overview, Unsupervised Cluster Evaluation using cohesion and separation, using proximity matrix, Scalable Clustering algorithm

UNIT-V

Web data mining: Introduction, Web terminology and characteristics, Web content mining, Web usage mining, web structure mining, Search Engines :Characteristics, Functionality, Architecture, Ranking of WebPages, Enterprise search

TEXT BOOKS:

1. Introduction to Data Mining: Pang-Ning tan, Michael Steinbach, Vipin kumar, Addision- Wesley.
2. Introduction to Data Mining with Case Studies: GK Gupta; Prentice Hall.

REFERENCE BOOKS:

1. Data Mining: Introductory and Advanced Topics, Margaret H Dunham, Pearson, 2008.
2. Fundamentals of data warehouses, 2/e , Jarke, Lenzerini, Vassiliou, Vassiliadis, Springer.
3. Data Mining Theory and Practice, Soman, Diwakar, Ajay, PHI, 2006.
4. Data Mining , Concepts and Techniques, 2/e, Jiawei Han, Micheline Kamber, Elsevier, 2006.

IV	L	P	Credits
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(ELECTIVE I) MOBILE COMPUTING			

UNIT-I:

Mobile Communications: An Overview- Mobile Communication-guided transmission, unguided transmission- signal propagation frequencies, antennae, modulation, modulation methods and standards for voice-oriented data communication standards, modulation methods and standards for data and voice communication, mobile computing- novel applications and limitations, mobile computing architecture, mobile system networks.

Mobile devices and systems: Cellular networks and frequency reuse, Mobile smart phones, Smart mobiles and systems, Handheld pocket computers, Handheld devices, Smart systems, Limitations of mobile devices

UNIT-II:

GSM and other 2G Architectures: GSM-services and system architecture, Radio interfaces of GSM, Protocols of GSM, Localization, Call handling, GPRS system architecture.

Wireless medium access control,CDMA,3G,and4G communication: Modulation, Multiplexing, Controlling the medium access, Spread spectrum, Coding methods, IMT-20003G wireless communication standards, WCDMA 3G communication standards, CDMA 3G communication standards, Broadband wireless access, 4Gnetworks.

UNIT-III:

Mobile IP Network layer: IP and Mobile IP network layers: OSI layer functions, TCP/IP and Internet protocol, Mobile internet protocol; Packet delivery and Handover Management; Location Management: Agent Discovery; Mobile TCP

Introduction to Mobile Adhoc network: fixed infrastructure architecture; MANET infrastructure architecture; MANET: properties, spectrum, applications; Security in Ad-hoc network; Wireless sensor networks; sensor network applications.

UNIT-IV:

Synchronization: Synchronization in mobile computing systems, Usage models for Synchronization in mobile application, Domain-dependant specific rules for data synchronization, Personal information manager, synchronization and conflict resolution strategies, synchronizer; Mobile agent: mobile agent design, aglets; Application Server

UNIT-V:

Mobile Wireless Short Range Networks and Mobile Internet: Wireless networking and wireless LAN, Wireless LAN (WLAN) architecture, IEEE 802.11protocol layers, Wireless application protocol (WAP)-WAP1.1 architecture, wireless datagram protocol (WDP), Wireless Transport Layer Security (WTLS), wireless transaction and session layers, wireless application environment.

TEXT BOOK:

1. RAJ KAMAL, "Mobile Computing," second edition, Oxford.
2. ASOKE K TALUKDER, HASAN AHMED, ROOPA R YAVAGAL, "Mobile Computing, Technology Applications and Service Creation" Second Edition, Mc Graw Hill.
3. UWE Hansmann, Lother Merk, Martin S. Nocklous, Thomas Stober, "Principles of Mobile Computing," Second Edition, Springer

IV	L	P	Credits
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(ELECTIVE I)
HUMAN COMPUTER INTERACTION

UNIT-I

Introduction: Importance of user Interface, definition, importance of good design. Benefits of good design. A brief history of Screen design

The graphical user interface: Popularity of graphics, the concept of direct manipulation, graphical system, Characteristics, Web user –interface popularity, characteristics- Principles of user interface.

UNIT-II

Design process: Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds, understanding business junctions.

UNIT –III

Screen Designing : Design goals, Screen planning and purpose, organizing screen elements, ordering of screen data and content, screen navigation and flow, Visually pleasing composition, amount of information, focus and emphasis, presentation information simply and meaningfully, information retrieval on web, statistical graphics, Technological consideration in interface design.

UNIT-IV

Windows: Windows new and Navigation schemes selection of window, selection of devices based and screen based controls.

Components : Components text and messages, Icons and increases, Multimedia, colors, uses problems, choosing colors.

UNIT-V

Software tools : Specification methods, interface, Building Tools.

Interaction Devices: Keyboard and function keys, pointing devices, speech recognition digitization and generation, image and video displays, drivers.

TEXT BOOKS :

1. Human Computer Interaction. 3/e, Alan Dix, Janet Finlay, Goryd, Abowd, Russell Beal, PEA.2004.

2. The Essential guide to user interface design,2/e, Wilbert O Galitz, Wiley DreamaTech.

REFERENCE BOOKS :

1. Designing the user interface. 4/e, Ben Shneidermann , PEA.
2. User Interface Design, Soren Lauesen , PEA.
3. Interaction Design PRECE, ROGERS, SHARPS, Wiley .
4. Human Computer, Interaction Dan R.Olsan, Cengage ,2010.

IV	L	P	Credits
	4	-	-

(ELECTIVE I)

ERP & SUPPLY CHAIN MANAGEMENT

UNIT-I

Introduction to ERP: Overview – Benefits of ERP, ERP and Related Technologies, Business Process Reengineering, Data Warehousing, Data Mining – On–line Analytical Processing, Supply Chain Management.

ERP Implementation: Implementation Life Cycle, Implementation Methodology, Hidden Costs, Organizing Implementation, Vendors, Consultants and Users, Contracts, Project Management and Monitoring.

UNIT–II

Business Modules: Business Modules in an ERP Package , Finance, Manufacturing, Human Resource, Plant Maintanance, Materials Management, Quality Management, Sales and Distribution.

Fundamentals of Supply Chain Management:

Supply chain networks, Integrated supply chain planning, Decision phases in s supply chain, process view of a supply chain, supply chain flows, Overview of supply chain models and modeling systems, Supply chain planning: Strategic, operational and tactical, Understanding supply chain through process mapping and process flow chart.

UNIT-III

SCM Strategies, Performance:

Supply chain strategies, achieving strategic fit, value chain, Supply chain drivers and obstacles, Strategic Alliances and Outsourcing, purchasing aspects of supply chain, Supply chain performance measurement: The balanced score card approach, Performance Metrics. Planning demand and supply: Demand forecasting in supply chain, Aggregate planning in supply chain, Predictable variability.

UNIT-IV

Planning and Managing Inventories:

Introduction to Supply Chain Inventory Management. Inventory theory models: Economic Order Quantity Models, Reorder Point Models and Multiechelon Inventory Systems, Relevant deterministic and stochastic inventory models and Vendor managed inventory models.

Distribution Management:

Role of transportation in a supply chain - direct shipment, warehousing, cross-docking; push vs. pull systems; transportation decisions (mode selection, fleet size), market channel structure, vehicle routing problem. Facilities decisions in a supply chain. Mathematical foundations of distribution management, Supply chain facility layout and capacity planning.

UNIT-V

Strategic Cost Management in Supply Chain:

The financial impacts, Volume leveraging and cross docking, global logistics and material positioning, global supplier development, target pricing, cost management enablers, Measuring service levels in supply chains, Customer Satisfaction/Value/Profitability/Differential Advantage.

TEXT BOOKS:

1. ERP Demystified, 2/e, Alexis Leon, TMH, 2007.
2. Supply Chain Management: Strategy, Planning, Operation, Sunil Chopra, Peter Meindel, PEA, 2002.

IV	L	P	Credits
	4	-	-

(ELECTIVE II)
SOFTWARE TESTING METHODOLOGIES

UNIT-I:

Introduction:- Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs

Flow graphs and Path testing:- Basics concepts of path testing, predicates, path predicates and achievable paths, path sensitizing, path instrumentation, application of path testing.

UNIT-II:

Transaction Flow Testing:-transaction flows, transaction flow testing techniques. Dataflow testing:- Basics of dataflow testing, strategies in dataflow testing, application of dataflow testing.

UNIT-III:

Domain Testing:-domains and paths, Nice & ugly domains, domain testing, domains and interfaces testing, domain and interface testing, domains and testability.

UNIT-IV:

Paths, Path products and Regular expressions:- path products & path _expression, reduction procedure, applications, regular expressions & flow anomaly detection.

Logic Based Testing:- overview, decision tables, path expressions, kv charts, specifications.

UNIT-V:

State, State Graphs and Transition testing:- state graphs, good & bad state graphs, state testing, Testability tips.

Graph Matrices and Application:-Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools.

TEXT BOOKS:

1. Software testing techniques - Boris Beizer, International Thomson computer press, second edition.
2. Software Testing- Yogesh Singh, CAMBRIDGE

REFERENCE BOOKS:

1. Introduction to Software Testing, Paul Amman, Jeff Offutt, CAMBRIDGE
2. Effective Software testing, 50 Specific ways to improve your testing, Elfriede Dustin, PEA

IV	L	P	Credits
	4	-	-

(ELECTIVE II)
ARTIFICIAL INTELLIGENCE

UNIT-I

Introduction to artificial intelligence: Introduction ,history, intelligent systems, foundations of AI, applications, tic-tac-tie game playing, development of ai languages, current trends in AI

Problem solving: state-space search and control strategies : Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative-deepening a*, constraint satisfaction

UNIT-II

Problem reduction and game playing: Introduction, problem reduction, game playing, alpha-beta pruning, two-player perfect information games

Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic

UNIT-III

Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames

advanced knowledge representation techniques: Introduction, conceptual dependency theory, script structure, cyc theory, case grammars, semantic web

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems, rule-based expert systems blackboard systems truth maintenance systems, application of expert systems, list of shells and tools

UNIT-IV

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

UNIT-V

Machine learning paradigms: Introduction, machine learning systems, supervised and unsupervised learnings, inductive learning, deductive learning, clustering, support vector machines, case based reasoning and learning

Artificial neural networks: Introduction, artificial networks, single layer feed forward networks, multi layered forward networks, design issues of artificial neural networks

TEXT BOOKS:

1. Artificial Intelligence- Saroj Kaushik, CENGAGE Learning,
2. Artificial intelligence, A modern Approach , 2nd ed, Stuart Russel, Peter Norvig, PEA
3. Artificial Intelligence- Rich, Kevin Knight,Shiv Shankar B Nair, 3rd ed, TMH
4. Introduction to Artificial Intelligence, Patterson, PHI

REFERNCE BOOKS:

1. Artificial intelligence, structures and Strategies for Complex problem solving, -George F Lugar, 5th ed, PEA
2. Introduction to Artificial Intelligence, Ertel, Wolf Gang, Springer
3. Artificial Intelligence, A new Synthesis, Nils J Nilsson, Elsevier

IV	L	P	Credits
	4	-	-

(ELECTIVE II)
COMPUTER GRAPHICS

UNIT -I:

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices.

Output primitives : Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary-fill and flood-fill algorithms.

UNIT-II

2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems. (p.nos 204-227 of text book-1).

2-D viewing : The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm

UNIT- III

3-D object representation : Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

3-D Geometric transformations : Translation, rotation, scaling, reflection and shear transformations, composite transformations.

UNIT- IV

3-D viewing : Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping

Visible surface detection methods : Classification, back-face detection, depth-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division and octree methods

UNIT-V :

Computer animation : Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications.

TEXT BOOKS:

1. Computer Graphics *C version*, Donald Hearn, M.Pauline Baker, Pearson
2. Computer Graphics Principles & practice, 2/e, Foley, VanDam, Feiner, Hughes, Pearson

REFERENCE BOOKS:

1. Computer Graphics, Donald Hearn and M.Pauline Baker, 2/E, PHI
2. Computer Graphics, Zhigand xiang, Roy Plastock, Schaum's outlines, 2/E, TMH
3. Procedural elements for Computer Graphics, David F Rogers, 2/e, TMH
4. Principles of Interactive Computer Graphics, Neuman , Sproul, TMH.
5. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.
6. Computer Graphics, Steven Harrington, TMH
7. Computer Graphics, Shirley, Marschner, Cengage
8. Computer Graphics, Rajesh Maurya, Wiley, india
9. Computer Graphics Pradeep Bhatiya, IK intentional

IV	L	P	Credits
	-	3	-
ADVANCED JAVA & WEB TECHNOLOGIES LAB			

Week-1:

Design the following static web pages required for an online book store web site.

1) **HOMEPAGE:**

The static home page must contain three **frames**.

Top frame:

Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

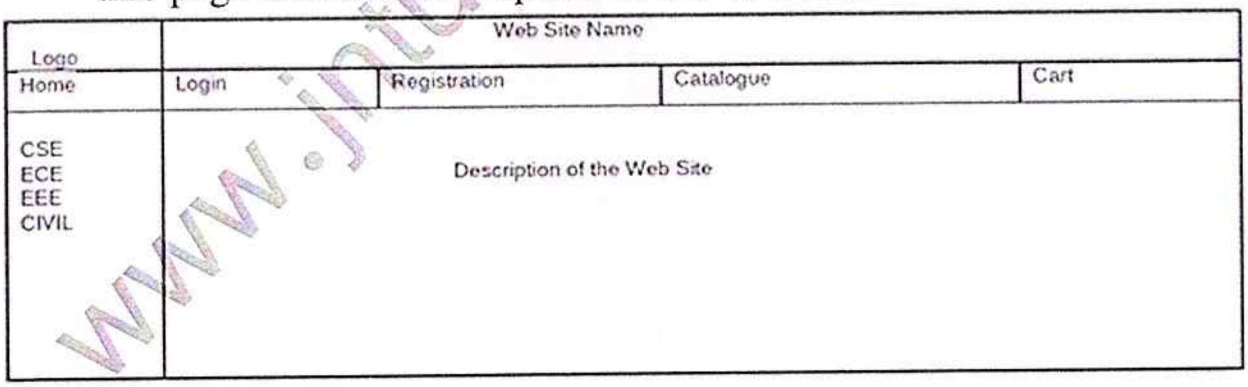
Left frame:

At least four links for navigation, which will display the catalogue of respective links.

For e.g.: When you click the link **"CSE"** the catalogue for **CSE** Books should be displayed in the Right frame.

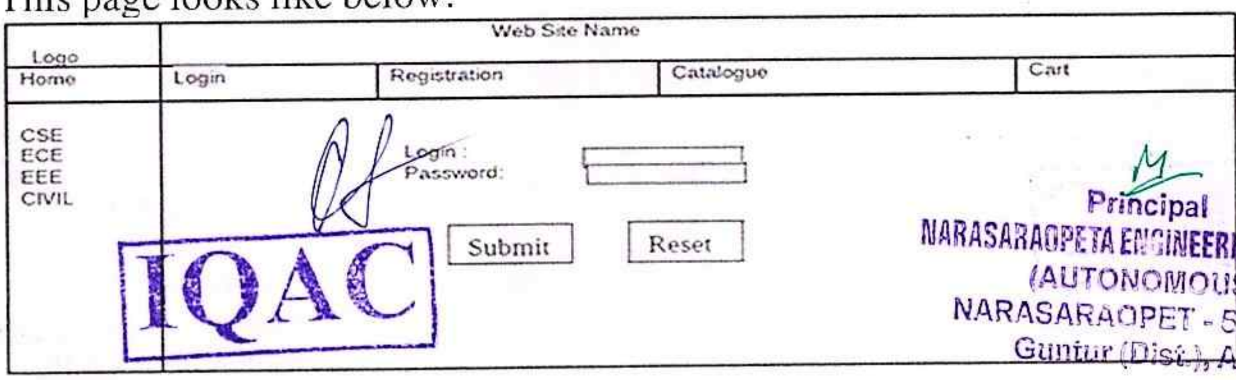
Right frame:

The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.



2) LOGIN PAGE:

This page looks like below:



3) CATOLOGUE PAGE:

The catalogue page should contain the details of all the books available in the web site in a table.

The details should contain the following:

1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL		Book : XML Bible Author : Winston Publication : Wiely	$ 40.5	Add to cart
		Book : AI Author : S.Russel Publication : Princeton hall	$ 63	Add to cart
		Book : Java 2 Author : Watson Publication : BPB publications	$ 35.5	Add to cart
		Book : HTML in 24 hours Author : Sam Peter Publication : Sam publication	$ 50	Add to cart

Note: Week 2 contains the remaining pages and their description.

Week-2:

4) CART PAGE: The cart page contains the details about the books which are added to the cart.The cart page should look like this:

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	**Book name**	**Price**	**Quantity**	**Amount**
	Java 2	$35.5	2	$70
	XML bible	$40.5	1	$40.5
			Total amount -	$130.5

5) REGISTRATION PAGE:

Create a "*registration form* "with the following fields

1) Name (Text field)
2) Password (password field)
3) E-mail id (text field)
4) Phone number (text field)
5) Sex (radio button)
6) Date of birth (3 select boxes)
7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
8) Address (text area)

WEEK 3:

VALIDATION:

Write *JavaScript* to validate the following fields of the above registration page.

1. Name (Name should contains alphabets and the length should not be less than 6 characters).
2. Password (Password should not be less than 6 characters length).
3. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
4. Phone number (Phone number should contain 10 digits only).

Note : You can also validate the login page with these parameters.

Use PHP to connect with the database to store the above details.

Week-4:

Design a web page using **CSS** (**C**ascading **S**tyle **S**heets) which includes the following:

1) Use different font, styles: In the style definition you define how each selector should work (font, color etc.). Then, in the body of your pages, you refer to these selectors to activate the styles.

For example:

```
<HTML>
<HEAD>
<style type="text/css">
B.headline {color:red; font-size:22px; font-family:arial; text-decoration:underline}
</style>

</HEAD>
```

```
<BODY>
<b>This is normal bold</b><br>
Selector {cursor:value}

For example:

<html>
<head>
<style type="text/css">
.xlink {cursor:crosshair}
.hlink{cursor:help}
</style>
</head>

<body>
<b>
<a href="mypage.htm" class="xlink">CROSS LINK</a>
<br>
<a href="mypage.htm" class="hlink">HELP LINK</a>
</b>
</body>
</html>

<b class="headline">This is headline style bold</b>
</BODY>

</HTML>
```

2) Set a background image for both the page and single elements on the page.

BODY {background-image:url(myimage.gif);}

You can define the background image for the page like this:

3) Control the repetition of the image with the background-repeat property.

As background-repeat: repeat Tiles the image until the entire page is filled, just like an ordinary background image in plain HTML.

4) Define styles for links as

A:link

A:visited

A:active

A:hover

Example:

```
<style type="text/css">
A:link {text-decoration: none}
A:visited {text-decoration: none}
A:active {text-decoration: none}
A:hover {text-decoration: underline; color: red;}
</style>
```

5) Work with layers:

For example:

LAYER 1 ON TOP:

```
<div style="position:relative; font-size:50px; z-index:2;">LAYER 1</div>
<div style="position:relative; top:-50; left:5; color:red; font-size:80px; zindex:
1">LAYER 2</div>
```

LAYER 2 ON TOP:

```
<div style="position:relative; font-size:50px; z-index:3;">LAYER 1</div>
<div style="position:relative; top:-50; left:5; color:red; font-size:80px; zindex:
4">LAYER 2</div>
```

6) Add a customized cursor:

Selector {cursor:value}

For example:

```
<html>
<head>
<style type="text/css">
.xlink {cursor:crosshair}
.hlink{cursor:help}
</style>
</head>

<body>
<b>
<a href="mypage.htm" class="xlink">CROSS LINK</a>
<br>
<a href="mypage.htm" class="hlink">HELP LINK</a>
</b>
</body>
</html>
```

Week-5:

Write an XML file which will display the Book information which includes the following:

1) Title of the book 2) Author Name
3) ISBN number 4) Publisher name
5) Edition 6) Price

Write a Document Type Definition (DTD) to validate the above XML file.
Display the XML file as follows.

The contents should be displayed in a table. The header of the table should be in color GREY. And the Author names column should be displayed in one color and should be capitalized and in bold. Use your own colors for remaining columns. Use XML schemas XSL and CSS for the above purpose.

Note: Give at least for 4 books. It should be valid syntactically.
Hint: You can use some xml editors like XML-spy

Week-6:

VISUAL BEANS:

Create a simple visual bean with a area filled with a color. The shape of the area depends on the property shape. If it is set to true then the shape of the area is Square and it is Circle, if it is false. The color of the area should be changed dynamically for every mouse click. The color should also be changed if we change the color in the "property window".

Week-7:

1) Install TOMCAT web server and APACHE.
While installation assign port number 4040 to TOMCAT and 8080 to APACHE. Make sure that these ports are available i.e., no other process is using this port.

2) Access the above developed static web pages for books web site, using these servers by putting the web pages developed in week-1 and week-2 in the document root.

Access the pages by using the urls :

http://localhost:4040/rama/books.html (for tomcat)

http://localhost:8080/books.html (for Apache)

Week-8:

User Authentication:

Assume four users user1, user2, user3 and user4 having the passwords pwd1,pwd2,pwd3 and pwd4 respectively. Write a servelet for doing the following.

1. Create a Cookie and add these four user id's and passwords to this Cookie.
2. Read the user id and passwords entered in the Login form (week1) and authenticate with the values (user id and passwords) available in the cookies.

If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display " You are not an authenticated user ".

Use init-parameters to do this. Store the user-names and passwords in the webinf.xml and access them in the servlet by using the getInitParameters() method.

Week-9:

Install a database(Mysql or Oracle). Create a table which should contain at least the following fields: name, password, email-id, phone number(these should hold the data from the registration form). Practice 'JDBC' connectivity.

Write a java program/servlet/JSP to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.

Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

Week-10:

Write a JSP which does the following job:

Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database (similar to week8 instead of cookies).

Week-11:

Create tables in the database which contain the details of items (books in our case like Book name , Price, Quantity, Amount)) of each category. Modify your catalogue page (week 2)in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page using JDBC.

Week-12:

HTTP is a stateless protocol. Session is required to maintain the state. The user may add some items to cart from the catalog page. He can check the cart page for the selected items. He may visit the catalogue again and select some more items. Here our interest is the selected items should be added to the old cart rather than a new cart. Multiple users can do the same thing at a time(i.e., from different systems in the LAN using the ip-address instead of localhost). This can be achieved through the use of sessions. Every user will have his own session which will be created after his successful login to the website. When the user logs out his session should get invalidated (by using the method session.invalidate()). Modify your catalogue and cart JSP pages to achieve the above mentioned functionality using sessions.

IV	L	P	Credits
	-	3	-

DATA WAREHOUSING AND MINING LAB

1. Demonstration of preprocessing on dataset student.arff
2. Demonstration of preprocessing on dataset labor.arff
3. Demonstration of Association rule process on dataset contactlenses. arff using apriori algorithm
4. Demonstration of Association rule process on dataset test.arff using apriori algorithm
5. Demonstration of classification rule process on dataset student.arff using j48 algorithm
6. Demonstration of classification rule process on dataset employee.arff using j48 algorithm
7. Demonstration of classification rule process on dataset employee.arff using id3 algorithm
8. Demonstration of classification rule process on dataset employee.arff using naïve bayes algorithm
9. Demonstration of clustering rule process on dataset iris.arff using simple k-means
10. Demonstration of clustering rule process on dataset student.arff using simple k-means

V	L	P	Credits
	4	-	-

INFORMATION SECURITY

UNIT- I

Introduction: Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT – II

Conventional Encryption:

Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC,

UNIT - III

Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

UNIT-IV

IP Security:

IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management

Web Security:

Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), SecureElectronic Transaction (SET)

Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT-V

SNMP: Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3, Intruders, Viruses and related threats

Fire walls: Firewall Design principles, Trusted Systems, Intrusion Detection Systems

TEXT BOOKS:

1. Network Security Essentials: Applications and Standards, William Stallings, PEA.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

REFERENCE BOOKS:

1. Network Security & Cryptography, Bernard Menezes, Cengage,2010
2. Fundamentals of Network Security, Eric Maiwald, Dream Tech
3. Network Security: Private Communication in a Public World, Kaufman, Perlman, PEA/PHI.
4. Principles of Information Security, Whitman, Thomson.
5. Cryptography and Network Security, 3/e, Stallings, PHI/PEA
6. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
7. Introduction to Cryptography, Buchmann, Springer

V	L	P	Credits
	4	-	-
NETWORK PROGRAMMING			

UNIT-I

Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

UNIT-II

TCP client server : Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

UNIT-III

Sockets : Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

I/O Multiplexing and socket options: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

UNIT-IV

Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

Elementary name and Address conversions: DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

UNIT-V

IPC : Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores.

Remote Login: Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

TEXT BOOK:

1. UNIX Network Programming, Vol. I, Sockets API, 2nd Edition. - W.Richard Stevens, Pearson Edn. Asia.
2. UNIX Network Programming, 1st Edition, - W.Richard Stevens. PHI.

REFERENCES:

1. UNIX Systems Programming using C++ T CHAN, PHI.
2. UNIX for Programmers and Users, 3rd Edition Graham GLASS, King abls, Pearson Education
3. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education

V	L	P	Credits
	4	-	-

OBJECT ORIENTED ANALYSIS AND DESIGN (USING UML)

UNIT-I

Introduction to UML: The meaning of Object-Orientation, object identity, encapsulation, information hiding, polymorphism, genericity, importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture.

UNIT-II

Basic structural Modelig: Classes, relationships, common mechanisms, diagrams, Advanced structural modeling: advanced relationships, interfaces, types & roles, packages, instances.

Class & object diagrams: Terms, concepts, examples, modeling techniques, class & Object diagrams.

UNIT-III

Collaboration diagrams: Terms, Concepts, depicting a message, polymorphism in collaboration diagrams, iterated messages, use of self in messages.

Sequence diagrams: Terms, concepts, differences between collaboration and sequence diagrams, depicting synchronous messages with/without priority call back mechanism broadcast message.

UNIT-IV

Behavioral Modeling: Interactions, use cases, use case diagrams, activity diagrams.

Advanced Behavioral Modeling: Events and signals, state machines, processes & threads, time and space, state chart diagrams.

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Guntur (Dist.), A.P.

UNIT –V

Architectural Modeling: Terms, concepts, examples, modeling techniques for component diagrams and deployment diagrams.

TEXT BOOKS:

1. The Unified Modeling Language User Guide, Grady Booch, Rambaugh, Ivar Jacobson, PEA
2. Fundamentals of Object Oriented Design in UML, Meilir Page-Jones, Addison Wesley

REFERENCE BOOKS:

1. Head First Object Oriented Analysis & Design, Mclaughlin,SPD OReilly,2006
2. Object oriented Analysis& Design Using UML, Mahesh ,PHI
3. The Unified Modeling Language Reference Manual, 2/e, Rambaugh, Grady Booch,etc., PEA
4. Object Oriented Analysis & Design, Satzinger, Jackson, Thomson
5. Object Oriented Analysis Design & implementation, Dathan.,Ramnath, University Press
6. Object Oriented Analysis & Design, John Deacon, PEA
7. Fundamentals of Object Oriented Analysis and Design in UML, M Pages-Jones, PEA
8. Object-Oriented Design with UML, Barclay,Savage,Elsevier,2008

V	L	P	Credits
	4	-	-

(ELECTIVE –III)
ANIMATION & GAMING

UNIT-I

What is mean by Animation – Why we need Animation – History of Animation – Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the WEB – 3D Animation – Special Effects - Creating Animation.

UNIT-II

Creating Animation in Flash: Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-based Animation - Working with the Timeline and Tween-based Animation – Understanding Layers

UNIT-III

Concept Development –Story Developing –Audio & Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets - 3D Animated Movies.

UNIT –IV

Animation: The Animation Loop, Calculating Frame Rates, Scheduling Tasks at Alternate Frame Rates, Restoring the Background, Double Buffering, Time – Based Motion, Scrolling the Background, Parallax, User Gestures, Timed Animations, Animation Best Practices

UNIT –V

A Grame Engine , The Game Loop, Loading Images, Multitrack Sound, Keyboard Events, High Scores, The Game Engine Listing, The Ungame, A Pinball Game

TEXTBOOK:

1. PRINCIPLES OF MULTIMEDIA – Ranjan Parekh, 2007, TMH. (Unit I, Unit III)
2. Multimedia Technologies – Ashok Banerji, Ananda Mohan Ghosh – McGraw Hill Publication. (Unit II: Chapter 10)
3. Core HTML5 CANVAS, Graphics, Animation and Game Development, David Geary, PEARSON (Unit IV, Unit V)

V	L	P	Credits
	4	-	-
(ELECTIVE –III) COMPUTER FORENSICS			

UNIT-I:

Computer Forensics and Investigations: Understanding Computer Forensics, Preparing for Computer Investigations, Taking A Systematic Approach, Procedure for Corporate High-Tech Investigations, Understanding Data Recovery Workstations and Software,

Investor's Office and Laboratory: Understanding Forensics Lab Certification Requirements, Determining the Physical Requirements for a Computer Forensics Lab, Selecting a Basic Forensic Workstation

UNIT-II

Data Acquisition: Understanding Storage Formats for Digital Evidence, Determining the Best Acquisition Method, Contingency Planning for Image Acquisitions, Using Acquisition Tools, Validating Data Acquisition, Performing RAID Data Acquisition, Using Remote Network Acquisition Tools, Using Other Forensics Acquisition Tools

Processing Crime and Incident Scenes: Identifying Digital Evidence, Collecting the Evidence in Private-Sector Incident Scenes, Processing law Enforcement Crime Scenes, Preparing for a Search, Securing a Computer Incident or Crime Scene, Sizing Digital evidence at the Scene, Storing Digital evidence, obtaining a Digital Hash.

UNIT-III

Current Computer Forensics Tools: Evaluating Computer Forensics Toll Needs, Computer Forensics Software Tools, Computer Forensics Hardware Tools, Validating and Testing Forensics Software

Computer Forensics Analysis and Validation: Determining What Data to Collect and Anlyze, Validating Forensic Data, Addressing Data-Hiding Techniques, Performing Remote Acquisition

UNIT-IV

Recovering Graphics and Network Forensics: Recognizing a Graphics File, Understanding Data Compression, Locating and Recovering Graphics Files, Understanding Copyright Issues with Graphics, Network Forensic, Developing Standard Procedure for Network Forensics, Using Network Tools, Examining Hiney Project

UNIT-V

E-mail Investigations Cell Phone and Mobile Device Forensics: Exploring the Role of E-mail in Investigations, Exploring the Role of Client and Server in E-mail, Investigating E-mail Crimes and Violations, Understanding E-mail Servers, Using Specialized E-mail Forensics Tools, Understanding Mobile Device Forensics, Understanding Acquisition Procedure for Cell Phones and Mobile Devoices

TEXT BOOK:

1. Nelson, Phillips Enfinger,Steuart, " Computer Forensics and Investigations, Cengage Learning.

V	L	P	Credits
	4	-	-
(ELECTIVE –III) E-COMMERCE			

UNIT-I

Electronic Commerce, Frame work, anatomy of E-Commerce applications, E-Commerce Consumer applications, E-Commerce organization applications.

Consumer Oriented Electronic commerce, Mercantile Process models.

UNIT- II

Electronic payment systems - Digital Token-Based, Smart Cards, Credit Cards, Risks in Electronic Payment systems.

UNIT-III

Inter Organizational Commerce - EDI, EDI Implementation, Value added networks.

Intra Organizational Commerce - work Flow, Automation Customization and internal Commerce, Supply chain Management.

UNIT- IV

Corporate Digital Library - Document Library, digital Document types, corporate Data Warehouses.

Advertising and Marketing, Information based marketing, Advertising on Internet, on-line marketing process, market research.

UNIT- V

Consumer Search and Resource Discovery, Information search and Retrieval, Commerce Catalogues,Information Filtering.

Multimedia - key multimedia concepts, Digital Video and electronic Commerce, Desktop video processings,Desktop video conferencing.

TEXT BOOK :

1. Frontiers of Electronic Commerce , Kalakata, Whinston, PEA,2006.

REFERENCE BOOKS:

1. E-Commerce Fundamentals and Applications Hendry Chan, Raymond Lee,Dillon,Chang, John Wiley.
2. E-Commerce,A Managerial Perspective, Turban E, Lee J , King, Chung H.M.,PEA,2001.
3. E-Commerce An Indian Perspective , 3/e, P.T. Joseph, PHI,2009.
4. E-Commerce, S.Jaiswal , Galgotia.
5. Electronic Commerce , Gary P.Schneider, Thomson.

V	L	P	Credits
	4	-	-

(ELECTIVE–IV)
MIDDLEWARE TECHNOLOGIES

UNIT-I

Introduction to Object Oriented Systems :

Preview of Object-orientation, Concept of distributed object systems, Reasons to distribute for centralized Objects. Client-server system architecture, Multi tier system architectures. File Server, Database Server, Group Server, Object Server, Web Server.

UNIT-II

Introduction to Middleware Technologies:

General Middleware, Service Specific Middleware, Client/Server Building blocks,RPC - messaging, Peer,to,Peer, Java RMI.

Introduction to Distributed Objects :

Computing standards, OMG, Overview of CORBA, Overview of COM/DCOM, and Overview of EJB.

UNIT-III

EJB Architecture :

Overview of EJB software architecture, View of EJB Conversation, Building and Deploying EJBs, Roles in EJB.

UNIT-IV

CORBA :

Introduction and concepts, distributed objects in CORBA, CORBA components, architectural features, method invocations, static and dynamic: IDL (Interface Definition Language) models and interfaces. Structure of CORBA IDL, CORBA's self-describing data; CORBA interface repository. Building an application using CORBA.

CORBA Services and CORBA Component Model :

Overview of CORBA Services, Object location Services, Messaging Services, CORBA Component Model.

UNIT-V

COM and NET:

Evolution of DCOM, Introduction to COM, COM clients and servers, COM IDL, COM Interfaces, COM Threading Models, Marshalling, Custom and standard marshalling, Comparison COM and CORBA, Introduction to .NET, Overview of .NET architecture, Remoting.

Service Oriented architecture (SOA) Fundamentals:

Defining SOA, Business value of SOA, SOA characteristics, Concept of a service, Basic SOA , Enterprise Service Bus (ESB), SOA enterprise Software Models.

TEXT BOOKS:

1. Distributed Component Architecture, G. Sudha Sadasivam , Wiley
2. Service Oriented Architecture: Concepts , Technology & Design, Thomas Erl, PHI
3. Java programming with CORBA, 3/e, G. Brose, A Vogel, K. Duddy, Wiley-dreamtech
4. Distributed Systems, 2/e, Tanenbaum, Van Steen, PEA

REFERENCE BOOKS :

1. Client/server Programming with Java & Corba W/cd, Robert Orfali, Dan Harkey, Wiley
2. Component Software: Beyond Object-Oriented Programming, Clemens Szyperski, PEA.
3. Inside CORBA, Mowbray, PEA
2. COM and CORBA side by side, Jason Pritchard, PEA
3. Enterprise JavaBeans 3.0, 5/e, Bill Burke, O'Reilly .
4. Component Based technology, Sudha Sadasivam, Wiley

V	L	P	Credits
	4	-	-
(ELECTIVE –IV) MULTIMEDIA APPLICATION DEVELOPMENT			

UNIT - I

Fundamental concepts in Text and Image:

Multimedia and hypermedia, world wide web, overview of multimedia software tools. Graphics and image data representation graphics/image data types, file formats, Color in image and video: color science, color models in images, color models in video.

UNIT - II

Fundamental Concepts in Video and Digital Audio:

Types of video signals, analog video, digital video, digitization of sound, MIDI, quantization and transmission of audio.

UNIT-III

Action Script I: Action Script Features, Object-Oriented Action Script, Datatypes and Type Checking, Classes, Authoring an Action Script Class.

Action Script II : Inheritance, Authoring an Action Script 2.0 Subclass, Interfaces, Packages, Exceptions.

Application Development:

An OOP Application Frame work, Using Components with Action Script Movie Clip Subclasses.

UNIT - IV

Multimedia Data Compression:

Lossless compression algorithm: Run-Length Coding, Variable Length Coding, Dictionary Based Coding, Arithmetic Coding, Lossless Image Compression, Lossy compression algorithm: Quantization, Transform Coding, Wavelet-Based Coding, Embedded Zerotree of Wavelet Coefficients Set Partitioning in Hierarchical Trees (SPIHT).

Basic Video Compression Techniques:

Introduction to video compression, video compression based on motion compensation, search for motion vectors, MPEG, Basic Audio Compression Techniques.

UNIT- V

Multimedia Networks:

Basics of Multimedia Networks, Multimedia Network Communications and Applications: Quality of Multimedia Data Transmission, Multimedia over IP, Multimedia over ATM Networks, Transport of MPEG- 4, Media-on-Demand (MOD).

TEXT BOOKS:

1. Fundamentals of Multimedia , Ze-Nian Li , Mark S. Drew, PHI/ PEA.
2. Multimedia Systems, Parag Havaldar, Gerard Medioni, cengage, 2009.
3. Essentials Action Script 3.0, Colin Moock, SPD O, Reilly,2007.

REFERENCE BOOKS:

1. Multimedia Applications, Steinmetz, Nahrstedt, Springer.
2. Digital Multimedia, Nigel Chapman, Jenny Chapman, Wiley-Dreamtech.
3. Multimedia & Communications Technology, Steve Heath, Elsevier .
4. Multimedia Technology & Applications, David Hilman , Galgotia.
5. Multimedia Technologies, Banerji, Mohan Ghosh, MGH.

V	L	P	Credits
	4	-	-

(ELECTIVE –IV)
SOFTWARE PROJECT MANAGEMENT

UNIT-I

Conventional Software Management : The waterfall model, conventional software Management performance.

Evolution of Software Economics : Software Economics, pragmatic software cost estimation.

Improving Software Economics : Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

The old way and the new : The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

UNIT-II

Life cycle phases : Engineering and production stages, inception, Elaboration, construction, transition phases.

Artifacts of the process : The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT - III

Model based software architectures : A Management perspective and technical perspective.

Work Flows of the process : Software process workflows, Iteration workflows.

Checkpoints of the process : Major mile stones, Minor Milestones, Periodic status assessments.

Iterative Process Planning : Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

UNIT - IV

Project Organizations and Responsibilities : Line-of-Business Organizations, Project Organizations, evolution of Organizations.

Process Automation : Automation Building blocks, The Project Environment.

Project Control and Process instrumentation : The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

UNIT-V

Tailoring the Process : Process discriminates.

Future Software Project Management: Modern Project Profiles, Next generation Software economics, modern process transitions.

TEXT BOOKs:

1. Software Project Management, Walker Royce, PEA, 2005.

REFERENCE BOOKS:

1. Software Project Management, Bob Hughes,3/e, Mike Cotterell, TMH
2. Software Project Management, Joel Henry, PEA
3. Software Project Management in practice, Pankaj Jalote, PEA, 2005,
4. Effective Software Project Management, Robert K.Wysocki, Wiley,2006
5. Project Management in IT, Kathy Schwalbe, Cengage
6. Quality Software Project Management, Futrell,Donald F. Shafer, Donald I. Shafer, PEA

V	L	P	Credits
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UML LAB

1. To create a UML diagram of ATM APPLICATION.
2. To create a UML diagram of LIBRARY MANAGEMENT SYSTEM.
3. To create a UML diagram of ONLINE BOOK SHOP
4. To create a UML diagram of RAILWAY RESERVATION SYSTEM
5. To create a UML diagram for BANKING SYSTEM

V	L	P	Credits
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NETWORK PROOGRAMMING LAB

Objectives:

- To teach students various forms of IPC through Unix and socket Programming

Recommended Systems/Software Requirements:

- Intel based desktop PC with minimum of 166 MHZ or faster processor with atleast 64 MB RAM and 100 MB free disk space LAN Connected
- Any flavour of Unix / Linux

Week1.

Implement the following forms of IPC.

a)Pipes b)FIFO

Week2.

Implement file transfer using Message Queue form of IPC

Week3.

Write a programme to create an integer variable using shared memory concept and increment the variable simultaneously by two processes. Use senphores to avoid race conditions

Week4.

Design TCP iterative Client and server application to reverse the given input sentence

Week5.

Design TCP iterative Client and server application to reverse the given input sentence

Week6.

Design TCP client and server application to transfer file

Week7.

Design a TCP concurrent server to convert a given text into upper case using multiplexing system call "select"

Week8.

Design a TCP concurrent server to echo given set of sentences using poll functions

Week9.

Design UDP Client and server application to reverse the given input sentence

Week10

Design UDP Client server to transfer a file

Week11

Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.

Week12

Design a RPC application to add and subtract a given pair of integers

REFERENCE BOOK:

1. Advance Unix Programming Richard Stevens, Second Edition Pearson Education
2. Advance Unix Programming, N.B. Venkateswarlu, BS Publication.