Academic Regulations, Course Structure and Syllabus

B. TECH.
Electronics and Communication Engineering
(4 Year Program)

NARASARAOPETA
ENGINEERING COLLEGE
(Autonomous)

Kotappakonda Road, Yellamanda (P.O), Narasaraopet- 522601, Guntur District, AP.
Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada. Code: 47.
Accredited by NBA & NAAC with "A" Grade; ISO 9001:2008 Certified Institution.
Phone: 08647239905 Website: www.nrtec.ac.in

ACADEMIC REGULATIONS - 2016 FOR B.Tech (REGULAR)

(Applicable for the students of B.Tech from the Academic Year 2016-17)

1. ELIGIBILITY FOR ADMISSION

The total seats available as per the approved intake are grouped into two categories viz. category A and Category B with a ratio of 70:30 as per the state government guidelines vide G.O No.52

a. The admissions for category A and B seats shall be as per the guidelines of Andhra Pradesh State Council for Higher Education (APSCHE) in consonance with government reservation policy.

- ❖ Under Category A: 70% of the seats are filled through EAMCET counselling.
- ❖ Under Category B: 30% seats are filled based on 10+2 merits in compliance with guidelines of APSCHE

b. Admission eligibility-Under Lateral Entry Scheme

Students with diploma qualification have an option of direct admission into 2nd year B. Tech. (Lateral Entry scheme). Under this scheme, 20% seats of sanctioned intake will be available in each course as supernumerary seats. Admissions to this three year B Tech later entry Programme will be through ECET. The maximum period to complete B. Tech. under Lateral Entry scheme is six consecutive academic years from the date of joining.

The selection for category A & B seats shall be as per Govt. of Andhra Pradesh rules.

2. AWARD OF B.TECH. DEGREE

A student will be declared eligible for the award of the B.Tech. Degree if he fulfils the following academic requirements.

(a) Pursue a course of study for not less than four academic years and not more than eight academic years counted from the academic year of admission.

(b) The student registers for 180 credits and secures all the 180 credits.

3. UG – B.TECH. PROGRAMMES OFFERED

The following UG- B.Tech Programs are offered at present

S. No.	Branch Code-Abbreviation	Branch
01	01-CE	Civil Engineering
02	02-EEE	Electrical and Electronics Engineering
03	03-ME	Mechanical Engineering
04	04-ECE	Electronics and Communication Engineering
05	05-CSE	Computer Science and Engineering

And any other course as approved by the authorities from time to time.

4. STRUCTURE OF THE PROGRAM

Program comprises of 4 academic years and each year has 2 semesters.
Each course is normally assigned a certain number of credits as follows:

- 3 credits for 3 lecture periods and 1 tutorial per week.
- 3 credits for 4 lecture periods per week
- 2 credits for 3 laboratory periods per week.
- 3 credits for 1 lecture and 4 practice periods for drawing subjects per week.
- 1 or 2 credits for Mini Project.
- 3 credits for Practical Training/ Internship.
- 10 credits for Project Work.

5. DISTRIBUTION AND WEIGHTAGE OF MARKS

The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks for Theory, Practical Training / Internship and 75 marks for Practical's / Mini Project. The Project Work shall be evaluated for 200 marks.

5.1 THEORY

For all theory subjects consisting of 6 units in each subject, the assessment shall be for 40 marks through internal evaluation and 60 marks through external end semester examination of 3 hours duration.

5. 1a. INTERNAL EVALUATION

The internal evaluation will be based on two cycle tests conducted in each semester. The 40 internal marks will be awarded as sum of 75% of the best cycle and 25% of the least cycle examinations, where each cycle of examination contain

Descriptive test	- 20 Marks
Objective test	- 10 Marks
Assignment test	-10 Marks

Each descriptive test question paper contains 3 questions one from each unit covering syllabus from 3 units (first 3 units for first cycle and remaining 3 units for second cycle). The student has to answer all the 3 questions (3X10M=30M). The 30 marks will be scaled down to 20 marks. The descriptive examination will be conducted for 1½ hour duration.

Online Objective type test question paper shall contain 20 objective questions for 10 marks covering syllabus from 3 units, which are considered for descriptive type test (20 X 1/2 M = 10M). The Objective Examination will be conducted for 20 minutes duration along with descriptive test.

In Assignment Tests, 5 or 6 questions will be declared in the class room at least one week in advance. In the test, one question will be given at random to each student and the student has to answer it.

The Assignment Test-1 will be conducted for 10 marks covering the syllabus of 1st unit. The Assignment Test-2 will be conducted for 10 marks covering the syllabus of 2nd unit. The internal marks for Assignment Test (10 Marks) for cycle-I shall be computed as best of two Assignment Tests-1 & 2 conducted. The Assignment Test-3 will be conducted

for 10 marks covering the syllabus of 4th unit. The Assignment Test-4 will be conducted for 10 marks covering the syllabus of 5th unit. The internal marks for Assignment Test (10 Marks) for cycle-II shall be computed as best of two Assignment Tests-3 & 4 conducted.

5.1b. EXTERNAL EVALUATION

The question paper comprises of two parts i.e. Part-A and Part-B. Part-A is compulsory and consists of six 2 marks questions covering all units. Part A is total 12 marks. Part-B consists of 6 questions, one from each unit and the student has to answer any four questions, and each question carries 12 marks. The examination duration is 3 hours.

5.2 PRACTICALS

For practical subjects there shall be continuous evaluation during the semester.

5.2. a. INTERNAL EVALUATION

There shall be continuous evaluation during the semester for 25 internal marks.
The internal marks shall be awarded as follows:

Record	- 10 Marks
Internal Lab Test	- 10 Marks
Day to day performance	- 5 Marks

5.2. b. EXTERNAL EVALUATION

For practical subjects there shall be an external examination at the end of the semester for 50 marks in the presence of external examiner. The examination duration is 3 hours.

5.3 DRAWING SUBJECTS

a. For the subject having design or drawing (such as Engineering Graphics, Engineering Drawing, Machine Drawing etc.,), the distribution shall be 40 marks for Internal Evaluation and 60 marks for End Examination.
The 40 internal marks will be evaluated as follows:

Internal Tests - 20 marks. (1½ hour duration)
Day to day work - 20 marks (evaluation of drawing sheets)

In the internal test, 3 questions will be given to the student and he has to answer all the three questions (3x10M = 30M scaled down to 20 marks)

There shall be two internal tests in a semester. The sum of 75% of the best and 25% of the least of two internal tests shall be considered for the award of internal marks.

b. The syllabus for the subject "**Machine drawing using Auto CAD**" consists of two major portions:

1. Unit I to III –Conventional drawing pattern.
2. Unit IV to VI-Computer lab pattern using any drafting package

The distribution of internal and external marks is 40 and 60 marks respectively.

Internal Evaluation: Max Marks: 40

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

1. Day-to-day work : 20 Marks (Evaluation of Charts)
2. Descriptive Test : 20 Marks

Cycle–I Examination – Conventional drawing pattern

In Cycle-I examination the 40 marks will be awarded as follows:

Day-to-day evaluation - 20 Marks
Descriptive Test - 20 Marks

In the Descriptive Test of duration 2 hours, 3 questions will be given to the student and he has to answer all the three questions (3x10M = 30M scaled down to 20 marks).

Cycle–II Examination – Computer lab pattern using any drafting package for duration of 2 hours.

In Cycle-II examination the 40 marks will be awarded as follows:

Record	-10 Marks
Execution	-15 Marks
Paper Work	-15 Marks

Of two cycle examinations conducted during the semester, sum of 75% of the best and 25% of the least of two cycle examinations shall be considered for the award of internal marks.

End semester Examination (Total Duration: 4 hours, Max. Marks: 60)
Conventional drawing pattern (Duration: 2 Hours, Marks: 30)
Computer lab pattern using any drafting packages (Duration: 2 Hours, Max: 30)
(Note: Both Conventional drawing pattern and Computer lab pattern using any drafting packages are compulsory and are to be conducted in separate sessions)

5.4 MANDATORY NON-CREDIT COURSES

A student is required to take up Non-Credit/mandatory courses, viz. Advanced Communication Skills, Quantitative Aptitude, Verbal Ability, Reasoning, NSS / Sports & Games and MOOCs (Massive Open Online Courses) etc., as and when the courses are offered. The B.Tech degree shall only be awarded if a student gets satisfactory grade in each of the mandatory non-credit courses besides acquiring 180 credits.

A student has to repeat the course if he does not get satisfactory grade in each non-credit course for getting the degree awarded.

NSS

There shall be internal valuation for 100 Marks, out of which 60 marks are for participation and involvement in day-to-day activities and 40 marks for participation and involvement in a three days NSS camp arranged during the semester.

Sports and Games

There shall be two internal valuations, each for 50 marks, in the chosen activity, one in the middle of semester and the other towards the end of the semester. Sum of the two valuations shall be taken as the final marks for 100.

MOOCs: Meeting with the global requirements, to inculcate the habit of self-learning and in compliance with UGC guidelines, MOOCs (Massive Open Online Courses) have been introduced. Student has to complete an on-line course to fulfil the academic requirement of B.Tech course. The on-line Course should be offered by any reputed organization like NPTEL, COURSERA, edX, Udacity, SWAYAM etc., approved by the departmental Committee constituted by HOD. Student has to submit the progress of the MOOC's course (such as

assignment submission etc.,) to the departmental committee. B.Tech. degree shall be awarded only upon submission of MOOC's certificate. If a student fails to submit in that semester, he/she has to submit the certificate in the subsequent semesters for getting the degree awarded.

5.5. PRACTICAL TRAINING / INTERNSHIP

Students are advised to take up Industrial Internship. In case, the student is unable to obtain the internship, they can opt for Practical Training.

Assessment for Internship:

Industrial Internship which is a part of the curriculum shall carry 100 marks. The time duration for internship shall be of 2 to 4 weeks during the inter semester break. After the completion of internship the student shall submit a certificate and a report to the concerned departmental committee constituted by the HOD for Evaluation and to conduct a Viva-Voce Examination. Out of 100 marks, 40 marks shall be awarded for submission of certificate and report and 60 marks for presentation and Viva-Voce examination.

Assessment for Practical Training:

The practical training gained by student shall be assessed for 100 marks. The time duration for Practical Training shall be 2 to 4 weeks during the inter semester break. The training shall be evaluated through continuous assessment. After the completion of Practical Training the student shall submit a report to the Departmental Committee constituted by HOD for evaluation and to conduct a Viva-Voce Examination. Out of 100 marks 40 marks shall be awarded for day to day performance and submission of report and 60 marks for presentation and Viva-Voce examination.

5.6 MINI PROJECT

Mini Project shall be evaluated for a total of 75 marks. Out of a total of 75 marks, 25 marks shall be for internal evaluation consisting of day-to-day work, reviews, the assessment of the project report and 50 marks for the external evaluation. The external evaluation shall be conducted by the committee. The committee consists of an External Examiner, Head of the Department and Supervisor of the Project. The evaluation of mini project work shall be conducted as and when offered.

5.7 PROJECT WORK

Out of a total of 200 marks for the project work, 80 marks shall be for Internal Evaluation consisting of day-to-day work, reviews, the assessment of the project report and 120 marks for the external evaluation. The external evaluation shall be conducted by the committee. The committee consists of an External Examiner, Head of the Department and Supervisor of the Project. The evaluation of project work shall be conducted at the end of the IV year II semester.

6. PASS MARK CRITERIA

A student shall be deemed to have satisfied the pass mark, if he secures not less than 35% of marks in the end examinations and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together as detailed below.

On passing a course of a program, the student shall earn the credits as assigned to that course.

S. No.	Category of Subject	Max. Marks	Internal Marks	External Marks	External pass %	External pass mark	Over all pass %	Over all pass mark
1	Theory/Drawing / Practical Training/ Internship	100	40	60	35	21	40	40
2	Practical	75	25	50	35	18	40	30
3	Mini Project	75	25	50	35	18	40	30
4	Project work	200	80	120	35	42	40	80

7. PROMOTION POLICY

7.1. ATTENDANCE REQUIREMENTS

(1) A student shall be eligible to appear for the end examinations if he acquires a minimum of 75% of attendance in aggregate of all the subjects.

(2) Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester for genuine medical reasons and shall be approved by a committee duly appointed by the college. A fee stipulated by the college shall be payable towards condonation of shortage of attendance. However the number of condonations is restricted to four for the entire course.

(3) A student who is short of attendance in a semester may seek re-admission into that semester when offered next time within 4 weeks from the date of commencement of class work.

(4) If any candidate fulfils the attendance requirement in the present semester, he shall not be eligible for re-admission into the same semester.

7.2. CREDIT REQUIREMENTS

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned above.

(1) A student shall be promoted from I to II year, if he put up the minimum attendance requirement in I year II semester, irrespective of credits earned.

(2) A student shall be promoted from II year to III year, only if he fulfils the academic requirement of 50% of the credits up to II year II semester from all the examinations, irrespective of whether the candidate takes the examination or not.

(3) A student shall be promoted from III to IV year, only if he fulfils the academic requirements of 50% of the credits up to III year II semester from all the examinations, irrespective of whether the candidate takes the examination or not.

(4) A candidate, who is not promoted either to III year or IV year due to lack of required credits can seek admission into III / IV year in subsequent years after obtaining the required credits as stipulated above.

(5) A student shall register and put up minimum attendance in all 180 credits and earn all 180 credits. Marks obtained in the all 180 credits shall be considered for the calculation of grade points/division.

(6) The registration in audit courses/ mandatory courses i.e. Advanced Communication skills, Aptitude, Verbal Ability, Quantitative Aptitude and Reasoning, NSS / Sports & Games and MOOCs etc., is compulsory and student should get a satisfactory report.

8. COURSE PATTERN

(1) The entire course of study is of four academic years and each year will have TWO Semesters (Total EIGHT Semesters).

(2) Supplementary Examinations:

A student is eligible to appear for the end examination in a subject, but absent for it or has failed in the end examinations may appear for that subject in supplementary examinations, when conducted next.

(3) Advanced supplementary Examinations:

Students who failed in courses of 4^{th} B.Tech. 2^{nd} Semester can appear for advanced supplementary examination conducted within one month after declaration of the revaluation results. However, those students who failed in these advanced supplementary examinations shall appear for subsequent examinations along with regular candidates in the examinations conducted at the end of the respective semester.

(4) When a student is detained due to lack of credits / shortage of attendance, he may be re-admitted in to the same semester / year in which he has been detained.

9. METHOD FOR AWARDING OF GRADE POINTS FOR A SUBJECT:

Theory/ Drawing / Laboratory / Practical Training / Internship / Mini Project / Project (% of marks in a subject)	Corresponding Grade Points	Letter Grade
91 - 100	10	O (Outstanding)
81 - 90	9	E (Excellent)
71 - 80	8	A (Very Good)
61 - 70	7	B (Good)
51 - 60	6	C (Satisfactory)
40 - 50	5	P (Pass)
<40	0	F (Fail)

10. CRITERIA FOR AWARD OF GRADES/DIVISION

10.1 Calculation of Semester Grade Point Average (SGPA)* for semester

The performance of each student at the end of each semester is indicated in terms of SGPA. The SGPA is calculated as given below:

$$SGPA = \frac{\sum(CR \times GP)}{\sum CR}$$

Where CR = Credits of a subject
GP = Grade Points awarded for a subject

*SGPA is calculated for a student who passed all the subjects in that semester.

10.2 Calculation of Cumulative Grade Point Average (CGPA)* for Entire Program:

The CGPA is calculated as given below:

$$CGPA = \frac{\sum(CR \times GP)}{\sum CR}$$

Where CR= Credits of a subject
GP = Grade Points awarded for a subject

*CGPA is calculated for a student who passed all the subjects in previous semesters along with current semester.

- The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.
- Equivalent percentage = (CGPA – 0.75) x 10

10.3 Award of Division:

After satisfying the requirements prescribed for the completion of the program, the student shall be eligible for the award of B.Tech Degree and shall be placed in one of the following classes:

CGPA	Class
≥ 7.75	Degree with First Class with Distinction (with no subject failures)
≥ 6.75	Degree with First Class (with subject failures)
≥ 5.75 & < 6.75	Degree with Second Class
< 5.75	Degree with Pass Class

10.4 CONSOLIDATED GRADE MEMO

All the students who registered for the semester end examinations will be issued memorandum of marks by the Institute. A Consolidated Grade Memo containing credits and grades obtained by the student will be issued after completion of the four year B.Tech program.

11. REVALUATION

1. Student can submit the application for revaluation, along with the prescribed fee for

revaluation of his answer script(s) of theory subject(s) as per the notification issued by the Controller of Examinations.

2. The Controller of Examinations shall arrange for revaluation of such answer script(s).
3. An External examiner, other than the first examiner shall revaluate the answer script(s).

12. MINIMUM INSTRUCTION DAYS

The minimum instruction days for each semester shall be 90 working days.

13. There shall be no branch transfer after the completion of admission process.

14. WITHHOLDING OF RESULTS

If the student has not paid the dues, if any, to the college or if any case of indiscipline is pending against him, the result of such student will be kept withheld. His degree will be withheld in such cases.

15. TRANSITORY REGULATIONS

Discontinued or detained candidates are eligible for readmission as and when next offered.
A candidate, who is detained or discontinued in a semester, on readmission shall be required to do all the subjects in the curriculum prescribed for the batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already passed such subjects in the earlier semester(s) he was originally admitted into and substitute subjects are offered in place of them as decided by the Board of Studies. However, the decision of the Board of Studies will be final.

15.1. A student who is following JNTUK curriculum and detained due to shortage of attendance at the end of the first semester of first year shall join the autonomous batch of first year first semester. Such students shall study all the subjects prescribed for the batch in which the student joins and considered on par with regular candidates of Autonomous stream and will be governed by the autonomous regulations.

15.2. A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of first year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects will be offered in place of them as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

15.3 Transfer candidates (from non-autonomous college affiliated to JNTUK)

A student who is following JNTUK curriculum, transferred from other college to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of Studies. The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be the sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

15.4 Transfer candidates (from an autonomous college affiliated to JNTUK)

A student who has secured the required credits up to previous semester as per the regulations of other autonomous institutions shall also be permitted to be transferred to this college.

A student who is transferred from the other autonomous colleges to this college in second year first semester or subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree.

However, exemption will be given in the subjects of the semester(s) of the batch which he had passed earlier and substitute subjects are offered in their place as decided by the Board of studies.

The total number of credits to be secured for the award of the degree will be the sum of the credits up to previous semester as per the regulations of the college from which he has transferred and the credits prescribed for the semester in which a candidate joined after transfer and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

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Academic Regulations (16) for B. Tech. (Lateral Entry Scheme)

(Effective for the students getting admitted into II year from the Academic Year 2017- 18 and onwards)

1. AWARD OF B. TECH. DEGREE

A student will be declared eligible for the award of the B. Tech. Degree if he fulfils the following academic regulations.

(a) Pursue a course of study for not less than three academic years and not more than six academic years counted from the academic year of admission.

(b) The candidate registers for 132 credits and secures all the 132 credits.

2. The attendance regulations of B.Tech (Regular) shall be applicable to B.Tech (LES), whereas the number of condonations is restricted to 3.

3. PROMOTION RULE:

(a) Attendance requirement is same as regular course.

(b) A lateral entry student will be promoted from II to III year if he puts up the minimum required attendance in II year II semester irrespective of credits earned.

(c) A student shall be promoted from III to IV year only if he fulfils the academic requirements of 50% of the credits up to III Year II semester from all the examinations, whether the candidate takes the examinations or not.

4. TRANSITORY REGULATIONS:

4.1 A student who is following JNTUK curriculum and detained due to shortage of attendance at the end of the first semester of second year shall join the autonomous batch of second year first semester. Such students shall study all the subjects prescribed for the batch in which the student joins and considered on par with Lateral Entry regular candidates of Autonomous stream and will be governed by the autonomous regulations.

4.2 A student who is following JNTUK curriculum, detained due to lack of credits or shortage of attendance at the end of the second semester of second year or at the subsequent semesters shall join with the autonomous batch in the appropriate semester. Such candidates shall be required to pass in all the subjects in the program prescribed by the Board of Studies concerned for that batch of students from that semester onwards to be eligible for the award of degree. However, exemption will be given in the subjects of the semester(s) of the batch of them as decided by the Board of Studies.

The student has to clear all his backlog subjects up to previous semester by appearing for the supplementary examinations conducted by JNTUK for the award of degree. The total number of credits to be secured for the award of the degree will be sum of the credits up to previous semester under JNTUK regulations and the credits prescribed for the semester in which a candidate seeks readmission and subsequent semesters under the autonomous stream. The class will be awarded based on the academic performance of a student in the autonomous pattern.

5. All the other regulations as applicable for B. Tech. Four- year degree course (Regular) will be applicable for B. Tech. (Lateral Entry Scheme).

MALPRACTICES RULES

DISCIPLINARY ACTION FOR / IMPROPER CONDUCT INEXAMINATIONS

- The Principal shall refer the cases of Malpractices in Internal Assessment Test and Semester end examinations to a malpractice prevention committee constituted by him for the purpose. Such committee shall follow the approved levels of punishment. The Principal shall take necessary action against the students based on the recommendations of the committee.
- Any action by the candidate trying to get undue advantage in the performance or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder:

	Nature of Malpractices/ Improper conduct	**Punishment**
	If the candidate:	
1(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination).	Expulsion from the examination hall and cancellation of the performance in that subject only.
1(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled and sent to the college.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the

		original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practicals and to be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles in the Answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6.	Refuses to obey the orders of the Chief Superintendent/Assistant – Superintendent /any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in-charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s)has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

	misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7.	Leaves the exam hall taking away answer script or intentionally tears of the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all college examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.
9.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the college expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to police and, a police case will be registered against them.
10.	Comes in a drunken condition to the	Expulsion from the examination hall and

	examination hall.	cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year.
11.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that semester/year examinations.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the college for further action to award suitable punishment.	

OTHER MATTERS:

1. Physically challenged candidates who have availed additional examination time and a scribe during their intermediate / EAMCET examinations will be given similar concessions on production of relevant proof / documents.
2. The Principal shall deal in an appropriate manner with any academic problem which is not covered under these rules and regulations, in consultation with the Heads of the departments and subsequently such actions shall be placed before the Academic Council for ratification. Any emergency modification of regulation, approved in the meetings of the Heads of the departments shall be reported to the Academic Council for ratification.

GENERAL:

1. The academic council may, from time to time, revise, amend or change the regulations, schemes of examinations and / or syllabi.
2. Where ever the words ‘’he’’ ‘’him’’ ‘’his’’, occur in the regulations, they include ‘’she’’, ’’her’’, ’’hers’’.
3. The academic regulation should be read as a whole for the purpose of any interpretation.
4. In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the principal is final.

NARASARAOPETA ENGINEERING COLLEGE: NARASARAOPET
(AUTONOMOUS)
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING
B.TECH FOUR YEAR COURSE STRUCTURE

I B.TECH - I SEMESTER COURSE STRUCTURE:

S.No.	SUBJECT	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 Physics	BS	3	1	-	40	60	100	3
5	Engineering Graphics	ES	1	-	4	40	60	100	3
6	Environmental Studies	ES	4	-	-	40	60	100	3
7	Basic Communication Skills Lab	HS	-	-	3	25	50	75	2
8	Engineering Physics Lab	BS	-	-	3	25	50	75	2
9	Electronic Workshop & IT Workshop	ES	-	-	3	25	50	75	2
Total			**18**	**3**	**13**	**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

I B.TECH. – II SEMESTER COURSE STRUCTURE:

S.No.	SUBJECT	Cat. Code	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
1	Interactive English	HS	4	-	-	40	60	100	3
2	Integral Transforms and Vector Calculus	BS	3	1	-	40	60	100	3
3	Engineering Chemistry	BS	4	-	-	40	60	100	3
4	Programming with C	ES	3	1	-	40	60	100	3
5	Network Analysis	ES	3	1	-	40	60	100	3
6	Professional Ethics, Values and Patents	HS	4	-	-	40	60	100	3
7	Enhancing 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			**21**	**3**	**9**	**315**	**510**	**825**	**24**

II B.TECH. – I SEMESTER COURSE STRUCTURE:

S.No.	SUBJECT	Cat. Code	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
1	Electronic Devices and Circuits	PC	3	1	-	40	60	100	3
2	Signals and Systems	PC	3	1	-	40	60	100	3
3	Control Systems	PC	3	1	-	40	60	100	3
4	Data Structures	ES	3	1	-	40	60	100	3
5	Electrical and Mechanical Technology	ES	3	1	-	40	60	100	3
6	Business Management Concepts for Engineers	HS	4	-	-	40	60	100	3
7	Electronic Devices and Circuits Lab	PC	-	-	3	25	50	75	2
8	Networks & Electrical Technology Lab	ES	-	-	3	25	50	75	2
9	Quantitative Aptitude and Reasoning – I (Mandatory Non-credit Course)	MC	3	-	-	-	-	-	-
Total			**21**	**6**	**6**	**290**	**460**	**750**	**22**

II B.TECH. – II SEMESTER COURSE STRUCTURE:

S.No.	SUBJECT	Cat. Code	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
1	Switching Theory and Logic Design	PC	3	1	-	40	60	100	3
2	Electronic Circuit Analysis	PC	3	1	-	40	60	100	3
3	Pulse and Digital Circuits	PC	3	1	-	40	60	100	3
4	Analog Communications	PC	3	1	-	40	60	100	3
5	Electromagnetic Waves and Transmission Lines	PC	3	1	-	40	60	100	3
6	Database Management Systems	ES	4	-	-	40	60	100	3
7	Electronic Circuits & Pulse and Digital Circuits Lab	PC	-	-	3	25	50	75	2
8	Analog Communications Lab	PC	-	-	3	25	50	75	2
9	Verbal Ability (Mandatory Non-credit Course)	MC	3	-	-	-	-	-	-
10	Sports & Games / NSS	MC	-	-	-	-	-	-	-
Total			**22**	**5**	**6**	**290**	**460**	**750**	**22**

III B. Tech. - I SEMESTER COURSE STRUCTURE:

S.No.	Subject	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Linear and Digital IC Applications	PC	3	1	-	40	60	100	3
2	Digital Communications	PC	3	1	-	40	60	100	3
3	Antenna and Wave Propagation	PC	3	1	-	40	60	100	3
4	Computer Organization and Microprocessors	PC	4	-	-	40	60	100	3
5	**Open Elective - I**	OE	4	-	-	40	60	100	3
6	Linear and Digital IC Applications Lab	PC	-	-	3	25	50	75	2
7	Digital Communications Lab	PC	-	-	3	25	50	75	2
8	Microprocessors and Interfacing Lab	PC	-	-	3	25	50	75	2
9	Mini Project	PW	-	-	-	25	50	75	1
10	Quantitative Aptitude and Reasoning – II (Mandatory Non-credit Course)	MC	3	-	-	-	-	-	-
Total			**20**	**3**	**9**	**300**	**500**	**800**	**22**

III B.TECH. – II SEMESTER COURSE STRUCTURE:

S.No.	Subject	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	VLSI Design	PC	3	1	-	40	60	100	3
2	Microwave and Optical Communications	PC	4	-	-	40	60	100	3
3	Digital Signal Processing	PC	3	1	-	40	60	100	3
4	Electronic Measurements and Instrumentation	PC	3	1	-	40	60	100	3
5	**Professional Elective – I:** i. Analog IC Design ii. Electronic Switching Systems iii. Advanced Computer Architecture iv. Coding Theory and Practice v. Digital Image Processing	PE	4	-	-	40	60	100	3
6	**Open Elective - II**	OE	4	-	-	40	60	100	3
7	Digital Signal Processing Lab	PC	-	-	3	25	50	75	2
8	Microwave & Optical Communications Lab	PC	-	-	3	25	50	75	2
9	Advanced Communication Skills (Mandatory Non-credit Course)	MC	3	-	-	-	-	-	-
10	MOOCS	MC	-	-	-	-	-	-	-
Total			**25**	**2**	**6**	**290**	**460**	**750**	**22**

IV B. Tech. - I SEMESTER COURSE STRUCTURE:

S.No.	Subject	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Object Oriented Programming through Java	ES	3	1	-	40	60	100	3
2	Microcontrollers and Embedded Systems	PC	4	-	-	40	60	100	3
3	Computer Networks	PC	4	-	-	40	60	100	3
4	**Professional Elective - II:** i. Digital IC design ii. Satellite Communications iii. Network Security and Cryptography iv. Bio Medical Instrumentation v. Advanced DSP	PE	4	-	-	40	60	100	3
5	**Professional Elective - III:** i. Mixed Signal Design ii. Radar Systems iii. Cloud Computing iv. Analytical Instrumentation v. Digital Signal Processors and Architectures	PE	4	-	-	40	60	100	3
6	**Open Elective - III**	OE	4	-	-	40	60	100	3
7	VLSI and Embedded Systems Lab	PC	-	-	3	25	50	75	2
8	Object Oriented Programming through Java Lab	ES	-	-	3	25	50	75	2
Total			**23**	**1**	**6**	**290**	**460**	**750**	**22**

IV B.TECH. – II SEMESTER COURSE STRUCTURE:

S.No.	Subject	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Cellular and Mobile Communications	PC	4	-	-	40	60	100	3
2	**Professional Elective - IV:** i. Low power IC design ii. Wireless Sensor Networks iii. System-On-Chip iv. PC based Instrumentation v. Speech Processing	PE	4	-	-	40	60	100	3
3	**Professional Elective - V:** i. FPGA Design ii. Software Defined Radio iii. Distributed Computing iv. Data Acquisition and Transmission v. Embedded System Design	PE	4	-	-	40	60	100	3
4	Project Work	PW	-	-	-	80	120	200	10
5	Practical Training / Internship	PW	-	-	-	40	60	100	3
Total			**12**	**-**	**-**	**240**	**360**	**600**	**22**

LIST OF OPEN ELECTIVES

Open Elective – I	Department Offering the Subject	No. of periods per week		No. of Credits
Subject Title		**L**	**T**	
Elements of Mechanical Engineering (Other than ME)	ME	4	-	3
Material Science (Other than ME)	ME	4	-	3
Basic Electrical and Electronics Engineering (Other than EEE, ME & ECE)	EEE	4	-	3
Industrial Electronics (Other than EEE)	EEE	4	-	3
Principles of Signals, Systems & Communications (Other than ECE)	ECE	4	-	3
Automotive Electronics	ECE	4	-	3
Medical Electronics	ECE	4	-	3
Image Processing Algorithms and Analysis (Other than ECE)	ECE	4	-	3
Database Management Systems (Other than ECE & CSE)	CSE	4	-	3
Front End UI & Frame Work Tools (Other than CSE)	CSE	4	-	3
Principles of Water Quality Management	CE	4	-	3
Remote Sensing and GIS (Other than CE)	CE	4	-	3

Open Elective – II	Department Offering the Subject	No. of periods per week		No. of Credits
Subject Title		**L**	**T**	
Nanotechnology	ME	4	-	3
Work Study	ME	4	-	3
Fundamentals of Electrical Energy (Other than EEE)	EEE	4	-	3
Linear Control Theory (Other than EEE & ECE)	EEE	4	-	3
Introduction to Microprocessors and Microcontrollers (Other than EEE & ECE)	ECE	4	-	3
Consumer Electronics	ECE	4	-	3
Internet of Things (IOT) (Other than CSE)	CSE	4	-	3
Web Technologies (Other than CSE)	CSE	4	-	3
Cloud Computing (Other than ECE)	CSE	4	-	3
OOPS through JAVA (Other than ECE & CSE)	CSE	4	-	3
Disaster Management	CE	4	-	3
Building Services (Other than CE)	CE	4	-	3

Open Elective – III	Department Offering the Subject	No. of periods per week		No. of Credits
Subject Title		**L**	**T**	
Operations Research (Other than ME)	ME	4	-	3
Robotics	ME	4	-	3
Energy Audit, Conservation & Management (Other than EEE)	EEE	4	-	3
Non-Conventional Energy Resources (Other than EEE)	EEE	4	-	3
Introduction to Embedded Systems (Other than ECE)	ECE	4	-	3
Global Positioning System (GPS)	ECE	4	-	3
Computer Networks (Other than ECE & CSE)	CSE	4	-	3
Web Animation and Interactivity using Flash	CSE	4	-	3
Web Services	CSE	4	-	3
Watershed Management	CE	4	-	3
Solid and Hazardous Waste Management (Other than CE)	CE	4	-	3

I B.TECH I SEMESTER

I B.TECH - I SEMESTER COURSE STRUCTURE:

S.No.	SUBJECT	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 Physics	BS	3	1	-	40	60	100	3
5	Engineering Graphics	ES	1	-	4	40	60	100	3
6	Environmental Studies	ES	4	-	-	40	60	100	3
7	Basic Communication Skills Lab	HS	-	-	3	25	50	75	2
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MC: Mandatory Course (No Credits)
L: Lecture
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I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	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

- Speak clearly, effortlessly, confidently and appropriately.
- Write coherently with acceptable accuracy, organizing ideas logically.
- Listen and read to comprehend different discourses and different genres of texts.
- 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:
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

Objectives:

- To understand types and sub-skills of reading and apply techniques to improve reading speed.

Outcomes:

- 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

REFERENCES:

1. Meenakshi raman, Sangeeta, Sharma *Fundamentals of technical communication*, Pg: 119-153 Oxford University Press, 2015
2. Rutherford, Andrea. J, *Basic Communication Skills for Technology*. Pearson, New Delhi. 2001
3. Raymond Murphy, *Murphy's English Grammar,* Cambridge University Press 2004
4. Meenakshi Raman, Sangeeta Sharma, *Technical Communication: English Skills for Engineers*, Oxford University Press, 2009
5. 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

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.

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.

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"*, 42^{nd} 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",* 9^{th} 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.

I B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
ENGINEERING PHYSICS (Common to All Branches)							

Course objectives:

- Physics is the foundation subject to all engineering and through the study in engineering physics the main aim is blending a strong physics component with relevant engineering backgrounds that are usually necessary to work in areas such as semiconductor, optical technologies, mechanical, electrical, and civil engineering. The students will get their traditional undergraduate engineering education that has a broad foundation in mathematics, engineering sciences and technology. This program emphasizes problem solving skills and an understanding of engineering design to address the needs and challenges of the technology age and allow students to take a broad range of engineering careers.

Course Outcomes:

Upon successful completion of the course, the students should be able to

- Understand the difference between classical and quantum mechanics
- Analyze and understand semiconductor technology and various types of lasers & optical fibers.
- Knows the applications of ultrasonic's in engineering and medicine
- Will recognize the experimental evidence of wave nature of light and interference in thin films, Diffraction grating and polarizer's in various fields.
- Recognize the importance of lasers in various fields.
- Learn the crystal structures and XRD techniques.
- Realize about the various applications of semiconductors in engineering & technology.

UNIT-I

Interference: Introduction – Coherent Sources -Interference in thin films by reflection – Newton's rings – Principle – construction- determination of radius of curvature of plano convex lens.

Diffraction : Introduction – Fraunhofer diffraction - Fraunhofer diffraction at single slit-double slit (qualitative) – Diffraction grating – Grating spectrum

Polarization: Introduction – Types of Polarization – Double refraction – Quarter wave plate ad Half Wave plate

UNIT-II

Lasers: Introduction – Characteristics of lasers – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Ruby laser – Helium Neon laser-Applications

Fiber Optics: Introduction- Principle of optical fiber - Acceptance angle – cone - Numerical Aperture-Applications

UNIT-III

Crystallography : Introduction – Space lattice – Basis – Unit Cell – Lattice parameters –

Bravais lattices – Crystal systems – Structures and packing fractions of SC,BCC and FCC.
X-Ray Diffraction Techniques: Directions and planes in crystals – Miller indices – Separation between successive (h k l) planes – Bragg's law.

UNIT – IV
Ultrasonic: Introduction – properties - Production of Ultrasonic waves –Piezo electric effect, Magnetostriction methods -Applications.
Acoustics: Introduction-Sound absorption-absorption coefficient-Reverberation Time-Sabine's formula-Eyring's formula

UNIT – V
Free electron theory: Classical free electron theory – Quantum free electron theory – Fermi dirac (analytical) and its dependence on temperature-Fermi energy-Density of states.
Quantum Mechanics: Introduction – Matter waves – Physical significance of wave function - Schrodinger Time Independent wave equations – Particle in a one dimensional potential box.

UNIT – VI
Band Theory of Solids: Bloch theorem (qualitative) – Kronig-Penny model - boundary conditions-origin of energy band formation in solids- concept of effective mass of electron and hole-classification of materials into conductors, semiconductors and insulators.
Semiconductor Physics: Introduction –Intrinsic, Extrinsic semiconductor and carrier concentrations – Fermi level in intrinsic and extrinsic semiconductors- Hall Effect.

TEXT BOOKS:

1. A.J. Dekker, *"Solid state Physics"*, Mc Millan India Ltd.
2. M.N. Avadhanulu and P.G. Kshirasagar, "*A Text Book of Engineering Physics*", S. Chand publications.
3. Palanisamy, "*Engineering Physics*", SciTech Publishers.
4. M.R. Srinivasan, *"Engineering Physics",* New Age international publishers

REFERENCES:

1. Charles Kittle, *"Introduction to solid state physics"*, Willey India Pvt. Ltd
2. T. Bhimasenkaram, *"Applied Physics",* BSP BH Publications.
3. M.Arumugam, *"Applied Physics",* Anuradha Agencies.
4. D.K.Bhattacharya, "*Engineering Physics*", Oxford University press.
5. Mani Naidu S, "*Engineering Physics*", Pearson Publications.
6. Sanjay D Jain and Girish G Sahasrabudhe, "*Engineering Physics*", University Press.
7. B.K.Pandey & S. Chaturvedi, "*Engineering Physics",* Cengage Learning.

I B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	1	0	4	40	60	100	3
ENGINEERING GRAPHICS (Common to CSE, ECE & EEE)							

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 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

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.

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

Upon successful completion of the course, the students should be able to

- Improve their basic communication skills to interact with peers and others in various social situations
- Speak English effortlessly with good pronunciation
- 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.

REFERENCES:

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, Puspha Latha, "*Communication skills"*, Oxford University Press 2005.

I B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2
ENGINEERING PHYSICS LAB (Common to All Branches)							

COURSE OBJECTIVE:

- The main aim of the course is to acquaint the students with basic concepts in Engineering Physics using the following illustrative list of experiments.

COURSE OUT COMES:

Upon successful completion of the course, the students should be able to

- These experiments in the laboratory are helpful in understanding important concepts of physics through involvement in the experiments by applying theoretical knowledge.
- It helps to recognize where the ideas of students agree with those accepted by physics and where they do not.

LIST OF EXPERIMENTS

1. Newton's rings –Radius of Curvature of Plano Convex Lens.
2. Determination of thickness of thin wire- Air wedge method
3. Determination of wavelength of a source-Diffraction Grating-Normal incidence
4. Determination of wavelength of Laser Source-single slit diffraction.
5. Determine the Numerical aperture of an optical fiber.
6. Determination of velocity of ultrasonic waves in liquids-ultrasonic interferometer.
7. Melde's experiment – Transverse and Longitudinal modes.
8. Determination of velocity of sound-Volume resonator
9. Verification of laws of vibrations in stretched strings -Sonometer.
10. Hall effect in semiconductors
11. Energy Band gap of a Semiconductor p - n junction.
12. Characteristics of Thermistor- Temperature coefficient

REFERENCES:

1. Dr.Y. Aparna & Dr.K.Venkateswarao, "*Engineering Physics Lab Manual* ", V.G.S. Book links.
2. *"Physics Practical Manual"*, Lorven Publications.

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

I B.TECH. – II SEMESTER COURSE STRUCTURE:

S.No.	SUBJECT	Cat. Code	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
1	Interactive English	HS	4	-	-	40	60	100	3
2	Integral Transforms and Vector Calculus	BS	3	1	-	40	60	100	3
3	Engineering Chemistry	BS	4	-	-	40	60	100	3
4	Programming with C	ES	3	1	-	40	60	100	3
5	Network Analysis	ES	3	1	-	40	60	100	3
6	Professional Ethics, Values and Patents	HS	4	-	-	40	60	100	3
7	Enhancing 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			**21**	**3**	**9**	**315**	**510**	**825**	**24**

I B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
INTERACTIVE 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 enhance the skills of listening, reading and critical thinking.
- To integrate English Language learning with training for employability skills.

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to

- Speak clearly, effortlessly, confidently and effectively.
- Write coherently and flawlessly, organizing ideas logically.
- Listen and read to comprehend different discourses and different genres of texts.

Teaching Methodology:

The methodology of teaching will be chalk and talk, PPT, audio-visual, and activity based

PART-I: COMMUNICATION SKILLS
Hours of Instruction per week: 8

PART-I COURSE OBJECTIVES:

1. Understand the significance of using formal language in communication and Identify different language patterns in communication.
2. Understand the importance of clarity and conciseness of writing.
3. To enhance word power and usage of lexicons among the learners.

PART-I COURSE OUTCOMES:

1. Apply Formal and Informal Language in office correspondence and real life situations.
2. Apply the Clarity, Conciseness and Formal language in E-mail writing, letter writing, report writing, paragraph writing and essay writing**.**
3. Use words in different contexts while speaking and decipher meaning of the words contextually while reading.

1. **Effective communication**
   a. Role and significance of communication
   b. Features of Human Communication
   c. Process of Communication
   d. Types of Communication, barriers to communication
2. **Oral Communication**
   a. Importance of Listening for effective communication

b. Interpersonal communication
c. Models of Interpersonal relationship development
d. Styles of communication
e. Persuasion techniques
f. Telephone and Cell phone etiquette

3. Written Communication

a. Paragraph writing **b.** Summaries **c.** Expansion of Proverbs
d. Essay writing **e.** Report writing **f.** The scientific paper
g. Letter writing **h.** Letters of Complaint **i.** Request to complaint
j. letters of inquiry and responses **k.** Resume writing **l.** Visumes
m. statement of purpose **n.** E-mail

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Remedial English

a. Importance of vocabulary and grammar,
b. Homonyms, Homophone and Homographs
c. Synonyms and antonyms
d. One word substitutes
e. Idioms
f. Words often confused
g. Subject-Verb agreement
h. active and passive voice
i. direct and indirect speech
j. Articles
k. Adjectives
l. Prepositions
m. Tense and aspect
n. Suffixes
o. Question tags
p. Prefixes
q. Punctuation
r. Common Errors
s. Correction of common errors

PART-II: READING FOR ENRICHMENT

PART-II COURSE OBJECTIVE:

- To inspire the learners by giving the success stories of the various fields and teach them that achievement comes only after burning the midnight oil.

PART-II COURSE OUTCOME:

- The students will emulate the achievers and develop perseverance, determination, dedication and industry

1. APJ Abdul Kalam
2. An Interview with Microsoft CEO Satya Nadella
3. Azim Premji

4. Sachin Tendulkar
5. Sam Pitroda: The Knowledge Revolution
6. Indra Nooyi: http://www.thefamouspeople.com/profiles/indra-nooyi-6440.php

TEXTBOOK:

1. E Suresh Kumar," *Engineering English",* Orient Black Swan Pvt. Ltd. Publishers.

REFERENCES:

1. Raman, Meenakshi and Sangeetha Sharma, "*Technical Communication: Principles and Practice",* Oxford University Press, New Delhi. 2011.
2. Rutherford, Andrea. J *Basic Communication Skills for Technology*. Pearson, New Delhi. 2001
3. Raymong Murphy, "*Murphy's English Grammar"*, Cambridge University Press 2004.
4. Meenakshi Raman, Sangeeta Sharma, "*Technical Communication: English Skills for Engineers",* Oxford University Press, 2009.
5. Meenakshi Raman, Sangeeta Sharma, "*Fundamentals of technical communication",* 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
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.

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
	4	0	0	40	60	100	3
ENGINEERING CHEMISTRY (Common to all Branches)							

COURSE OBJECTIVES:

- For prospective engineers knowledge about water used in industries and for drinking purpose is useful; hence chemistry of hard water, boiler troubles and modern methods of softening hard water are introduced.
- Polymer chemistry may be one of the most relevant of the sub-disciplines of chemistry for the modern citizen. Very few consumer goods are made without a significant contribution from the spectacular applications of polymers. Modern materials depend on large variety of properties available from polymers. Not only is polymer chemistry eminently practical, it is also fascinating from an academic view point.
- With the increase in demand, a wild variety of materials coming up. Some of them have excellent engineering properties and a few of these materials are introduced.
- The basics for the construction of galvanic cells as well as some of the sensors used in instruments are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory.
- Fuels as a source of energy are a basic need in industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
- Photochemistry is to understand the basic principles and types of photochemical reactions. To ensure that students have a good knowledge about photoenergy. To be aware with the significant applications of photochemistry in many life areas.

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to

- Water Technology deals with the processes and mechanisms that are required to manage the human water cycle. Its function is to provide continuous and sufficient quantities of safe palatable drinking water for both domestic and industrial consumers and dispose of the used water to prevent environmental damage and to protect public health.
- The advantages and limitations of plastic materials and their use in design would be understood.
- The students would be now aware of materials like naomaterials, fullerenes and their uses. Similarly liquid crystals, solar cells and cement are understood. The importance of green synthesis is well understood and how they are different form conventional methods is also explained.
- Able to apply operating principles and the reaction mechanisms of electrochemistry knowledge to analysis and design of batteries and fuel cells. Able to get knowledge on corrosion in order to protect the metals from the environment.
- To be able to understand and perform the various characterization techniques of fuels and fuels which are used commonly and their economics, advantages and limitations are discussed.
- To understand the basics of photochemistry, Law of absorption of light, limitation/deviation and applications of Lambert Beer's law, photochemical law, Jablonski's diagram, applications of photochemistry.

UNIT-I: WATER AND ITS INDUSTRIAL APPLICATIONS

Sources of water–Impurities of water–Hardness, types of hardness and its units–Estimation of hardness by EDTA method–Boiler troubles (Sludge and Scale, Priming and Foaming, Caustic embrittlement, Boiler corrosion)–Softening of water–Internal treatment methods– External treatment methods–(Lime–Soda, Zeolite and Ion exchange process)–Desalination of brackish water (Reverse osmosis and Electrodialysis)–Municipal water treatment methods–Problems on hardness and lime-soda process.

UNIT-II: POLYMER SCIENCE AND TECHNOLOGY

Introduction-Classification of polymers–Polymerization, types and mechanism of polymerization–Stereo regular polymers–Plastics–Thermoplastics and thermosetting plastics–Compounding of plastics–Preparation, properties and applications of Polyethylene, PVC, Bakelite and Polycarbonates–Rubbers and elastomers–Natural rubber, vulcanization–Synthetic rubbers (Buna–N, Buna–S, Thiokol rubber)–Applications–Fiber reinforced plastics, Conducting polymers and Biodegradable polymers.

UNIT-III: CHEMISTRY OF ADVANCED MATERIALS

Nanomaterials: Types–Preparation of carbon nanotubes and fullerenes–Properties and engineering applications

Liquid crystals: Types and engineering applications

Green Chemistry: Principles–Methods for green synthesis and applications

Cement: Preparation of Portland cement–Setting and hardening of cement

Solar Cells: Solar heaters–Photovoltaic cells–Solar reflectors

UNIT-IV: ELECTROCHEMICAL CELLS AND CORROSION

Galvanic cells–Single electrode potential–Reference electrodes–Electrochemical series–Batteries (primary, secondary and fuel cells)

Corrosion: Causes and effects of corrosion–Theories of corrosion (dry, chemical and electrochemical corrosion)–Factors effecting corrosion–Corrosion control methods–Cathode protection–Sacrificial anodic, Impressed current methods–Surface coatings–Methods of application on metals (Hot dipping, Galvanizing, Tinning, Cladding, Electroplating, Electroless plating)–Organic surface coatings–Paints–Constituents and their functions.

UNIT-V: FUELS AND COMBUSTION

Fuels–Introduction–Classification–Calorific value–HCV and LCV–Bomb calorimeter–Problems on calorific value (Theoretical and Experimental)–Coal–Proximate and ultimate analysis–Problems on analysis of coal–Petroleum–Refining–Cracking–knocking–Petrol–Synthetic petrol–Gaseous fuels–Natural gas–LPG, CNG–Junker's gas calorimeter–Combustion–Problems on air requirements–Rocket fuels.

Unit-VI: PHOTOCHEMISTRY

Photo-excitation of organic molecules–Jablonski Diagram–Laws of Photochemistry and quantum yield–Calorimetric analysis–Photochemical equilibrium–Photosensitization–Some examples of photochemical reactions–Chemistry of vision and other applications of photochemistry.

TEXT BOOKS:

1. P.C. Jain and M. Jain, *"Engineering Chemistry"*, Dhanpat Rai & Sons, Delhi.
2. Shashi Chawla, *"A Textbook of Engineering Chemistry"*, Dhanpat Rai & Sons, Delhi.
3. S.S. Dara, *"A Textbook of Engineering Chemistry"*, S. Chand & Co. New Delhi.
4. N.Y.S. Murthy, V. Anuradha, K. Rama Rao, *"A Text Book of Engineering Chemistry"*, Maruthi Publications.
5. B. Sivasankar, *"Engineering Chemistry"*, McGraw-Hill companies, 2010.

REFERENCES:

1. K. Sesha Maheswaramma and Mridula Chugh, *"Engineering Chemistry"*), Pearson Publications, 2013.
2. Dr. Y. Bharati Kumari and Dr. Jyotsna Cherukuri, *"A Textbook of Engineering Chemistry"*, VGS Publications.
3. R. Gopalan, D. Venkatappayya, Sulochana Nagarajan, *"Text Book of Engineering Chemistry"*, Vikas Publications, 2011.
4. C. Parameswara Murthy, C.V. Agarwal, Adhra Naidu, *"Text Book of Engineering Chemistry"*, B.S. Publications, 2006.

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.

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.

I B.TECH - II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2
ENGINEERING CHEMISTRY LAB (Common to all Branches)							

COURSE OBJECTIVES:

- To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

COURSE OUTCOMES:

Upon successful completion of the course, the students should be able to

- Carrying out different types of titrations for estimation of concerned in materials using comparatively more quantities of materials involved for good results, and
- Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results.

List of Experiments

Introduction to chemistry laboratory–Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis etc.

Volumetric Analysis

1. Estimation of NaOH using standard HCl solution
2. Estimation of Mohr's salt using potassium dichromate ($K_2Cr_2O_7$) solution
3. Estimation of $CuSO_4$ using sodium thiosulphate ($Na_2S_2O_3$) solution.

Water Analysis

4. Determination of hardness of water sample by EDTA method
5. Determination of alkalinity of water sample
6. Determination of free chlorine in bleaching powder
7. Determination of turbidity of water sample

Conductometric Titrations

8. Conductometric titration between strong acid and strong base (HCl + NaOH)
9. Conductometric titration between mixture of acids and strong base (HCl and CH_3COOH + NaOH)

Food analysis

10. Estimation of Vitamin-C

Preparation of Polymeric Resins

11. Preparation of phenol formaldehyde resin
12. Preparation of urea formaldehyde resin

TEXT BOOKS:

1. K. Mukkanti, etal, *"Practical Engineering Chemistry"*, B.S. Publications, Hyderabad.
2. S.S. Dara, *"A text book on experiments and calculation Engg."*

3. Chatwal, Anand, *"Instrumental methods of chemical analysis"*, Himalaya Publications
4. *"Chemistry Practical Manual"*, Lorven Publications
5. Vogel, "*Inorganic quantitative analysis"*.

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.

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

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 B.TECH I SEMESTER

II B.TECH. – I SEMESTER COURSE STRUCTURE:

S.No.	SUBJECT	Cat. Code	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
1	Electronic Devices and Circuits	PC	3	1	-	40	60	100	3
2	Signals and Systems	PC	3	1	-	40	60	100	3
3	Control Systems	PC	3	1	-	40	60	100	3
4	Data Structures	ES	3	1	-	40	60	100	3
5	Electrical and Mechanical Technology	ES	3	1	-	40	60	100	3
6	Business Management Concepts for Engineers	HS	4	-	-	40	60	100	3
7	Electronic Devices and Circuits Lab	PC	-	-	3	25	50	75	2
8	Networks & Electrical Technology Lab	ES	-	-	3	25	50	75	2
9	Quantitative Aptitude and Reasoning – I (Mandatory Non-credit Course)	MC	3	-	-	-	-	-	-
Total			**21**	**6**	**6**	**290**	**460**	**750**	**22**

II B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
ELECTRONIC DEVICES AND CIRCUITS							

COURSE OBJECTIVES:

Students undergoing this course are expected to

1. Know the properties of semiconductor materials.
2. Understand the operation and principles of P-N diode and special diodes.
3. Understand various types of rectifiers and filters.
4. Know the working of BJT and need for transistor biasing and stabilization.
5. Know the working of FET and other Transistors.

COURSE OUTCOMES:

After completion of the course, students will be able to

CO1: Explore the semiconductors.
CO2: Use P-N diodes and special diodes in electronic circuits.
CO3: Analyze BJT and its thermal stability.
CO4: Explore the operation of FET, other transistors and their applications.

SYLLABUS:

UNIT- I: OVERVIEW OF SEMICONDUCTORS

Insulators, Semiconductors and Metals – Classification using Energy gap, Intrinsic and Extrinsic Semiconductors – Electrons and Holes, Conductivity, Mobility, Drift and Diffusion Currents, Transportation of Charge Carriers - Generation and Recombination of Carriers, Charge Densities in Semiconductors, Hall Effect - Quantitative Analysis and Applications, Continuity Equation, Mass Action Law, Einstein's Equation, Fermi level in intrinsic and extrinsic semiconductors.

UNIT- II: JUNCTION DIODE CHARACTERISTICS

P-N Junction Diode - Formation of P-N Junction, Open Circuited P-N Junction, Biased P-N Junction - Forward Bias, Reverse Bias, Current Components in P-N Junction Diode, Law of Junction, Diode Current Equation - Quantitative Analysis, V-I Characteristics of Diode - Forward Bias, Reverse Bias, Breakdown in P-N Junction Diode, Temperature Dependence on V-I Characteristics, Diode Resistance-Static Resistance, Dynamic Resistance, Reverse Resistance, Diode Capacitance - Transition Capacitance, Diffusion Capacitance, Energy Band Diagram of P-N Junction Diode.

UNIT- III: SPECIAL DIODES AND RECTIFIERS

Zener Diode - V-I Characteristics, Applications, Breakdown Mechanisms - Zener Breakdown and Avalanche Breakdown, Construction, Operation, Characteristics and applications of LED, LCD, Photodiode, Varactor Diode and Tunnel diode.

Basic Rectifier setup, Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Inductive and Capacitive Filters, L– Section and π- Section, Derive and compare rectifier parameters with and without filter.

UNIT- IV: BIPOLAR JUNCTION TRANSISTOR (BJT)

Bipolar Junction Transistor – Types, Symbols and Operation, Transistor Current Components, Transistor Equation - Relation among I_C, I_B, I_{CBO}, Transistor Configurations - CB, CE and CC, Transistor as a switch, Transistor switching times, Transistor as an Amplifier, Characteristics of Transistor in Common Base Configuration, Common Emitter and Common Collector Configurations - Input and output characteristics, Early effect, Transistor parameters, Current amplification factor, Relation among α, β, and γ, Comparison of CB, CE and CC Configurations, Punch Through/ Reach through, Typical transistor junction voltage values, Photo Transistor.

UNIT- V: BJT BIASING AND THERMAL STABILITY

Need For Biasing, Operating Point, Load Line Analysis - D.C. Load Line, A.C. Load Line, Biasing - Methods, Basic Stability, Fixed Bias, Collector-to-base Bias and Self Bias, Stabilization against variations in V_{BE}, I_c and β, Stability Factors S, S' and S'', Bias Compensation - Thermistor, Sensistor, Diode Compensation for variation in I_{CO}, Thermal Runaway, Thermal Stability.

UNIT- VI: FET & OTHER TRANSISTORS

FET Types and Symbols - JFET and MOSFET/IGFET, JFET: N- Channel and P-Channel Construction, Operation, Characteristics - Drain and Transfer, Parameters - Drain Resistance, Amplification factor, Transconductance, Pinch-off voltage**,** MOSFET - Types - Depletion MOSFET - N Channel and P Channel, Enhancement MOSFET - N-Channel and P-Channel, Construction, Operation, Characteristics - Transfer and Drain Characteristics for Depletion and Enhancement Modes , Comparison between JFET and MOSFET.

SCR- Symbol, Two-Transistor version, UJT - Negative Resistance Property and Applications**.**

TEXT BOOKS:

1. Electronic Devices and Circuits – J. Millman, C. Halkias, Tata McGraw-Hill, Third Edition, 2010.
2. Electronic Devices and Circuits – Allen Mottershed, PHI, 2011.
3. Electronic Devices and Circuits – Salivahanan, N. Suresh Kumar, A. Vallavaraj, Tata McGraw-Hill, Second Edition, 2008.

REFERENCE BOOKS:

1. Integrated Electronics – Jacob Millman, C. Halkies, C.D. Parikh, Satyabrata Jit, Tata McGraw-Hill, Second Edition, 2011.
2. Electronic Devices and Circuit Theory – R.L. Boylestad and Louis Nashelsky, Pearson Publications, Eleventh Edition, 2013.
3. Electronic Devices and Circuits – A.P. Godse and U.A. Bakshi, Technical Publications, First Edition, 2009.

II B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
SIGNALS AND SYSTEMS							

COURSE OBJECTIVES:

1. To get an in-depth knowledge about signals and analysis of the same using various transforms.
2. Able to know different types of signals and their frequency domain analysis.
3. Understand the principle, filter characteristics and bandwidth of a linear system.
4. Understand the concepts of auto correlation, cross correlation and power density.

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO1 : Know about basic signals and its operations.
CO2 : Represent time-domain signals in frequency-domain using different transforms.
CO3 : Understand the LTI system and responses for different inputs using Convolution method.
CO4 : Understand Sampling theorem and its applications, Correlation and its applications.

SYLLABUS:

UNIT- I: SIGNAL ANALYSIS

Classification of Signals: Analog, Discrete, Digital, Deterministic & Random, Periodic & Aperiodic, Even & Odd, Energy & Power signals. Basic Operations on Signals: Time-Shifting, Time-Scaling, Time-Reversal, Amplitude Scaling and Signal Addition. Elementary Signals: Unit Step, Unit Ramp, Unit Parabolic, Impulse, Sinusoidal function, Exponential function, Gate function, Triangular function, Sinc function and Signum function. Signal approximation using orthogonal functions, Mean square error, Closed or complete set of orthogonal functions, Orthogonality in complex functions.

UNIT- II: FOURIER SERIES

Representation of Fourier series, Continuous time periodic signals, Properties of Fourier Series, Dirichlet‘s conditions, Trigonometric Fourier Series and Exponential Fourier Series, Conversion of Exponential Fourier Series from Trigonometric Fourier series & vice versa.

UNIT- III: FOURIER TRANSFORMS

Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of periodic signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function, Introduction to Hilbert Transform.

UNIT- IV: LAPLACE TRANSFORMS AND SIGNAL TRANSMISSION THROUGH LINEAR SYSTEMS

Laplace Transforms

Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of Region of Convergence (ROC), Constraints on ROC for various classes of signals, Properties of Laplace transforms, Relation between Laplace transform and Fourier transform.

Signal Transmission through Linear Systems

System and its types: Linear & Non-Linear, Time Variant & Time Invariant, Causal & Non Causal, Static & Dynamic, Stable & Unstable. Impulse response of a linear time invariant (LTI) system and 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 and its characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between bandwidth and rise time.

UNIT- V: SAMPLING

Sampling theorem, Types of Sampling: Impulse Sampling, Natural and flattop Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing.

UNIT- VI: CONVOLUTION, CORRELATION AND PSD 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 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.

TEXT BOOKS:

1. Signals, Systems and Communications – B.P. Lathi, BS Publications, 2008.
2. Signals and Systems – Simon Haykin and Van Veen, Wiley, Second Edition, 2003.

REFERENCE BOOKS:

1. Signals and Systems – A.V. Oppenheim, A.S. Will sky and S.H. Nawab, PHI, Second Edition, 2013.
2. Signals and Systems – Ramesh Babu, SciTech Publications, Third Edition, 2011.
3. Signals and Systems – A. Anand Kumar, PHI Publications, Third Edition, 2013.

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

COURSE OBJECTIVES:

1. Learn the fundamental concepts of Control systems and mathematical modeling of the system.
2. Know various systems and time response analysis for various inputs.
3. Understand the basics of stability analysis of the system.
4. Study the frequency response analysis of the system and classical control design techniques.

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO1 : Represent the mathematical model of a system.
CO2 : Determine the time response of different order systems for various inputs.
CO3 : Analyze the stability of the system.
CO4 : Understand the frequency response analysis of the system and classical control design techniques.

SYLLABUS:

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: Gain, Stability, External Disturbance or Noise and Sensitivity, Mathematical models: Differential equations, Impulse Response and transfer functions - Translational and Rotational mechanical systems, Analogous Systems: Force-voltage, Force-Current, Torque-voltage, Torque-Current.

UNIT- II: TRANSFER FUNCTION REPRESENTATION

Transfer Function of DC Servomotors: Armature controlled and Field Controlled DC Servomotor, Transfer Function of AC Servo motor, Block diagram representation of systems considering electrical systems as examples: Block diagram algebra, Representation by Signal flow graph, Terms used in SFG, Reduction using Mason's gain formula.

UNIT- III: TIME RESPONSE ANALYSIS

Unit Standard test signals: Step, Ramp, Parabolic and Impulse, Time response of first order systems: step, unit ramp and unit impulse, Characteristic Equation of Feedback control systems, Transient response of second order systems: Unit step input, Time domain specifications: Delay time, Rise time, Peak time, Peak over shoot and Settling time, Steady state response: Steady state errors and error constants – K_p, K_v and K_a, Effects of proportional derivative, proportional integral systems.

UNIT- IV: STABILITY ANALYSIS IN S-DOMAIN AND ROOT LOCUS TECHNIQUE

Stability Analysis in S-Domain

The concept of stability, Necessary condition for stability, Routh's stability criterion, Difficulties

in the formation of Routh table, Qualitative stability and Conditional 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 AND STABILITY ANALYSIS IN FREQUENCY DOMAIN

Frequency Response Analysis

Introduction to Frequency domain specifications: Resonant peak, Resonant frequency, Bandwidth, 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, Determination of Phase margin and Gain margin.

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, state space representation using physical variables: Electrical systems, state space representation using phase variables: state model from differential equations and Transfer functions, Diagonalization, solving the time invariant state equations, State transition matrix, Properties, Concepts of controllability and observability.

TEXT BOOKS:

1. Control Systems Engineering – I. J. Nagrath and M. Gopal, New Age International Pvt Ltd, Sixth Edition, 2017.
2. Automatic Control Systems – B.C. Kuo, John Wiley & Sons, Eighth Edition, 2003.

REFERENCE BOOKS:

1. Modern Control Engineering – Katsuhiko Ogata, Pearson, Fifth Edition, 2009.
2. Control Systems – N. K. Sinha, New Age International, Fourth Edition, 2013.
3. Control Systems – A. Anand Kumar, PHI Learning Pvt. Ltd, Second Edition, 2014.

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

COURSE OBJECTIVES:

1. Comprehensive knowledge of data structures and exposure to recursive algorithms, searching and sorting techniques
2. Apply stack and queue data structures for logical operations
3. Understand Linked-list representation models in various types of applications
4. Implementation of trees in various forms, orientation on graphs, representation of graphs, graph traversals

COURSE OUTCOMES:

After the completion of this course, the student should be able to

CO1: Analyze algorithms, searching and sorting techniques
CO2: Explain elementary data structures such as stacks, queues and linked lists
CO3: Implement trees and advanced concepts of trees in various forms
CO4: Design a variety of graph data structures and used in practical applications

SYLLABUS:

UNIT- I: INTRODUCTION TO DATA STRUCTURES AND ALGORITHMS

Basic Terminology, Elementary Data Structure Organization, Classification of Data structures, Operations on Data structures, Abstract Data Type. **Recursion**: Pseudo code, recursive examples, Factorial, GCD implementation, Fibonacci numbers.

UNIT- II: SEARCHING AND SORTING

Introduction to Searching, Linear Search, Binary Search, Introduction to Sorting, Internal Sorting, External Sorting, Insertion sort, Merge sort.

UNIT- III: STACKS AND QUEUES

Stacks

Introduction to Stacks, Array Representation of stacks, Operations on stack, Push operation, pop operation, peek operation, Linked representation of stacks, operations on a linked stack, Push operation, pop operation, Applications of stacks, Evaluation of a postfix expression, Conversion of infix expression into a prefix expression.

Queues

Introduction, Array Representation of Queues, Linked representation of Queues, Circular Queues, Applications of queues.

UNIT- IV: LINKED LISTS

Introduction, Basic terminologies, Linked lists versus Arrays, Memory allocation and De-allocation for a linked list, single linked list, Traversing a Linked List, Searching a value in a linked list, inserting a new node in a linked list, Deleting a node from a linked list, Circular linked list, inserting a new node in a Circular linked list, Deleting a node from a Circular linked list, Doubly linked list, inserting a new node in a Doubly linked list, Deleting a node from a Doubly

linked list.

UNIT- V: TREES

Introduction, Basic Terminology, Types of Trees, General Trees, Forests, Binary Trees,, Expression Trees, Traversing a Binary Tree, Pre-order Traversal, In-order Traversal, Post-order traversal, Level order traversal, (recursive & non-recursive)**,** Constructing a Binary Tree from Traversals**,** Binary Search Trees, operations on Binary Search Trees, Searching for a node in Binary Search Tree, inserting a new node in Binary Search Tree, Deleting a node from a Binary Search Tree.

UNIT- VI: GRAPHS

Introduction, Graph Terminology, Directed Graphs, Representations of Graphs, Graph Traversal algorithms, Breadth- First Search Algorithm, Depth-First-Search Algorithm.

TEXT BOOKS:

1. Data Structures using C - Reema Thareja, Oxford, Second Edition, 2014.
2. Data Structures - Richard F. Gilberg, Cengage. Second Edition, 2007.

REFERENCE BOOKS:

1. Data Structures and Algorithms - G. A. V. Pai, TMH, 2008.
2. Data Structure with C - Seymour Lipschutz, TMH, 2010.
3. Data structures and algorithm analysis in C - Mark Allen Weiss, Pearson, Second Edition, 2002.

ADDITIONAL RESOURCES:

1. nptel.ac.in/courses/106102064/1

nptel.ac.in/courses/106103069

II B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
ELECTRICAL AND MECHANICAL TECHNOLOGY							

COURSE OBJECTIVES:

1. To understand the principle of operation and construction details of DC machines and Transformers.
2. To understand the principle of operation and construction details of alternator and induction motor.
2. To understand the principles and construction of various measuring instruments.

COURSE OUTCOMES:

Upon completion of the course, students are able to

CO1: Understand the operation of DC machines and transformers.

CO2: Know about Principle of operation of three-phase induction motors and working principle of various measuring instruments.

CO3: Learn about different Modes of heat transfer

CO4: Analyse the Working principle of DC Generators and Motors

SYLLABUS:

UNIT- I: DC MACHINES AND TRANSFORMERS

DC Machines

Principle of operation of DC generator - emf equation - types of DC machine - torque equation of DC motor - applications - three point starter, speed control methods - OCC of DC generator - **(Simple Problems only)**

Transformers

Principle of operation of single phase transformers - e.m.f equation - losses - efficiency and regulation **(Simple Problems only)**

UNIT- II: AC ROTATING MACHINES

Principle of operation of 3-Phase induction motor - slip-torque characteristics - efficiency - applications.

Principle of operation of alternators - regulation by synchronous impedance method - **(Simple Problems only)**

UNIT– III: MEASURING INSTRUMENTS

Classification - Deflection, controlling, damping torque, ammeter, voltmeter, wattmeter, MI, MC instruments - Energy meter - Construction of CRO.

UNIT- IV: JOINING AND FORMING PROCESSES

Types of joining, arc welding, resistance welding, gas welding, brazing and soldering. Metal forming: forging, rolling and extrusion – operations, working and principle.

UNIT- V: HEAT TRANSFER

Modes of heat transfer - heat transfer parameters, various thermo physical properties. Conduction

- heat transfer for extended surfaces, Fins. Convection - Mechanism, Natural and Forced Convection. Radiation- Thermal radiation, Blackbody radiation, Radiation intensity, Radiative properties.

UNIT- VI: POWER TRANSMISSION

Different types - power transmission by belts, ropes and chain. Gears: classification of gears, applications.

TEXT BOOKS:

1. Electrical Technology - Surinder Pal Bali, Pearson Publications, 2013.
2. Electrical Circuit Theory and Technology - John Bird, Routledge Taylor & Francis Group, Fifth Edition, 2014.
3. Electrical Machines - P.S.bimbra, Khanna Publishers, Seventh Edition, 2004.
4. Electrical Machines - J. B. Guptha, S. K. Kataria and sons Publishers, First Edition, 2010.
5. Workshop Technology - Vol I and II –Hazra Chowdary, Media promoters and Publications Pvt. Ltd.
6. Elements of Mechanical Engineering - V. K. Manglik, PHI Publications, 2013.

REFERENCE BOOKS

1. Basic Electrical Engineering - M.S.Naidu and S.Kamakshiah, TMH Publications
2. Fundamentals of Electrical Engineering - Rajendra Prasad, PHI Publications, Second Edition
3. Basic Electrical Engineering - Nagsarkar and Sukhija, Oxford Publications, Second Edition
4. Electrical Engineering - Prasad and Sivanagaraju, Cengage Learning
5. Electrical machines - D. P. Kothari, I. J. Nagarth, McGraw-Hill Publications, Fourth Edition.
6. Basic electrical engineering - M. S. Naidu and S. kamaksiah, TMH Publications.
7. Elements of Mechanical Engineering - Mathur, and Mehta, Jain Brothers, 2013
8. Internal Combustion Engines - V. Ganesan, Tata McGraw-Hill publications.

II B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
BUSINESS MANAGEMENT CONCEPTS FOR ENGINEERS							

COURSE OBJECTIVE:

To equip the student with the fundamental knowledge relating to economic principles, management concepts and fundamentals of the accounting.

COURSE OUTCOMES:

Upon completion of the course, students are able to

CO1: Learns necessary skills relating to the economics, management and accountancy which are useful for decision making.

CO2: Equip themselves with the basic principles of accounting which will be of help to them to know the fundamentals of accounting.

CO3: Acquire necessary skills relating to various functional aspects of management viz., Human Resource Management, Marketing Management etc.

CO4: Acquaint with the latest management concepts and practices which are used in the industry.

SYLLABUS:

UNIT- I: INTRODUCTION TO MANAGERIAL ECONOMICS

Definitions, Nature And Scope- Relation With Other Subjects- Demand Definition- Determinants- Law of Demand and Its Exceptions- Concept of Elasticity of Demand- Demand Forecasting Techniques.

UNIT- II: THEORY OF PRODUCTION AND COST ANALYSIS

Production Function- Law of Variable Proportions- Economies of Scale- Cost Concepts- CVP Analysis (With Simple Problems) - Significance- Limitations- Introduction to Markets – Features of various markets- Perfect competition, Monopoly and Oligopoly.

UNIT- III: INTRODUCTION TO FINANCIAL ACCOUNTING

Definition- GAAP principles- types of accounting- Double Entry System- Journal Entries - Ledger- Trial Balance- Income statement-Balance sheet-Final Accounts with Simple Adjustments.

UNIT- IV: INTRODUCTION TO MANAGEMENT

Concept, Nature, Importance- Functions of Management- Henry Fayols Principles of Management- F. W. Taylors Scientific Management- Douglas Mc Gregors Theory X and Y- Challenges of Management.

UNIT- V: FUNCTIONAL AREAS OF MANAGEMENT (1)

Concept of HRM, Functions of HR Manager- Marketing Management- Functions of Marketing Manager- Production Management-Functions of Production Management – Methods of Production- Job Production, Batch Production and Mass Production – Method Study- Inventory Management- ABC Analysis – EOQ Analysis.

UNIT- VI: FUNCTIONAL AREAS OF MANAGEMENT (2)

Project Management: (PERT/CPM): Development of Network – Difference between PERT and CPM- Problems on Critical Path- Problems on PERT Analysis- Financial Management- Concepts of Capital –Working Capital- Capital Budgeting- Functions of Financial Management.

TEXT BOOKS:

1. Managerial economics and financial analysis - Dr. N. APPARAO, Dr. P. Vijay Kumar, Cengage publication's, New Delhi, 2011.
2. Managerial Economics and Financial Analysis - Dr. A. R. Aryasri, TMH, 2011.
3. Managerial Science - Dr. P. Vijaya Kumar, Dr. N. Appa Rao, Cengage. Delhi, 2012.

REFERENCE BOOKS:

1. Managerial Economies – Varshney, Maheswari, Sultan Chand and Sons, New Delhi.
2. Managerial Economics - Suma Damodaran, Oxford, 2011.
3. Essentials of Management – Koontz, Weihrich, TMH, 2011.
4. Strategic Management – Hitt, Vijaya Kumar, Cengage learning, New Delhi, 2010.

II B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	2
ELECTRONIC DEVICES AND CIRCUITS LAB							

COURSE OBJECTIVE:

This lab course is intended to know the usage of various electronic equipment and to study the characteristics of different electronic devices.

COURSE OUTCOMES:

After the completion of this course, the student should be able to

CO1 : Understand and analyze the behavior of PN junction diode, Zener diode, LED and their applications.

CO2 : Understand the characteristics of BJT in CE, CB, CC configurations and FET in CS configuration and their applications.

CO3 : Understand the characteristics and applications of SCR and UJT.

LIST OF EXPERIMENTS:

1. P-N Junction Diode Characteristics.
   Part A: Germanium Diode (Forward bias & Reverse bias).
   Part B: Silicon Diode (Forward bias & Reverse bias).
2. Zener Diode Characteristics.
   Part A: V-I Characteristics.
   Part B: As a Voltage Regulator.
3. V-I Characteristics of LED
4. Half-wave Rectifier (without and with filter).
5. Full-wave Rectifier (without and with filter).
6. Switching characteristics of BJT
7. BJT Characteristics (CE Configuration).
   Part A: Input Characteristics.
   Part B: Output Characteristics.
8. BJT Characteristics (CB Configuration).
   Part A: Input Characteristics.
   Part B: Output Characteristics.
9. BJT Characteristics (CC Configuration).
   Part A: Input Characteristics.
   Part B: Output Characteristics.
10. FET Characteristics (CS Configuration).
    Part A: Drain Characteristics.
    Part B: Transfer Characteristics.
11. SCR Characteristics.
12. UJT Characteristics.

Equipment required for Laboratory

1. Breadboard Trainers.
2. Ammeters (Analog or Digital).
3. Voltmeters (Analog or Digital).
4. Regulated Power Supplies.
5. Analog/Digital Storage Oscilloscopes.

6. Analog/Digital Function Generators.
7. Digital Multimeters.
8. Decade Résistance Boxes/Rheostats.
9. Decade Capacitance Boxes.
10. Cathode Ray Oscilloscopes.

II B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	2
NETWORKS & ELECTRICAL TECHNOLOGY LAB							

COURSE OBJECTIVES:

1. To learn the steps used for verification of circuit theorems, the concepts of resonance in series and parallel circuits and calculate network parameters.
2. To determine the losses and efficiencies of a DC Machine, Transformer and Induction Machine.
3. To draw the performance curves and speed control of DC machines.

COURSE OUTCOMES:

Upon completion of the course, students are able to

CO1: Calculate the efficiency of Machines and Transformers and draw the performance curves of each.

CO2: Draw the no-load curve of a DC generator and calculate critical speed and critical resistance.

CO3: Verify and understand the basic circuit principles and theorems

Any five experiments are to be conducted from each part

PART – A

1. Series and Parallel Resonance – Timing, Resonant frequency, Bandwidth and Q -factor determination for RLC network.
2. Time response of first order RC/RL network for periodic non-sinusoidal inputs – time constant and steady state error determination.
3. Two port network parameters – Z - Y Parameters, chain matrix and analytical verification.
4. Verification of Superposition and Reciprocity theorems.
5. Verification of maximum power transfer theorem with both DC and AC supply with Resistive and Reactive loads.
6. Experimental determination of Thevenin's and Norton's equivalent circuits and verification by direct test.

PART – B

1. Magnetization characteristics of D.C Shunt generator. Determination of critical field resistance.
2. Load Test on DC Series Generator.
3. Swinburne's Test on DC shunt machine (Predeterming efficiency of a given DC Shunt machine working as motor and generator).
4. Brake test on DC shunt motor. Determination of performance characteristics.
5. OC & SC tests on Single - phase transformer (Predetermination of efficiency and regulation at given power factors and determination of equivalent circuit).
6. Brake test on 3-phase Induction motor (performance characteristics).

II B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	0	0	0	0
QUANTITATIVE ABILITY							

COURSE OBJECTIVES:

1. To train students in analyzing 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 is able to:

CO1 : Prepare well for clearing Quantitative Aptitude and Reasoning tests for campus placements

CO2 : Critically evaluate various real life situations by resorting to Analysis of key issues and factors.

CO3 : Demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.

CO4 : Solve complex mathematical problems in the shortest time possible by applying shortcuts.

SYLLABUS FOR QUANTITATIVE APTITUDE:

UNIT– I: SIMPLE EQUATIONS, RATIO, PROPORTION AND VARIATION

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 AND PROGRESSIONS

1. **Percentages**
   a. Introduction
   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 Selling Price
   e. Two different articles sold at same Cost Price
   f. Gain% / Loss% on Selling Price

3. **Partnership**
   a) Introduction
   b) Relation between capitals, Period of investments and Shares
4. **Simple Interest**
   a) Definitions
   b) Problems on interest and amount
   c) Problems when rate of interest and time period are numerically equal
5. **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
6. **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
7. **Progressions**
   a) Arithmetic Progression
   b) Geometric Progression
   c) Harmonic Progression
   d) Arithmetic Mean, Geometric Mean, Harmonic Mean and their relation.

SYLLABUS FOR REASONING:

UNIT- III: DEDUCTIONS & CONNECTIVES

1. **Deductions**
   a) Finding the conclusions using Venn diagram method
   b) Finding the conclusions using syllogism method
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

1. **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

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

REFERENCES 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

www.practice**aptitude**tests.com/numerical-**reasoning**-tests

II B.TECH II SEMESTER

II B.TECH. – II SEMESTER COURSE STRUCTURE:

S.No.	SUBJECT	Cat. Code	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
1	Switching Theory and Logic Design	PC	3	1	-	40	60	100	3
2	Electronic Circuit Analysis	PC	3	1	-	40	60	100	3
3	Pulse and Digital Circuits	PC	3	1	-	40	60	100	3
4	Analog Communications	PC	3	1	-	40	60	100	3
5	Electromagnetic Waves and Transmission Lines	PC	3	1	-	40	60	100	3
6	Database Management Systems	ES	4	-	-	40	60	100	3
7	Electronic Circuits & Pulse and Digital Circuits Lab	PC	-	-	3	25	50	75	2
8	Analog Communications Lab	PC	-	-	3	25	50	75	2
9	Verbal Ability (Mandatory Non-credit Course)	MC	3	-	-	-	-	-	-
10	Sports & Games / NSS	MC	-	-	-	-	-	-	-
Total			**22**	**5**	**6**	**290**	**460**	**750**	**22**

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

SWITCHING THEORY AND LOGIC DESIGN

COURSE OBJECTIVES:

1. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
2. To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
3. To implement simple logical operations & to familiarize with the concepts of Boolean algebra.
4. To design combinational logic circuits, sequential logic circuits.
5. To implement synchronous and asynchronous state machines using flip-flops.

COURSE OUTCOMES:

Upon Successful completion of the course, the students are able to

CO1 : Manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.

CO2 : Deploy simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.

CO3 : Design and analyze combinational circuits and sequential circuits

CO4 : Apply different models of Finite State Machines for design of sequential circuits.

SYLLABUS:

UNIT- I: NUMBER SYSTEMS & CODES

Number systems: Representation of numbers of different radix, Conversation from one radix to another radix, R-1's compliments and r's compliments of signed numbers, Problem solving.
Arithmetic operations (addition & subtraction): Binary, Octal, Decimal & Hexadecimal. Binary Codes: Classifications, BCD, Execess-3, Gray and their Properties, Error detecting and correcting codes: Parity checking, Even parity, Odd parity, Hamming code (7, 12 & 15 bit).

UNIT- II: LOGIC OPERATIONS AND MINIMIZATION TECHNIQUES

Logic Operations

Basic logic operations- AND, OR, NOT, Universal building blocks, EX-OR, EX- NOR gates, Boolean theorems, Principle of complementation & Duality, De-Morgan theorems, Standard SOP & POS forms and their conversions, Two level NAND – NAND and NOR- NOR realizations.

Minimization Techniques

Minimization of logic functions using Boolean theorems, minimization of switching functions using K-Map up to 6 variables, Tabular (Quine-McCluskey) minimization, Problem solving.

UNIT- III: COMBINATIONAL LOGIC CIRCUITS DESIGN

Introduction, Design procedure, Adders & Subtractors: Design of Half adder, Full adder, Half subtractor, Full subtractor, Applications: 4-bit binary parallel adder, Binary parallel subtractor, Adder-Subtractor circuits & Look ahead carry adder. BCD adder circuit, Excess 3 adder circuit. Encoders & Decoder: Design of decoder, Encoder, 4- priority encoder, Realization of Boolean functions using decoders. Multiplexers & Demultiplexers: Design, Higher order,

Realization of Boolean functions using multiplexers & demultiplexers. Comparators: Design of 2, 3 & 4-bit digital comparator.

UNIT- IV: INTRODUCTION TO PLDs

Introduction to PLDs, Realization of switching functions using PROM, PLA and PAL, Basics structures, Programming tables of PLDs, Merits & demerits of PROM, PAL and PLA comparison, Implementation of code converters.

UNIT- V: SEQUENTIAL CIRCUITS – I

Basic Architectural Distinctions between Combinational and Sequential circuits, Fundamentals of Sequential Machine Operation.

Latches and Flip Flops

SR, JK, D and T type Flip Flops, Race Around Condition in JK, JK Master Slave flip flop, Excitation table of all Flip Flops. Conversion from one flip-flop to another flip-flop.

Registers and Counters

Shift Registers, Data Transmission in Shift Registers, Operation of Shift Registers, Bidirectional Shift Registers, Universal Shift Register. Applications of Shift Registers, Design of synchronous and Asynchronous Counters, Design and Operation of Ring and Twisted Ring Counter.

UNIT- VI: SEQUENTIAL CIRCUITS – II

Finite State Machine: Analysis of clocked sequential circuits, State diagrams, State tables, Reduction of state tables using Partition technique and State assignment, Design procedures. Realization of circuits using various flip-flops. Mealy to Moore conversion and vice-versa.

TEXT BOOKS:

1. Digital Design – M. Morris Mano, PHI, Fourth Edition, 2008.
2. Switching and Finite Automata Theory – Zvi Kohavi, Cambridge University Press, Third Edition, 2009.
3. Switching Theory and Logic Design – A. Anand Kumar, Prentice-Hall of India Pvt.Ltd, Second Edition, 2014.

REFERENCE BOOKS:

1. Modern Digital Electronics – R. P. Jain, TMH, Fourth Edition, 2010.
2. Fundamentals of Logic Design – Charles H. Roth, Jr, Jaico Publishing House, Fourth Edition, 2006.
3. Microelectronics – Jacob Millman, Arvin Grabel, TMH, Second Edition, 2009.
4. Introduction to Switching Theory & Logical Design – Frederick J. Hill & Gerald R. Peterson, John Wiley & Sons Inc, Second Edition, 1974.

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
ELECTRONIC CIRCUIT ANALYSIS							

COURSE OBJECTIVES:

1. Analysis of single stage and multistage amplifiers
2. Frequency response of single stage and multistage amplifiers.
3. Different power amplifiers and tuned amplifiers.
4. Concept of negative feedback in amplifiers.
5. Operation, types and stability of Oscillators

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO1 : Understand the transistor configuration at different frequency responses.
CO2 : Design different single stage and multistage amplifiers.
CO3 : Know the importance of negative feedback in amplifiers
CO4 : Understand the applications of oscillators, power and tuned amplifiers.

SYLLABUS:

UNIT- I: THE TRANSISTOR AT LOW FREQUENCIES

Graphical Analysis of the CE configuration, Two port devices and the Hybrid Model, Transistor Hybrid Model, Determination of h-parameters from characteristics, Conversion of h-parameters, Analysis of a transistor amplifier circuit using h-parameters, The emitter follower, Comparison of Transistor amplifier configurations. Simplified common emitter hybrid model-Current gain, Input impedance, Voltage gain and output impedance.

FET: FET small signal model, Low frequency common source and common drain amplifiers, FET as Voltage Variable Resistor, Biasing the FET.

UNIT- II: THE TRANSISTOR AT HIGH FREQUENCIES

BJT: Transistor at high frequencies, Hybrid- π common emitter transistor model-elements in the hybrid- π, Hybrid π parameter values, Hybrid π conductance- transistor trans conductance, Input conductance, Feedback conductance, Base spreading resistance, Output resistance, Hybrid π capacitances, Validity of hybrid π model, High frequency analysis of CE amplifier-CE short circuit current gain, Current gain with resistive load, Single stage CE transistor amplifier response, Cut-off frequencies and Gain bandwidth product.

FET: Analysis of common source and common drain Amplifier circuits at high frequencies.

UNIT- III: MULTISTAGE AMPLIFIERS

Introduction, Classification of Amplifiers, Distortion in amplifiers, RC coupled amplifier, Low frequency response of an RC coupled stage, High frequency response of two cascaded CE transistor stage, High input resistance transistor circuits- Darlington pair, Biasing problem, Bootstrapped Darlington circuit.

UNIT– IV: FEEDBACK AMPLIFIERS

Feedback principle and concept, Types of feedback, Classification of amplifiers- Voltage amplifier, Current amplifier, Transconductance amplifier, Transresistance amplifier, Feedback topologies, Characteristics of negative feedback amplifiers, General analysis of feedback amplifiers-input resistance and output resistance, Performance comparison of feedback amplifiers, Method of analysis of feedback amplifiers, Analysis feedback amplifier- Voltage series feedback, Current shunt feedback.

UNIT- V: OSCILLATORS

Introduction, Oscillator principle and condition for oscillation, Types of oscillators, RC phase shift oscillator using BJT, RC phase shift oscillator using BJT with cascade connection of high pass and low pass filters. Wien bridge oscillator using BJT, Generalized analysis of LC oscillators-load impedance, Voltage gain without feedback, feedback fraction, equation of the oscillator, Hartley oscillator with BJT and their analysis, Colpitts Oscillator with BJT and their analysis and Crystal oscillators-quartz crystal construction.

UNIT- VI: POWER AMPLIFIERS

Introduction, Definition and Amplifier types - Class A, Class B, Class AB, Class C and Class D amplifiers, Amplifier efficiency, Series fed class A amplifier-D.C. bias operation, AC operation, Efficiency, Maximum efficiency, Transformer coupled Class A amplifier-transformer action, Operation of amplifier stage efficiency, Class B amplifier operation- Input power, Output power, Efficiency, Class B amplifier circuits – Transformer coupled push pull circuits, Complementary symmetry circuits, Power transistor heat sinking, Class C and Class D amplifiers.

TEXT BOOKS:

1. Integrated Electronics Analog and Digital Circuits and Systems – Jacob Millman, Christos C Halkias, Tata McGraw-Hill, Fifty Edition, 1991.
2. Electronic Devices and Circuit Theory – R.L. Boylestad and Louis Nashelsky, Pearson Publications, Eleventh Edition, 2013.

REFERENCE BOOKS:

1. Electronic Devices and Circuits – Salivahanan, N. Suresh Kumar, A. Vallavaraj, Tata McGraw-Hill, Second Edition, 2008.
2. Introductory Electronic Devices and Circuits – Robert T. Paynter, Pearson Education, Seventh Edition, 2006.
3. Micro Electronic Circuits – Sedra A.S. and K.C. Smith, Oxford University Press, Fifth Edition, 2004.
4. Electronic Circuit Analysis and Design – Donald A. Neaman, Tata McGraw-Hill, Second Edition, 2001.

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
PULSE AND DIGITAL CIRCUITS							

COURSE OBJECTIVES:

1. Study the concepts of wave shaping circuits, switching characteristics of diode and transistor.
2. Analyze different types of Multi vibrators and their design procedures.
3. Study the Time-base Generators.
4. Study Sampling Gates and design NAND and NOR gates using various logic families.

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO1 : Understand different linear and non-linear wave shaping circuits.
CO2 : Understand different diode and transistor switching times.
CO3 : Design different multi-vibrators.
CO4 : Analyze time base generators and sampling gates.

SYLLABUS:

UNIT- I: LINEAR WAVE SHAPING

The high pass and low pass RC circuits: Sinusoidal input, Step input, Pulse input, Square and Ramp input, RC network as a differentiator and an integrator, RL and RLC circuits and their response for step input.

UNIT- II: NON-LINEAR WAVE SHAPING

Diode and its characteristics, Diode series clippers, Diode parallel clippers, Transistor clippers, Two level clipping circuits and 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.

UNIT- III: SWITCHING CHARACTERISTICS OF DEVICES

Diode as a switch, Diode switching times, Piecewise linear diode characteristics, Transistor as a switch, Transistor switching times (delay time, rise time, storage time and fall time), Break down voltage consideration of transistor, Design of transistor switch, Characteristics of logic family, Realization of Logic Gates using DTL, TTL, ECL and CMOS logic circuits, Comparison of logic families.

UNIT- IV: MULTIVIBRATORS-I

Introduction to multivibrator, Types of multivibrator, Analysis and design of fixed bias, self-bias bistable multivibrator, Calculation of heaviest load current, Collector catching Diodes, Commutating Capacitors, Methods of Triggering using RC network & Diode.

UNIT- V: MULTIVIBRATORS-II

Analysis and design of collector coupled monostable multivibrator, Triggering methods of a monostable multivibrator, Application of monostable multivibrator as a voltage to time converter, Analysis and design of collector coupled astable multivibrator, Expression for time period T,

Astable Multivibrator as a voltage to frequency converter, Schmitt trigger: operation of the circuit, Hysteresis, calculation of UTP and LTP and applications.

UNIT- VI: TIME BASE GENERATORS AND SAMPLING GATES

Time Base Generators

General features of a time-base signal, Errors and expressions for sweep speed error, displacement error and transmission error, Relation between e_s, e_d and e_t, Methods of generating time base waveform, Miller and Bootstrap time base generators and basic principles, Transistor Miller time base generator, Transistor Bootstrap time base generator, Current Time-base generators.

Sampling Gates

Basic operating principles of sampling gates, Unidirectional sampling gates, Bidirectional sampling gates, Two diode sampling gates, four diode sampling gate, Sampling oscilloscope, Reduction of pedestal in gate circuits, Applications of sampling gates.

TEXT BOOKS:

1. Pulse, Digital and Switching Waveforms – J. Millman, H. Taub and Mothiki S. Prakash Rao, Tata McGraw-Hill, Second Edition, 2008.
2. Solid State Pulse circuits – David A. Bell, PHI, Fourth Edition, 2002.

REFERENCE BOOKS:

1. Pulse and Digital Circuits – A. Anand Kumar, PHI, Second Edition, 2005.
2. Wave Generation and Shaping – L. Strauss, Tata McGraw-Hill, Second Edition, 1970.
3. Pulse and Digital Circuits – Mothiki S. Prakash Rao, Tata McGraw-Hill, 2006.
4. Pulse and Digital Circuits – Venkata Rao K, Rama Sudha K, Manmadha Rao G, Pearson Education India, 2010.

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
ANALOG COMMUNICATIONS							

COURSE OBJECTIVES:

1. Understand Modulation & demodulation techniques of AM, DSB, SSB,VSB and know Frequency Division Multiplexing
2. Understand Modulation & demodulation techniques and Know Properties of FM
3. Know Noise Figure in AM & FM receiver systems
4. Understand Function of various stages of AM, FM transmitters and Characteristics of AM & FM receivers.
5. Understand Modulation & demodulation techniques of PAM & PTM.

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO1: Analyze the percentage of modulation in FM systems and spectrum of FM signal.
CO2: Describe signal power by using power spectral characteristics in AM and FM systems.
CO3: Analyze noise characteristics in the channel communications.
CO4: Design AM and FM transmitters and receivers.

SYLLABUS:

UNIT- I: AMPLITUDE MODULATION

Introduction to communication system-Block Diagram Of Communication Systems, Need for modulation, Types of Modulation-Continuous Wave Modulation, Pulse Modulation, Amplitude Modulation, Time and frequency domains description, Single tone modulation-Modulation Index, Degree Of Modulation, Power relations in AM waves-Efficiency of modulation, AM current calculation, Generation of AM waves-Square law Modulator, Switching modulator,
Detection of AM waves-Square law detector and Envelope detector.

UNIT- II: DSB & SSB MODULATION

DSBSC Time and Frequency domain description-Bandwidth of DSB-SC wave, Power calculation in DSB-SC Wave, Generation of DSBSC Waves-Balanced Modulator, Ring modulator, Coherent detection of DSB-SC Modulated Wave-Effect of Phase Error, Effect of Frequency Error and COSTAS Loop.

SSBSC Time and Frequency domain description-Power Relations in SSB-Wave, Generation methods of AM SSB Waves -Frequency discrimination, Phase discrimination, Weavers method,
Demodulation of SSB Waves-Coherent Detection, Envelop Detector, VSB modulation: Time and Frequency domain description, Generation of VSB Modulated wave, Comparison of AM Techniques, Applications of different AM Systems

UNIT- III: ANGLE MODULATION

Basic concepts-Time domain description of FM, Time domain description of PM, Frequency Modulation, Single tone frequency modulation-Frequency Deviation, Modulation index, Percent Modulation, Spectrum Analysis of Sinusoidal FM Wave-Constant BW FM, Narrow band FM-Generation of NBFM Wave, Frequency spectrum of NBFM, Phasor diagram of NBFM, Wide

band FM-Important properties of Bessel Function, Frequency spectrum of WBFM, Constant Average Power, Transmission bandwidth of FM Wave, Generation of FM Waves -Armstrong method, Direct FM, Varactor Diode Modulator, Reactance Tube Modulator, Detection of FM Waves-Slope detector, Foster-seely discriminator, Ratio detector, Balanced Frequency discriminator, Zero crossing detector, Phase Locked Loop and Comparison of FM &AM

UNIT- IV: NOISE

Introduction to Noise, Types of Noises –Man made noise, Thermal Noise, White Gaussian Noise, Noise in Analog communication System-Calculate Figure of merit, SNR, 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: RADIO TRANSMITTERS & RECEIVERS

Radio Transmitters-Function of a Transmitter, Basic Components of a Radio Transmitter, Classification of Transmitter- MW, SW, UHF and VHF, Micro Wave Transmitter, AM, FM, PM, TV, Radiobroadcasting Transmitters, AM Transmitter-Low-Level Transmitter, High Level Transmitter, Effect of feedback on performance of AM Transmitter, FM Transmitter – Variable reactance type, Phase modulated FM Transmitter, Frequency stability in FM Transmitter

Radio Receivers - Receiver Types- AM, FM, Communication, Television, Radar Receivers, And Radio Receivers, Tuned radio frequency receiver-Block Diagram of TRF Receiver, Draw backs of TRF Receiver, Super heterodyne receiver-Block Diagram of Super heterodyne Receiver, And Advantages, RF section and Characteristics- Tuned Circuit, RF Amplifier, Sensitivity, Selectivity, Fidelity, Noise Figure, Image Frequency and its Rejection, Frequency changing and tracking-Conversion Trans Conductance, Separately Excited Mixer, Self-Excited Mixer, Padder Tracking, Trimmer Tracking, Three Point Tracking, Intermediate frequency - Choice of Intermediate Frequency, IF Amplifier AGC-Simple AGC, Delayed AGC, FM Receiver-RF Amplifier Section, Oscillator and Mixer, IF Amplifier and Amplitude limiting.

UNIT– VI: PULSE MODULATION

Types of Pulse modulation- PAM, PPM, PWM, Difference between Pulse Analog and Digital Modulation Techniques, PAM (Single polarity, Double polarity): Generation and demodulation-Naturally Sampled PAM Signal, Ideally Sampled PAM Signal, Flat –Top Sampled PAM Signal, Generation and Demodulation of PAM Wave, Advantages and Disadvantages of PAM Wave.

PTM- PWM and PPM, PWM: Generation & demodulation-Frequency spectrum for PWM Wave, Advantages and Disadvantages of PWM Wave, PPM: Generation and demodulation-Advantages and Disadvantages of PPM Wave

Multiplexing: Frequency Division Multiplexing-Define Multiplexing, Block Diagram of FDM, Advantages and Disadvantages of FDM, Time Division Multiplexing-Block Diagram of TDM, Advantages and Disadvantages of TDM, Comparison between TDM and FDM.

TEXT BOOKS:

1. Principles of Communication Systems – H Taub, D. Schilling and Gautam Saha, TMH, Third Edition, 2008.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH, Fifth Edition, 2011.
3. Communication Systems – B.P. Lathi, BS Publication, 2008.

REFERENCE BOOKS:

1. Communication Systems – Simon Haykin, John Wiley, Fifth Edition, 2017.

2. Communication Systems – R.P. Singh, S.D. Sapre, TMH, Second Edition, 2007.
3. Fundamentals of Communication Systems - John G. Proakis, Masoud, Salehi, Pearson, Second Edition, 2014.

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
EM WAVES AND TRANSMISSION LINES							

COURSE OBJECTIVES:

1. To introduce the concepts of Electrostatics and Magneto statics.
2. To understand Electromagnetic Waves and their Propagation.
3. To understand the Maxwell's Equations and boundary conditions.
4. To familiarize with the transmission line concepts.

COURSE OUTCOMES:

After completion of this course, the students will be able to

CO1: Apply the concepts of Electric and Magnetic Fields in different applications.

CO2: Apply Maxwell's equations in electromagnetics.

CO3: Understand wave propagation and derive the Wave Equations in Perfect Dielectric and Conducting Media.

CO4: Understand wave characteristics - reflection and refraction of Electromagnetic Waves in different media and analyze different transmission lines and applications.

SYLLABUS:

UNIT- I: ELECTROSTATICS

Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss Law and Applications, Electric Field Intensity due to point charge, Infinite line charge, Infinite sheet of charge, Uniformly charged sphere, Electric Potential - Electric Potential due to point charge and infinite line charge, Energy Density, Poisson's and Laplace's Equations.

UNIT- II: MAGNETOSTATICS

Biot-Savart Law, Ampere's Law and Applications, Magnetic Flux Density, Magnetic Vector Potential.

UNIT- III: MAXWELL'S EQUATIONS

Faraday's Law and Transformer emf, Inconsistency of Ampere's Law and Displacement Current Density, Continuity Equation, Maxwell's Equations in Differential and Integral Forms and Word Statements for static fields and time varying fields of electric and magnetic.

UNIT- IV: EM WAVES

Types of Media, Wave Propagation in Perfect Dielectrics, Lossy (General Case - conducting) media. Uniform Plane Waves – Definition, Uniform Plane Wave Propagation in Free Space and Conducting media, Conductors & Dielectrics – Characterization. Poynting Vector and Poynting Theorem – Applications.

UNIT- V: EM WAVE CHARACTERISTICS

Electric and Magnetic Boundary Conditions, Polarization, Reflection and Refraction of Plane Waves – Normal and Oblique Incidence on Perfect Dielectric and conductor, Brewster Angle, Critical Angle and Total Internal Reflection Surface Impedance.

UNIT- VI: TRANSMISSION LINES

Types, Parameters, Transmission Line Equations, Primary and Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless/Low Loss Characterization, Distortion – Condition for Distortionless and Minimum Attenuation, Loading - Types of Loading, Input Impedance Relations, SC and OC Lines, Reflection Coefficient, VSWR,. UHF Lines as Circuit Elements; λ/4, λ/2 and λ/8 Lines.

TEXT BOOKS:

1. Electromagnetic Waves and Radiating Systems – E.C. Jordan and K.G. Balmain, PHI, Second Edition, 2000.
2. Elements of Electromagnetics – Matthew N.O. Sadiku, Oxford Univ. Press, Third Edition, 2001.
3. Electromagnetic Waves and Transmission Lines – G. S. N. Raju, Pearson Education India, 2006.

REFERENCE BOOKS:

1. Electromagnetic Field Theory and Transmission Lines – G. Sasi Bhushana Rao, Wiley India Pvt Ltd, 2012.
2. Electromagnetics – J. D. Kraus, Keith R. Carver, TMH, Third Edition, 1984.
3. Schaum's Outline of Electromagnetics – J.A. Edminister, Mahmood Nahvi, TMH, Fourth Edition, 2014.
4. Transmission Lines and Networks – Umesh Sinha, Satya Prakashan (Tech. India Publications), New Delhi, 2010.

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
DATABASE MANAGEMENT SYSTEMS							

COURSE OBJECTIVE:

This course Provides students with theoretical knowledge and practical skills in the design, use of databases and database management systems in information technology applications.

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO1 : Acquire knowledge in fundamentals of DBMS and identify the differences between traditional file system and DB systems.

CO2 : Understand various DBMS models and how queries are being processed and executed in RDBMS.

CO3 : Analyse DB design methodology and normalization process.

CO4 : Discuss the various transaction and concurrency management techniques and various files indexing techniques.

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, and Database applications, Brief introduction of different Data Models - Hierarchical, Network and Relational; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, Centralized and Client Server architecture for the database.

UNIT- II: ENTITY RELATIONSHIP MODEL

Introduction, Representation of entities, attributes, entity set, relationship, relationship set, Key constraints - Key constraints for Ternary Relationships, participation constraints, class hierarchies, Aggregation; sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

UNIT- III: SQL

Form of a basic SQL Query, Examples of Basic SQL Queries, Expressions and Strings in the SELECT Command, Simple Database schema, data types, table definitions, different DML operations, basic SQL querying using where clause, arithmetic and logical operations, SQL functions - Date and Time, Numeric, String conversion; Creating tables with relationship, implementation of key and integrity constraints, nested queries, correlated Nested Queries, set-Comparison Operators, sub queries, grouping, aggregate operators, 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.

UNIT- IV: RELATIONAL MODEL

Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values - Comparisons Using Null Values, Logical Connectives AND, OR, and NOT, Impact on

SQL Constructs, Disallowing Null Values; Integrity constraints in SQL - Domain constraints, Entity constraints, Referential integrity constraints, Assertions.

UNIT- V: SCHEMA REFINEMENT (NORMALIZATION)

Problems Caused by Redundancy (Null Values), Decompositions, Problems Related to Decomposition, Functional dependency, Properties of Functional dependency, Normal forms based on functional dependency - 1NF, 2NF and 3NF.

Transaction Management: Transaction - Single-User versus Multiuser Systems; Transactions, Database Items, Read and Write Operations, and DBMS Buffers.

UNIT- VI: CONCURRENCY CONTROL

Why Concurrency Control Is Needed, Why Recovery Is Needed, Transaction States and Additional Operations, The System Log, Commit Point of a Transaction, properties of transactions, Characterizing Schedules Based on Serializability - Serial, Non serial, Two-Phase Locking Techniques for Concurrency Control - Types of Locks and System Lock Tables, Guaranteeing Serializability by Two-Phase Locking, Dealing with Deadlock and Starvation.

Introduction to Indexing:

Types of Single- Level Ordered Indexes - Primary Indexes, Clustering Indexes, Secondary Indexes.

TEXT BOOKS:

1. Database Management Systems - Raghuram Krishnan, Johannes Gehrke, TMH, Third Edition, 2003.
2. Fundamentals of Database Systems - Ramez Elmasri, Shamkant B. Navathe, PEA, Sixth Edition, 2010.

REFERENCE BOOKS:

1. Database System Concepts - Silberschatz, Korth, TMH, Fifth Edition, 2006.
2. Introduction to Database Systems - C J Date, PEA, Eighth Edition, 2006.

ADDITIONAL RESOURCES:

1. nptel.ac.in/courses/106106093
2. nptel.ac.in/courses/106104135

II B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	2
ELECTRONIC CIRCUITS & PULSE AND DIGITAL CIRCUITS LAB							

COURSE OBJECTIVES:

1. Frequency response of single stage and multi stage amplifiers.
2. Working of Power amplifier.
3. How frequency response varies by applying negative feedback on amplifiers.
4. Different frequency sinusoidal signal generation.

COURSE OUTCOMES:

After Completion of this course, student must be able to

CO1: Understand the effect of capacitors on frequency response of amplifier.

CO2: Determine the efficiency of power amplifiers.

CO3: Generate Sinusoidal signals with different frequencies and know the difference between different Multivibrators.

LIST OF EXPERIMENTS:

I) DESIGN AND SIMULATION IN SIMULATION LABORATORY USING MULTISIM OR PSPICE OR EQUIVALENT SIMULATION SOFTWARE & VERYFING THE RESULT BY HARDWARE (Any Six):

1. Two Stage RC Coupled Amplifier
2. Voltage series feedback amplifier - Freq. response, Impedances measurement(with and without feedback)
3. Current series feedback amplifier - Freq. response, Impedances measurement(with and without feedback)
4. Wien Bridge oscillator using Transistors –Design for different frequencies
5. RC Phase Shift Oscillator using Transistors- Design for different frequencies
6. Class A Power Amplifier (with and without Transformer load)
7. Class B Power Amplifier
8. Boot strapped emitter follower

II) PULSE AND DIGITAL CIRCUITS (Any six)-By Designing the circuit

1. Linear wave shaping (Diff. Time Constants, Differentiator, Integrator)
2. Non –linear wave shaping-clippers., Clampers
3. Bistable Multivibrator
4. Astable Multivibrator (voltage-frequency convertor)
5. Monostable Multivibrator
6. Schmitt Trigger
7. Study and implementation of logic gates
8. Study and implement applications of Flip flops- Counters and Registers

Equipment required for Laboratory

Software:

i. Analog and Digital design/ Simulation software
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

II B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	2

ANALOG COMMUNICATIONS LAB

COURSE OBJECTIVES:

1. Analog Communication system modulation and demodulation techniques.
2. Analysis of Signal Spectrum characteristics.
3. Pulse Modulation techniques.

COURSE OUTCOMES:

After Completion of this course, the students must be able to

CO1: Design and measure performance of AM and FM communication systems.
CO2: Identify and measure factors which hamper communication systems.
CO3: Routinely use communications test equipment.

LIST OF EXPERIMENTS:

Twelve experiments to be done: (a. Hardware, b. MATLAB Simulink)

1. Amplitude Modulation and Demodulation
2. AM - DSBSC Modulation and Demodulation
3. Spectrum Analysis of Modulated signal using Spectrum Analyzer.
4. Diode Detector Characteristics
5. Pre-emphasis and De-emphasis
6. Frequency Modulation and Demodulation
7. AGC Circuit
8. Sampling Theorem
9. Pulse Amplitude Modulation and Demodulation
10. Pulse Width Modulation and Demodulation
11. Pulse Position Modulation and Demodulation
12. Phase Locked Loop

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 Analog Communication
7. Components
8. Spectrum Analyzer -60 M Hz.

Software Required:

1. Computer systems with latest specifications
2. Connected in LAN (optional)
3. Operating system (windows XP)
4. Simulations software (MATLAB-Simulink)

II B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	0	0	0	0
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

CO1 : Use appropriate words effectively in their communication
CO2 : Identify and correct Grammar and vocabulary related errors
CO3 : Construct the sentences effectively using appropriate verbal reasoning abilities
CO4 : Demonstrate understanding and comprehensive skills.

SYLLABUS:

TEACHING METHODOLOGY:

The methodology of teaching will be chalk & talk, Ppt., Audio-Visual and activity based.

No. of Periods per Unit	8	No. of tutorial periods	1

UNIT- I: VOCABULARY BUILDING

(Direct links to content used from the web page:

a. http://grammar.ccc.commnet.edu/grammar/vocabulary.htm
b. http://www.enhancemyvocabulary.com/
c. http://celi.olemiss.edu/wp-content/uploads/sites/7/2014/01/StrategiesVocabulary-080808.pdf**)**

UNIT- II: SENTENCE CONSTRUCTION

(Direct links to content used from the web page:

a. http://www.learnenglish.de/grammar/sentencetext.html
b. http://www.bbc.co.uk/skillswise/factsheet/en30stru-l1-f-rules-and-egs-to-help-you-make-a-sentence
c. http://www.dummies.com/how-to/education-languages/language-arts/Grammar-Usage/Sentence-Construction.html
d. https://www.liberty.edu/media/2030/Sentence_Construction.pdf
e. http://www2.isu.edu/success/writing/handouts/sent-structure.pdf)

UNIT- III: ENGLISH USAGE AND REMEDIAL GRAMMAR

(Direct links to content used from the web page:

a. http://ihecs-langues.be/remedial/grammar.htm
b. http://mdudde.net/books/BA/BA%20I%20year/English/ba-1st-engish-paperB.pdf

c. http://www.sakshieducation.com/Engg/EnggAcademia/CommonSubjects/English-GRAMMAR.pdf

Books with page numbers:

1. How to prepare for the Verbal Ability and Reading Comprehension for the CAT, Arun Sharma, Meenakshi Upadhyay, Tata McGraw-Hill Publishing Company Limited, 2007; Pg.No.2.233-2.236.
2. The Official Guide for GMAT Review, 11th edition, Blanche Brann LP, Lawrenceville NJ, Pg. No: 630 – 662.**)**

UNIT- IV: ANALOGIES AND REVERSE ANALOGIES

(Direct links to content used from the web page:

a. http://www.jagranjosh.com/articles/verbal-ability-analogies-and-reverse-analogies-questions-for-cat-1335522802-1
b. http://www.testprepreview.com/modules/analogies1.htm
c. http://www.gmat-pacer.com/gre-guidetc.html

Books with page numbers:

1. A Modern Approach to Verbal & Non – Verbal Reasoning by Dr. R.S. Aggarwal, 1994, S.Chand & Co, Pg. Nos 35-142.
2. How to prepare for the Verbal Ability and Reading Comprehension for the CAT, Arun Sharma, Meenakshi Upadhyay, Tata McGraw-Hill Publishing Company Limited, 2007, Pg. No's 2.95-2.103.**)**

UNIT- V: READING COMPREHENSION, CLOSE PASSAGE & FILL IN THE BLANKS

(Direct links to content used from the web page:

a. http://www.majortests.com/sat/reading-comprehension.php
b. http://cat.wordpandit.com/rc-passage-36/
c. http://www.mycatprep.com/FreepracticeQuestionsEnglish.html
d. http://www.lofoya.com/Verbal-Test-Questions-and-Answers/Reading-Comprehension/intro
e. http://mba.hitbullseye.com/free_mock_cat/Reading-Comprehension-CAT.php

Books with page numbers:

1. How to prepare for the Verbal Ability and Reading Comprehension for the CAT, Arun Sharma, Meenakshi Upadhyay, Tata McGraw-Hill Publishing Company Limited, 2007, Pg. No 1.11-1.99
2. The Official Guide for GMAT Review, 11th edition, Blanche Brann LP, Lawrenceville NJ, Pg. No's: 340-462.**)**

UNIT- VI: FACTS, INFERENCES & JUDGMENTS

Books with page numbers:

1. A Modern Approach to Verbal & Non – Verbal Reasoning by Dr. R.S. Aggarwal, 1994, S.Chand & Co, Section-II Pg. No's: 1-224
2. How to prepare for the Verbal Ability and Reading Comprehension for the CAT, Arun Sharma, Meenakshi Upadhyay, Tata McGraw-Hill Publishing Company Limited, 2007, Pg. No's: 3.5 – 3.27; 3.63 – 3.64
3. The Official Guide for GMAT Review, 11th edition, Blanche Brann LP, Lawrenceville NJ, Pg. No 464-506

No. of Periods for assessments for all units	2

REFERENCES:

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

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

III B.TECH I SEMESTER

III B. TECH. - I SEMESTER COURSE STRUCTURE:

S.No.	Subject	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Linear and Digital IC Applications	PC	3	1	-	40	60	100	3
2	Digital Communications	PC	3	1	-	40	60	100	3
3	Antenna and Wave Propagation	PC	3	1	-	40	60	100	3
4	Computer Organization and Microprocessors	PC	4	-	-	40	60	100	3
5	**Open Elective - I**	OE	4	-	-	40	60	100	3
6	Linear and Digital IC Applications Lab	PC	-	-	3	25	50	75	2
7	Digital Communications Lab	PC	-	-	3	25	50	75	2
8	Microprocessors and Interfacing Lab	PC	-	-	3	25	50	75	2
9	Mini Project	PW	-	-	-	25	50	75	1
10	Quantitative Aptitude and Reasoning – II (Mandatory Non-credit Course)	MC	3	-	-	-	-	-	-
Total			**20**	**3**	**9**	**300**	**500**	**800**	**22**

III B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
LINEAR AND DIGITAL IC APPLICATIONS							

COURSE OBJECTIVES:

1. To familiarize with the functioning of various Linear ICs such as OP-AMP, Timer, Voltage Controlled Oscillator and Phase Locked Loop.
2. To introduce different digital MSI ICs and memories.
3. To extend logic gate concepts to realize combinational and sequential circuits.
4. To familiarize with CAD tools.

COURSE OUTCOMES:

At the end of the course, Students will be able to

CO1: Recall the basics of FET, MOSFET, amplifiers, standard memories and their characteristics.

CO2: Define basic logic gates, combinational and sequential circuits.

CO3: Extend the logic gate concept to realize basic combinational and sequential circuits for various Boolean expressions.

CO4: Illustrate the operation of IC 555 timer, utilization of filters, VCO, data converters and PLL in the development of various circuits.

CO5: Demonstrate the applications of Operational amplifier and IC 555 timer such as Adder, Substractor, V-I, I-V converter, Differentiator, Integrator, and Triangular, Square wave generators, PWM, PPM generation respectively.

CO6: Make use of the computer-aided design tools for development of complex digital logic circuits.

UNIT – I: OPERATIONAL AMPLIFIER AND ITS APPLICATIONS

The Operational Amplifier, Ideal Operational Amplifier, Operational Amplifier internal circuit, DC and AC characteristics, compensation techniques, Analysis of data sheets of IC 741, Op-amp applications: Adder, Subtractor, V to I and I to V converters, Sample and Hold circuit, Log and Anti log Amplifiers, Integrator and Differentiator, Triangular and Square wave generators.

UNIT – II: D-A AND A-D CONVERTERS & 555 IC TIMER

Need for D-A and A-D conversion, Basic DAC techniques, A-D converters, DAC/ADC Specifications. 555 IC Timer- Pin diagram, functional description, Monostable and Astable operation.

UNIT – III: ACTIVE FILTERS, VCO & PHASE LOCKED LOOP

Active filters, Voltage Controlled Oscillator (VCO)-IC 566- Pin diagram, Block diagram Description, 565 IC PLL- Pin diagram, block schematic, basic principle of operation, PLL applications.

UNIT – IV: DIGITAL LOGIC FAMILIES AND INTERFACING

Introduction to logic families, CMOS logic, CMOS steady state and dynamic electrical behavior, CMOS logic families. Bipolar logic, TTL families, CMOS/TTL interfacing, Emitter coupled logic, Comparison of CMOS, TTL and ECL.

UNIT – V: DESIGN OF COMBINATIONAL & SEQUENTIAL LOGIC CIRCUITS

Ripple adders and subtractors-74x999,283, Design of decoders, Encoders, Priority encoder, Multiplexers, Demultiplexers, Parity circuits, Comparators, Simple Floating-Point Encoder and basic flip-flops with relevant Digital ICs, design of Counters, Counter Applications, MSI Registers, Shift registers, bi-directional shift register, universal shift register with relevant Digital ICs.

UNIT – VI: MEMORIES & INTRODUCTION TO VHDL

Memories: ROM, Static RAM, standard SRAMS, synchronous SRAMS, Dynamic RAM, Synchronous DRAMs.

History of VHDL, Design flow, program structure, Modeling Styles of VHDL, Statements used in VHDL, Packages, Libraries, Objects and Classes, Subprograms, VHDL Modelling - Simulation, Logic Synthesis, Inside a logic Synthesizer, Constraints, Technology Libraries. Example programs.

Text Books:

1. D. Roy Choudhury, Shail B. Jain, "Linear Integrated Circuits", 4th Multi Colour Edition, New Age International (p) Ltd, 2010.
2. John F. Wakerly, "Digital Design Principles & Practices", 3rd Edition, PHI/ Pearson Education Asia, 2005.

Reference Books:

1. Ramakanth, A. Gayakwad, "OP-Amps & Linear ICs", PHI, 1987.
2. J. Bhasker, "VHDL Primer", 3rd Edition, Pearson Education/ PHI.
3. Atul P.Godse and Deepali A.Godse, "Digital IC Applications", Technical Publ., Pune, 2005.
4. K. Lal Kishore, V. S. V. Prabhakar, "VLSI Design", I.K International publishing house,Pvt Ltd.

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

COURSE OBJECTIVES:

1. To introduce the concepts of different pulse modulation and digital modulation Techniques.
2. To familiarize with the error detection and correction techniques.
3. To study the concept of entropy and need for source encoding.
4. To understand various digital modulation techniques and able to analyze various systems for their performance in terms of probability error.

COURSE OUTCOMES:

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

CO1: Define various Pulse Digital Modulation Techniques

CO2: Compare various modulation schemes for Digital information transmission

CO3: Solve Probability of error of various Digital Modulation Techniques

CO4: Demonstrate the transfer function of the Matched and Optimum filters.

CO5: Illustrate the channel capacities of different channels and Demonstrate the error correction and detection capabilities of Linear Block and Convolution codes.

CO6: Make use of various source coding techniques to compute and analyze Block codes, Cyclic codes and Convolution codes.

UNIT – I: PULSE DIGITAL MODULATION

Elements of digital communication systems- Information source, source encoder and decoder, channel encoder and decoder, digital modulators and de modulators, communication channel, Advantages of Digital Communication Systems, sampling theorem, Elements of PCM -PCM generator, PCM receiver, transmission band width in PCM, Sampling, Quantization & Coding, Quantization error Companding in PCM systems - μ-law companding for speech signals, A-law companding , signal to noise ratio of companded PCM, Differential PCM systems (DPCM) - Principle of DPCM, DPCM transmitter, reconstruction of DPCM Signal, Delta Modulation- Operating Principle of DM, DM transmitter, DM Receiver, advantages and disadvantages of DM, Noise in PCM and DM Systems- Slope over load distortion, granular noise, Transmission noise, quantization noise, Comparison of PCM and DM Systems.

UNIT – II: DIGITAL MODULATION TECHNIQUES

Amplitude Shift Keying-Signal space diagram of ASK, ASK generator and ASK detector, non-coherent ASK reception, Frequency Shift Keying-BFSK Transmitter, Spectrum and Bandwidth of BFSK, coherent BFSK Receiver, non-coherent BFSK Receiver, signal space representation, advantage and disadvantage, Phase Shift Keying-Principle of BPSK, Graphical Representation of BPSK , Generation and reception of BPSK signal, Spectrum of BPSK Signal, signal space diagram of BPSK , Bandwidth of BPSK signals, Differential Phase Shift Keying(DPSK)-Transmitter and Receiver, Band width of DPSK signal, Advantages and disadvantages of DPSK Quadrature Phase Shift Keying-QPSK Transmitter and Receiver, Signal Space Representation of QPSK Signals, Bandwidth of QPSK Signal, Advantages of QPSK, Spectrum of QPSK, M-aray Phase Shift Keying and Frequency Shift Keying Signal space diagram, Power Spectral Density of M-array PSK, Bandwidth Euclidean Distance, Transmitter and receiver, Similarity of BFSK and

BPSK.

UNIT – III: DATA TRANSMISSION

Base band signal receiver-Signal to noise ratio of the integrator and dump filter, probability of error in integrate and dump filter receiver, probability of error-Probability of error of optimum filter, matched filter, probability of error using matched filter, Impulse response of the matched filter, probability of error of the matched filter, properties of matched filter coherent reception correlator Calculation of error probability of ASK, BPSK, BFSK.

UNIT – IV: INFORMATION THEORY AND SOURCE CODING

Discrete messages and information content-Measure of information concept of amount of information and its properties, Entropy and its properties, Information rate, Mutual information and its properties, Shannon's theorem-Capacity of Gaussian Channel, Band width S/N trade off Shannon -Fano coding, Huffman coding, Discrete Communication Channels, channel capacity of discrete and analog channels, capacity of a Gaussian channel, bandwidth –S/N trade off.

UNIT – V: LINEAR BLOCK CODES

Matrix description of Linear Block codes, Error detection and error correction capabilities of Linear block codes, Hamming codes, Binary cyclic codes, syndrome calculation, BCH Codes.

UNIT – VI: CONVOLUTION CODES

Encoding of convolution codes-Time domain approach, transform domain approach, Graphical approach-state, tree and trellis diagram, Viterbi decoding algorithm.

Text Books:

1. Simon Haykin, "Digital Communications" Student Edition, John Wiley, 2010.
2. H. Taub and D. Schilling, "Principles of Communication Systems", TMH, 2003.
3. B.P.Lathi, "Modern Analog and Digital Communication", 3rd Edition, Oxford reprint, 2004.

Reference Books:

1. J. S. chitode, "Digital communication". 2nd revised edition 2009.
2. Sam Shanmugam, "Digital and Analog Communication Systems", John Wiley, 2005.
3. John Proakis, "Digital Communications", TMH, 1983.

III B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
ANTENNAS AND WAVE PROPAGATION							

COURSE OBJECTIVES:

1. Understand the applications of the electromagnetic waves in free space.
2. To introduce radiation mechanism for understanding various forms of Antennas.
3. To familiarize with Measure various parameters of antenna, and the concepts of wave propagation and its characteristics in atmospheric conditions.

COURSE OUTCOMES:

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

CO1: Illustrate the radiation mechanism and basic antenna parameters.

CO2: Interpret wire antennas, loop antennas, reflector antennas, lens antennas, horn antennas and microstrip antennas.

CO3: Develop the fields radiated by various types of antenna.

CO4: Build different types of antenna arrays.

CO5: Demonstrate antenna measurements to know antenna's performance.

CO6: Identify the characteristics of radio wave propagation.

UNIT – I: ANTENNA FUNDAMENTALS

Definition and function of Antenna. Radiation Mechanism – single wire, 2-wire, dipoles, Current Distribution on a thin wire antenna. Characteristics of Antenna- Radiation Pattern, Radiation intensity, Beam solid angle, Directivity, Gain, Polarization, efficiency, Equivalent areas, Radiation Resistance, Effective length, antenna temperature; Relation between Maximum Directivity and effective area, illustrated Problems.

UNIT – II: LINEAR WIRE ANTENNA

Potential function- Maxwell's Equation approach, Radiation from Small Electric Dipole, Quarter wave Monopole and Half wave Dipole – Current Distributions, Evaluation of Field Components, Power Radiated, Radiation Resistance. Introduction to Antenna Theorems and Loop antennas.

UNIT – III: ANTENNA ARRAYS

Introduction, 2 element arrays – different cases; Arrays of N isotropic point sources Broadside, End-fire Arrays, EFA with Increased Directivity. Principle of pattern multiplication, Binomial and Phased array.

UNIT – IV: HF, VHF, UHF ANTENNAS

Introduction, Traveling wave radiators – basic concepts, Long wire antennas, V-Antenna, Rhombic Antenna, Folded Dipole, Yagi-Uda Antenna, Helical Antenna, Reflector antennas, Parabolic antennas.

UNIT – V: MICROWAVE ANTENNAS AND ANTENNA MEASUREMENTS

Horn Antenna, Lens Antenna. Micro strip antenna.

Antenna Measurements: Radiation pattern, Gain transfer method, Absolute measurement, Directivity.

UNIT – VI: WAVE PROPAGATION

Friss Free space Equation for wave Propagation, Ground wave Propagation, Space wave Propagation- Field strength calculation, Line of Sight, Duct Propagation, Tropospheric Scattering. Sky wave Propagation-Formation of Ionospheric Layers, Mechanism of Reflection and Refraction and their Characteristics, Ionospheric Abnormalities and Absorption.

Text Books:

1. Constantine A.Balanis, "Antenna Theory: Analysis and Design", 4th Edition, John Wiley & Sons, 2016.
2. K.D. Prasad, Satya Prakashan, "Antennas and Wave Propagation" –Tech India Publications, New Delhi, 2001.

Reference Books:

1. J. D. Kraus, R. J. Marhefka, "Antennas and Wave Propagations", 4th Edition, McGraw-Hill, 2010.
2. E.C.Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems", 2nd Edition, PHI, 2007.
3. F.E. Terman, "Electronic and Radio Engineering", 4th Edition, McGraw-Hill, 1955.

III B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
COMPUTER ORGANISATION & MICROPROCESSORS							

COURSE OBJECTIVES:

1. To familiarize with the computer system.
2. To learn the concepts of computer arithmetic operations, computer instructions and its memory organization.
3. To understand the 8086 architecture and its programming.
4. Explore how to interface the memory and I/O devices to 8086 microprocessor.

COURSE OUTCOMES:

After completion of the course, students will be able to

CO1: Recall the basic concepts, elements & operations of digital computer system.

CO2: Demonstrate memory organization and I/O processing.

CO3: Illustrate the instruction set present in a processor for arithmetic, logical and control operations.

CO4: Make use of Instruction set in developing the assembly language programming

CO5: Develop application based programs using digital interfacing.

CO6: Model an 8086 based microcomputer system by interfacing memory and I/O devices.

UNIT – I: COMPUTER SYSTEM

Computer components, computer function, Interconnection structures, Bus interconnection, arithmetic and logic unit, integer representation, integer arithmetic, floating point representation, floating point arithmetic.

UNIT – II: CENTRAL PROCESSING UNIT

Instruction Sets, Characteristics and addressing modes – Machine instruction characteristics, Types of operands and operators, addressing modes, instruction formats, Assembly language,

Process Structure and Functions – Process organization, register organization, instruction cycle, instruction pipelining, The RISC versus CISC

UNIT – III: CONTROL UNIT AND MICRO PROGRAMMED CONTROL

Micro operations, control of the processor, hardwired implementation, micro programmed control, micro instruction sequencing and micro instruction execution.

The Memory System: Computer Memory System Overview, Cache Memory Principles, Semiconductor Main Memory, Advanced DRAM Organization, Magnetic Disk, Optical Memory, DMA.

UNIT – IV: 8086 MICROPROCESSORS

Register organization of 8086, Architecture, signal description of 8086, physical memory organization, general bus operation, I/O addressing capability, Minimum mode, maximum mode of 8086 system and timings, machine language instruction formats, addressing mode of 8086, instruction set off 8086,assembler directives and operators.

UNIT – V: 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 – VI: 8086 INTERFACING

Semiconductor memory interfacing, Interfacing i/o ports, PIO 8255 modes of operation of 8255,interfacing to D/A and A/D converters, stepper motor interfacing, Programmable interrupt controller 8259A, the keyboard /display controller8279, programmable communication interface 8251 USART, DMA Controller 8257.

Text Books:

1. William Stallings, "Computer Organization and Architecture", 8th Edition, Pearson, 2010.
2. A.K.Ray, K.M.Bhurchandi, "Advanced Microprocessors and Peripherals", Tata McGraw Hill Publications, 2000.

References Books:

1. Morris Mano, "Computer system architecture", 3rd Edition, Pearson Education, 2007.
2. Douglas V Hall, "Microprocessors and interfacing, Programming and Hardware", 2nd Edition, TMH, 2006

III B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	2
LINEAR & DIGITAL IC APPLICATIONS LAB							

COURSE OBJECTIVES:

1. Demonstrate applications of OP-Amp and IC 555 timer
2. Classify the operation of analog filters
3. Illustrate and compare the operation of multivibrators and different voltage regulators
4. Develop the internal circuits for different digital operations

COURSE OUTCOMES:

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

CO1: Demonstrate the applications of Op-amp such as Adder, Subtractor, Comparator, Integrator and Differentiator Circuits.

CO2: Classify the active filters such as LPF, HPF, BPF and Band Reject Filters.

CO3: Interpret the operation of Oscillator circuits.

CO4: Illustrate the operation of Multivibrator circuits.

CO5: Compare various types of voltage regulators.

CO6: Develop the complex digital logic circuits including both combinational and sequential logics by using computer-aided design tools.

SECTION-I:

1. OP AMP Applications – Adder, Subtractor, Comparator Circuits.
2. Integrator and Differentiator Circuits using IC 741.
3. Active Filter Applications – LPF, HPF , BPF, Band Reject Filters.
4. IC 741 Oscillator Circuits – Phase Shift and Wien Bridge Oscillators.
5. IC 555 Timer – Monostable & Astable Operation Circuit.
6. Schmitt Trigger Circuits – using IC 741 and IC 555.
7. Voltage Regulator
   A) Using IC 723.
   B) Three Terminal Voltage Regulators – 7805, 7809, 7912.
8. 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, IC723, 7805, 7809, 7912 and other essential components.
8. Analog IC Tester

SECTION-II:

1. Realization of Logic Gates.
2. 3 to 8 Decoder- 74138

3. 8*1 Multiplexer-74151 and De-multiplexer-74155
4. 4-Bit Comparator-7485.
5. D Flip-Flop- 7474
6. Counters
    A) 4 Bit Counter-7493
    B) Decade Counter- 7490
7. Universal shift register-74194/195
8. RAM (16×4)-74189 (read and write operations)

Equipment Required:

1. Xilinx ISE software-latest version
2. Personal computer with necessary peripherals
3. Hardware kits- Various FPGA families.

Note: Six Experiments from each section.

III B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	2
DIGITAL COMMUNICATIONS LAB							

COURSE OBJECTIVES:

1. Illustrate the concept of time division multiplexing and demultiplexing
2. Understand different digital modulation techniques
3. Know the translation of analog signals into digital data
4. Understand the usage of Simulation tool for companding technique
5. Know various channel encoding schemes

COURSE OUTCOMES:

On successful completion of the course, students will be able to

CO1: Experiment with different digital modulation techniques and observe their results.
CO2: Demonstrate Time Division Multiplexing and demultiplexing.
CO3: Translate analog signals into digital data.
CO4: Interpret different techniques in modern digital communications, in particular in source coding using Simulation tools.
CO5: Apply Simulation tool for companding technique.
CO6: Identify the various channel encoding schemes for a given data stream.

List of Experiments

1. Time Division Multiplexing.
2. Pulse Code Modulation.
3. Analyze Of Differential Pulse Code Modulation.
4. Delta Modulation.
5. Frequency Shift Keying.
6. Phase Shift Keying.
7. Differential Phase Shift Keying.
8. Companding.
9. Source Encoding and Decoding.
10. Design Linear Block Encoder and Decoder.
11. Design Binary Cyclic Encoder and Decoder.
12. Design Convolution Encoder and Decoder.

Equipment Required For Laboratories:

1. RPS-(0-30V).
2. CRO-(0-20MHz).
3. Function Generators-(0-1MHz).
4. RF Generators –(0-1000MHz/0-100MHz).
5. Multimeters.
6. Lab experimental Kits for Digital Communication.
7. Components.
8. Radio Receiver/TV Receiver Demo Kits or Trainers.

III B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	2
MICROPROCESSORS AND INTERFACING LAB							

COURSE OBJECTIVES:

1. To become familiar with the architecture and Instruction set of Intel 8086 microprocessor.
2. To provide practical hands on experience with Assembly Language Programming.
3. To familiarize the students with interfacing of various peripheral devices with 8086 microprocessor.

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1: Apply the fundamentals of assembly level programming of microprocessors.
CO2: Build various assembly language programs using 8086.
CO3: Summarize the concepts of Assembly level language programming and its applications.
CO4: Develop the assembly level programming using 8086 instruction set.
CO5: Interpret how different I/O devices can be interfaced to processor and explore several techniques of interfacing.

PART-I: MICROPROCESSOR 8086

1. Write an ALP in 8086 for arithmetic operations: addition, subtraction, multiplication and division on multi-byte numbers.
2. Write an ALP in 8086 to find the factorial of an 8-bit number.
3. Write an ALP in 8086 to sort an array of 8-bit numbers in ascending order
4. Write an ALP in 8086 to convert BCD number to ASCII number and vice versa.
5. Write an ALP in 8086 for string operations - Move Block, Reverse string, Inserting, Deleting, Length of the string, String comparison.
6. Write an ALP in 8086 to count even and odd numbers in a given series of 16-bit numbers.
7. DOS Programming-Reading the characters from keyboard and Display the characters.

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.

III B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	0	0	-	-	-	-
QUANTITATIVE APTITUDE AND REASONING - II							

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:

CO1: Will be able to prepare well for clearing Quantitative Aptitude and Reasoning tests for campus placements

CO2: Will be able to critically evaluate various real life situations by resorting to Analysis of key issues and factors.

CO3: Will be able to demonstrate various principles involved in solving mathematical

CO4: Problems and thereby reducing the time taken for performing job functions.

Unit I: Numbers, Time and Distance, Time and work, Averages, Mixtures and Allegations

1. 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 Model

2. 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

3. 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

4. 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

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

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 given
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

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

2. Binary Logic

a) Definition of a truth-teller
b) Definition of a liar
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 V: 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

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

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

References:

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

III B.TECH II SEMESTER

III B.TECH. – II SEMESTER COURSE STRUCTURE:

S.No.	Subject	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	VLSI Design	PC	3	1	-	40	60	100	3
2	Microwave and Optical Communications	PC	4	-	-	40	60	100	3
3	Digital Signal Processing	PC	3	1	-	40	60	100	3
4	Electronic Measurements and Instrumentation	PC	3	1	-	40	60	100	3
5	**Professional Elective – I:** i. Analog IC Design ii. Electronic Switching Systems iii. Advanced Computer Architecture iv. Coding Theory and Practice v. Digital Image Processing	PE	4	-	-	40	60	100	3
6	**Open Elective - II**	OE	4	-	-	40	60	100	3
7	Digital Signal Processing Lab	PC	-	-	3	25	50	75	2
8	Microwave & Optical Communications Lab	PC	-	-	3	25	50	75	2
9	Advanced Communication Skills (Mandatory Non-credit Course)	MC	3	-	-	-	-	-	-
10	MOOCS	MC	-	-	-	-	-	-	-
Total			**25**	**2**	**6**	**290**	**460**	**750**	**22**

III B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
VLSI DESIGN							

COURSE OBJECTIVES:

1. Learn the various fabrication steps of IC and come across basic electrical properties of MOSFET.
2. 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.
3. Learn the various subsystem designs and issues raised in the VLSI design.

COURSE OUTCOMES:

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

CO1: Recall the basic structural and electrical aspects of MOS transistors, architecture of FPGA and CPLD.

CO2: Compare the properties of NMOS, PMOS, CMOS and Bipolar technologies.

CO3: Outline the basic logic circuits using MOSFETs.

CO4: Interpret the pass transistor, inverters, Latch-up in CMOS circuits and scaling rules of MOS technology.

CO5: Build the sub systems like adders, 4 -bit processors and ALU.

CO6: Explain inverter delays, fan-in and fan- out, power calculation and clock mechanism in VLSI design.

CO7: Summarize various design rules and design issues in the VLSI.

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, GaAs Technologies.

UNIT-II: 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-III: VLSI CIRCUIT DESIGN PROCESSES

MOS layers, stick diagrams, design rules and layout, 2µ.meter, 1. 2µ.meter CMOS rules, Layout Diagrams of universal gates and CMOS inverter, Symbolic diagrams-Translation to Mask

UNIT-IV: BASIC CIRCUIT CONCEPTS

Sheet Resistance R_s and its concepts to MOS, Area Capacitance calculations, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-in and fan-out, choice of layers.

Scaling of MOS circuits: Scaling models, Scaling function for device parameters, Limitation of Scaling.

UNIT-V: SUB SYSTEM DESIGN

Architectural issues, switch logic, Gate logic, examples of structural design (Combinational logic) and some clocked sequential circuits. Subsystem Design Process: General Arrangement of 4-bit arithmetic processor, Design of an ALU subsystem.

UNIT-VI: 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, Basic FPGA architecture, basic CPLD architecture comparison of FPGA, ASIC and CPLD.

Text Books:

1. Kamran Eshraghian, Douglas and A. Pucknell and Sholeh Eshraghian, "Essentials of VLSI Circuits and Systems", Prentice-Hall of India Private Limited, 2009 Edition.
2. K.V.K.K. Prasad, Kattula Shyamala, "VLSI Design-Black Book", Kogent Learning Solutions Inc.2012 Edition.

Reference Books:

1. A. Albert Raj & T. Latha, "VLSI Design", PHI Learning Private Limited, 2010.
2. A. Shanthi and A. Kavita, "VLSI Design", 1st Edition, New Age International Private Limited, 2006.

III B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
MICROWAVE AND OPTICAL COMMUNICATIONS							

COURSE OBJECTIVES:

1. To get knowledge on different microwave sources.
2. To familiarize different waveguides and their field expression.
3. To introduce the microwave components and measurement of power, attenuation, frequency and VSWR using microwave bench.
4. To familiarize with different types of optical fibers, light sources and detectors.

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1: Illustrate the waveguides and waveguide components.
CO2: Tell how the microwave parameters will measure.
CO3: Infer different microwave sources.
CO4: Summarize about different optical fibers and characteristics.
CO5: Compare different optical detectors as well as optical sources.
CO6: Demonstrate an optical system.

UNIT-I: MICROWAVE TRANSMISSION LINES

Introduction, Microwave Spectrum and Bands, Applications of Microwaves. Rectangular Waveguides – TE/TM mode analysis, Expressions for Fields, Dominant and Degenerate Modes, Introduction to Circular wave guides, related problems.

UNIT-II: MICROWAVE COMPONENTS & MICROWAVE TUBES

Waveguide Attenuators – Resistive Card and Rotary Vane types; Calculation of scattering matrix for E plane, H plane, Magic Tee and Directional Coupler; Ferrite Components – Gyrator, Isolator, Circulator. Classification of Microwave Tubes, Two Cavity Klystron – Structure, Velocity Modulation Equation, Applegate Diagram; Reflex Klystron – Structure, Applegate Diagram; Travelling Wave Tube – operation, Magnetron operation.

UNIT-III: MICROWAVE SOLID STATE DEVICES & MEASUREMENTS

Gunn Diode – Principle, RWH Theory; IMPATT Diode, Description of Microwave Bench, Measurement of Attenuation, Frequency, VSWR using Microwave Bench and Power measurement using Bolometer Method.

UNIT-IV: 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, Types of rays, V-number, Mode coupling, Step Index fibers, Graded Index fibers, Single mode fibers- Cut off wavelength, Mode Field Diameter, Related problems.

UNIT-V: OPTICAL SOURCES LEDS

Structures, quantum efficiency, modulation; Laser diodes principle, modes, threshold conditions, external quantum efficiency, resonant frequencies, Reliability of LED & ILD.

UNIT-VI: PHOTO DETECTORS PHOTODIODES

Principle, PIN and avalanche photo diodes; comparison of photo detectors, Temperature effect on avalanche gain, noise in photo detectors, Optical receiver operation- Fundamental receiver operation, Digital signal transmission, error sources, performance Receiver configuration, Digital receiver, Probability of Error Optical system design-Point-to-point links-Component choice and

considerations, Link power budget, Rise time budget with examples.

Text Books:

1. Samuel Y. Liao, "Microwave Devices and Circuits", 3rd Edition, PHI, 2003.
2. Gerd Keiser, "Optical fiber communications", 4th Edition, MGH, 2008.

Reference Books:

1. R.E. Collin, "Foundations for Microwave Engineering", IEEE Press, 2nd Edition, John Wiley, 2002.
2. Herbert J. Reich, J.G. Skalnik, P.F. Ordung and H.L. Krauss, "Microwave Principles", CBS Publishers and Distributors, New Delhi, 2004.
3. Djafar K. Mynbaev and Lowell L. Scheiner, "Fiber Optic Communication Technology", Pearson Education Asia, 2001.
4. M. Kulkarn, "Microwave and Radar Engineering", 3rd Edition, Umesh Publications New Delhi., 2008.

III B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
DIGITAL SIGNAL PROCESSING							

COURSE OBJECTIVES:

1. Enhance the analytical ability of the students in facing the challenges posed by growing trends in communication, control and signal processing areas.
2. Develop ability among students for problem formulation, system design and solving skills.
3. Demonstrate basic knowledge of Digital Signal Processing by understanding various transformations.
4. Understand Various Discrete-time signals and class of linear shift-invariant systems will be studied using the convolution sum, and the frequency domain, using transformations.
5. Design system with digital network composed of adders, delay elements, and coefficient multipliers.

COURSE OUTCOMES:

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

CO1: Analyze the signals and system in Time and Frequency domain through its respective tools.

CO2: Find DFT and IDFT coefficients of a given discrete time sequence using Fast Fourier Transform algorithm.

CO3: Illustrate the significance of various filter structures and effects of round off errors.

CO4: Demonstrate knowledge of complex number, Fourier series and ability to design electrical and electronics systems.

CO5: Construct the digital filter circuits for generating desired signal wave shapes (non-sinusoidal) for different applications like computers, control systems and counting and timing systems.

CO6: Interpret the digital computer or digital hardware for quantizing amplitudes of signals.

UNIT-I: INTRODUCTION

Review of Discrete Time Signals: Some Elementary Discrete-Time Signals, Classification of Discrete–Time Signals, Simple Manipulations of Discrete–Time Signals, Discrete Time Systems: Input-Output Description of Systems, Block Diagram Representation of Discrete-Time Systems, and Classification of Discrete-Time Systems Interconnection of Discrete-Time Systems. Frequency domain representation of Discrete Time Signals and Systems, Discrete-Time Fourier Transform (DTFT): Existence of DTFT, properties of DTFT.DISCRETE FOURIER SERIES: Properties of Discrete Fourier Series, DFS representation of periodic sequences.

UNIT-II: DISCRETE FOURIER TRANSFORMS

Properties of DFT, Circular & Linear Convolution of Sequences using DFT, and Computation of DFT: Direct evaluation of the DFT. FAST FOURIER TRANSFORMS:Radix-2 Fast Fourier Transforms (FFT), Decimation in Time and Decimation in Frequency FFT Algorithms: radix-2 DIT-FFT, DIF-FFT, and Inverse FFT: IDFT-FFT.

UNIT-III: REALIZATION OF IIR FILTERS

Review of Z-Transforms: z-transform and ROC of finite and infinite sequence, properties of z-transform, relationship between the Fourier transform and z-transform, inverse z-transform. Solution of Difference Equations of Digital Filters, Block Diagram Representation of Linear Constant Coefficient Difference Equations, Basic structures of IIR systems: Direct form-I realization, Direct form-II realization, transposed, cascade form, parallel form. Lattice structures of IIR systems, Conversion from Lattice structure to direct form, Conversion from direct from to Lattice structure, Lattice-ladder structure.

UNIT-IV: REALIZATION OF FIR FILTERS

Basic structures of FIR systems: Transversal structure, Linear phase, Lattice structure, Polyphase Lattice structures of FIR systems, Conversion from Lattice structure to direct form, Conversion from direct from to Lattice structure, Lattice-ladder structure.

UNIT-V: IIR DIGITAL FILTERS

Analog filters approximations: Butterworth and Chebyshev, Design of IIR digital filters from analog filters, Design examples, Frequency Transformations in Analog Domain: Low pass to Low pass filter, Low pass to High pass filter, Low pass to Band pass filter, and Low pass to Band stop filter. Frequency Transformations in digital domain: Low pass to Low pass filter, Low pass to High pass filter, Low pass to Band pass filter, and Low pass to Band stop filter.

UNIT-VI: FIR DIGITAL FILTERS

Characteristics of FIR Digital Filters, Frequency Response. Design of FIR Digital Filters Using Window Techniques: Rectangular Window, Triangular or Bartlett Window, Raised Cosine Window Hanning Window, Blackman Window, Kaiser Window, Frequency Sampling Technique: Frequency Sampling Realization, Frequency Response, Design, Comparison of IIR and FIR filter, Illustrative Problems.

Text Books:

1. John G. Proakis, Dimitris G. Manolakis, "Digital signal processing, principles, Algorithms and applications", 4th Edition, Pearson Education/PHI, 2007.
2. A.V. Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing", 2nd Edition, PHI, 2008.

Reference Books:

1. Ramesh Babu, "Digital Signal Processing", Scitech Publications, 2011.
2. Andreas Antoniou, "Digital signal processing", TATA McGraw Hill, 2006.
3. R S Kaler, M Kulkarni,, Umesh Gupta, "A Text book on Digital Signal processing", I K International Publishing House Pvt. Ltd, 2010.
4. M H Hayes, Schaum's outlines, "Digital signal processing", TATA Mc-Graw Hill, 2007.

III B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
ELECTRONIC MEASUREMENTS AND INSTRUMENTATION							

COURSE OBJECTIVES:

1 List out Performance Characteristics of Different Electronic Measuring Instruments, its Analysis and Calibration Techniques.
2 Memorize Signal Generator and Wave Analyzers for Analysis of EM Spectrum.
3 Describe Concepts of Passive and Active Transducers.
4 Explain about all AC bridges and Q-meters, Design Methods and its Applications.
5 Review the concepts of electrical and electronics measurements with different techniques.
6 Illustrate concepts of computer controlled test systems, storage elements and display instruments.
7 Make use of transducers and instruments in lab experiments for applications.

COURSE OUTCOMES:

After going through this course, the student will be able to

CO1: List out Electronic Instruments, their Characteristics and use, Peculiar Errors Associated with the Instruments and how to minimize such Errors
CO2: Classify the Instruments based on Static and Dynamic Characteristics.
CO3: Review the Principle of Operation of Electronic Measuring Instruments.
CO4: Relate Concepts of Passive and Active Transducers.
CO5: Experiment with transducers, electrical and electronic instruments.
CO6: Select transducers, computer controlled test systems, storage and display instruments for experimenting.
CO7: Illustrate various concepts of electrical instruments and electronic instruments.

UNIT-I: BASIC MEASUREMENTS

Functional Elements of measurement system- Examples - Characteristics of instruments: Static characteristics, Dynamic characteristics, Types of errors, sources of errors, methods of eliminating Errors, Histogram, Mean, Measure of dispersion from the mean, Range Deviation Average deviation, Standard Deviation, Variance, Bourdon Tubes.

UNIT-II: TRANSDUCERS

Transducers- Classification of Transducers, Characteristics, Basic Requirements of a Tansducer, Resistive Transducer, Strain Gauge, Inductive Transducer, Capacitive displacement transducer, LVDT, Load cell Transducers, Thermocouple, Thermistor, Radiation Pyrometers.

UNIT-III: ELECTRICAL MEASUREMENTS

Measurement of Voltage and Current: D'Arsonval Galvanometer, permanent magnet moving coil, permanent magnet moving iron, Dynamometer, Measurement of Resistance, Inductance and Capacitance: Wheat stone bridge, Kelvin double bridge, Wien Bridge, Hay's bridge, Maxwell bridge, Anderson bridge, Q- Meter, Schering bridge, Ohmmeter.

UNIT-IV: ELECTRONIC MEASUREMENTS

Signal generators: Function Generator, RF Signal Generator, Random Noise Generator, Sweep generators- Wave Analyzer- Harmonic, Distortion Analyzer - Spectrum Analyzer - DC & AC Voltmeters, Digital Voltmeters, Electronic Multimeters, VOM meters.

UNIT-V: COMPUTER CONTROLLED TEST SYSTEMS

Testing an Audio Amplifier, Testing a Radio Amplifier, Instruments used in Computer Controlled Instrumentation, Micro Processor based System and Measurement Frequency Counter, Measurement of

physical parameters force, pressure, velocity, humidity and Data acquisition systems.

UNIT-VI: STORAGE AND DISPLAY INSTRUMENTS

Cathode Ray Oscilloscopes – CRT Circuit, Vertical Deflection System, Delay Line, Horizontal Deflection System, Oscilloscope Techniques, Special Oscilloscopes, Recorders -XY & Magnetic Tape Dot Matrix Display.

Text Books:

1. A.K.Sawhney," Electrical, Electronic measurement & Instrumentation", 18th Edition, Dhanpat Rai & Sons, Reprint 2010
2. Albert.D.Helfrick & William.D.Cooper, "Modern Electronic Instrumentation & Measurement Techniques", PHI , 2003.

Reference Books:

1. E.W. Golding and F.C. Widdis, "Electrical Measurements and measuring Instruments", 5th Edition, AH Wheeler & Company, 1993.
2. Alan Morris, "Principles of Measurements & Instrumentation", 2nd Edition, PHI , 2003.
3. R. K. Rajput, "Electronic Measurements & Implementation", S. Chand Publications, 2012.

III B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ANALOG IC DESIGN *(Professional Elective – I)*							

COURSE OBJECTIVES:

1 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.
2 In this course, students can study CMOS Amplifiers like Differential Amplifiers, Cascode Amplifiers, Output Amplifiers, and Operational Amplifiers.
3 The concepts of Open-Loop Comparators and Different Types of Oscillators like Ring Oscillator, LC Oscillator etc.

COURSE OUTCOMES:

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

CO1: Define the basic concepts of MOS transistor like switch , amplifiers and Oscillators.
CO2: Interpret the CMOS modeling, measurement techniques of OP-AMP and general concepts of Oscillators.
CO3: Demonstrate the Op-AMP and comparators using CMOS circuits.
CO4: Illustrate cascode amplifiers, cascode OP-AMPs, open loop comparators and phase detectors.
CO5: Summarize current sinks and sources, compensation of OP-AMP and performance of comparators
CO6: Outline the general concepts of current mirrors, oscillators and PLL

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.

UNIT-II: ANALOG CMOS SUB-CIRCUITS

MOS Switch, MOS Diode, MOS Active Resistor, Current Sinks and Sources, Current Mirrors, 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.

UNIT-VI: OSCILLATORS & PHASE-LOCKED LOOPS

General Considerations, Ring Oscillators, LC Oscillators, Voltage Controlled Oscillators. PLL concepts- simple PLL, charge pump PLLs, Non -ideal effects in PLLs, phase Detector.

Text Books:

1. Philip E. Allen and Douglas R. Holberg, "CMOS Analog Circuit Design", International Second Edition/Indian Edition, Oxford University Press 2010.
2. Behzad Razavi, "Design of Analog CMOS Integrated Circuits", 2nd Edition, McGraw-Hill Education, 2017.

Reference Books:

1. Paul R. Gray, Paul J. Hurst, S. Lewis and R. G. Meyer, "Analysis and Design of Analog Integrated Circuits", 5th Edition, Wiley India, 2010.
2. David A. Johns, Ken Martin, "Analog Integrated Circuit Design", Student Edition, Wiley India, 2013.

III B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ELECTRONIC SWITCHING SYSTEMS *(Professional Elective – I)*							

COURSE OBJECTIVES:

1. The student will be able to understand the process of telecommunication.
2. The concepts of measuring the traffic.
3. In this course, students can study various digital switching techniques.
4. Design simple applications.

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1: Recall the primitive and conventional telecommunication terminology.
CO2: Summarize various telecommunication switching mechanisms.
CO3: Illustrate different telecommunication networks and their working.
CO4: Interpret modern telecommunication standards.
CO5: Demonstrate a telecommunication system for a specific application.
CO6: Solve problems related to telecommunication issues.

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, Signalling Techniques, In-channel Signalling, Common Channel Signalling, Cellular Mobile Telephony.

Signalling: Customer Line Signalling, Audio- Frequency Junctions and Trunk Circuits, FDM Carrier Systems, PCM Signalling, Inter- Register Signalling, Common- Channel Signalling Principles, CCITT Signalling System no.6, CCITT Signalling System no.7, Digital Customer Line Signalling.

UNIT-IV: PACKET SWITCHING

Statistical Multiplexing, Local- Area and Wide- Area Networks, Large-scale Networks, Broadband Networks. Electronics & Communication Engineering 145 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, Signalling, Numbering and Addressing, Service Characterization, Interworking, ISDN Standards, Expert Systems in ISDN, Broadband ISDN, Voice Data Integration. Applications of telecommunication for modern day requirements.

Text Books:

1. Thiagarajan Viswanathan, "Telecommunication Switching Systems and Networks", PHI, 2008.
2. J. E. Flood, "Telecommunications Switching, Traffic and Networks", Pearson Education, 2006.

Reference Books:

1. J. Bellamy, "Digital Telephony", 2nd Edition, John Wiley, 2001.
2. Achyut S. Godbole, "Data Communications and Networks", TMH, 2004.
3. H. Taub & D. Schilling, "Principles of Communication Ststems", 2nd Edition, TMH, 2003.
4. B. A. Forouzan, "Data Communication & Networking", 3rd Edition, TMH, 2004.
5. Roger L. Freeman, "Telecommunication System Engineering", 4th Edition, Wiley-Inter Science, John Wiley & Sons, 2004.

III B.TECH. II - SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ADVANCED COMPUTER ARCHITECTURE *(Professional Elective – I)*							

COURSE OBJECTIVES:

1. Computer design, RISC, CISC instruction sets.
2. Cache Coherence and Message Passing Mechanisms.
3. Different trends in parallelism.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to do the following:

CO1: Interpret the concepts of computer architecture, MIMD and SIMD computers.

CO2: Demonstrate the Design Space of Processors and Memory hierarchy.

CO3: Summarize various models & problems of Linear and Non Linear pipeline Processors.

CO4: Compare and Contrast different Cache coherence problems and message passing mechanisms.

CO5: Outline the implementation models of SIMD and MIMD organizations.

CO6: Relate different forms of parallelism in parallel systems**.**

UNIT –I: PARALLEL COMPUTER

The state of computing- Computer Development Milestones, Elements of Modern Computers, Evolution of Computer Architecture, System Attributes to performance; Multiprocessors and Multicomputer-Shared Memory Multiprocessors, Distributed Memory Multiprocessors, A Taxonomy of MIMD Computers; Multivector and SIMD Computers-Vector Super computers, SIMD Supercomputers.

UNIT–II: PROCESSOR AND MEMORY HIERARCHY

Design space of processors, Instruction-set Architectures, Characteristics of typical CISC and RISC Architecture, Hierarchical Memory Technology, Inclusion, Coherence and Locality.

UNIT-III: LINEAR AND NONLINEAR PIPELINE PROCESSORS

Asynchronous and Synchronous models, Clocking and Timing control, Speedup, Efficiency and Throughput; Nonlinear pipeline processors: Reservation and Latency analysis-Problems, Collision Free Scheduling-problems, Instruction Execution Phases.

UNIT–IV: CACHE COHERENCE AND MESSAGE PASSING MECHANISMS

Cache Coherence problem-Two protocol approaches, Snoopy Bus Protocols, Directory based Protocols; Message Passing Mechanisms- Message-Routing Schemes, Deadlock Virtual Channels, Flow Control Strategies, Multicast Routing Algorithms.

UNIT –V: SIMD AND MIMD COMPUTER ORGANIZATIONS

Implementation models, The CM-2 Architecture; A Synchronized MIMD Machine, Control Processors and Processing Nodes, Interprocessor Communications.

UNIT–VI: TRENDS IN PARALLEL SYSTEMS

Forms of Parallelism- Structural Parallelism versus Instruction Level Parallelism, a Simple Parallel Computation, Parallel Algorithms, Stream Processing; Cray Line of Computer Systems.

Text Book:

1. Kai Hwang & Naresh Jotwani "Advanced Computer Architecture- Parallelism, Scalability, Programmability" Second Edition, Mc Graw Hill Publishing.

Reference Books:

1. John L. Hennessy, David A. Patterson - Computer Architecture: A Quantitative Approach, 3rd Edition, An Imprint of Elsevier.

2. Dezso Sima, Terence Fountain, Peter Kacsuk, "Advanced Computer Architecture – A Design Space Approach", Pearson Ed.

III B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
CODING THEORY AND PRACTICE *(Professional Elective – I)*							

COURSE OBJECTIVES:

1. Understand the concepts of information, entropy, mutual information and study the Shannon's fundamental limits, theorems on information transmission.
2. Introduce and classify the Error correcting codes and understand the encoding and decoding of various linear block codes, Convolutional codes.
3. Know the mathematical description of error correcting codes.
4. Introduce the extension field called Galois field and their role in the design of BCH and RS codes.
5. Study the applications of error correcting codes.

COURSE OUTCOMES:

After completion of the course, the student will be able to:

CO1: Illustrate the significance of entropy and mutual information in communications

CO2: Interpret the limits of data transmission

CO3: Identify the importance of source encoding in data transmission

CO4: Build new structures for encoder and decoder to address the issues in evaluating performance of communication system

CO5: Make use of convolution and block codes in error detection and correction

CO6: Summarize various advanced codes for communication system reliability improvement

UNIT-I: INFORMATION THEORY

Entropy, Information rate, source coding, Shannon-Fano and Huffman coding techniques, Mutual Information, Channel capacity of Discrete Channel, Shannon- Hartley law, Trade-off between bandwidth and SNR.

Error Control Codes: Examples of the use of error control codes, basic notions, Characterization of Error control codes performance of error control codes, comparison of uncoded and coded systems.

UNIT-II: CONVOLUTION CODES

Convolution encoders, structural properties of convolution codes, Trellis Diagrams, Viterbi Algorithm, Performance Analysis.

Linear Block Codes: Linear block Codes and their properties, standard arrays, Syndromes, Weight Distribution. Error Detection/Correction Properties, Modified Linear block codes.

UNIT-III: FINITE FIELDS

Groups, Rings, Fields Properties of finite Fields, Extension Fields, Polynomials over Finite Fields, Minimal Polynomials, Conjugates.

UNIT-IV: CYCLIC CODES

General theory, Shift Register Implementations, Shortened Cyclic codes, CRCs for Error Detection.

UNIT-V: BCH AND RS CODES

Algebraic Description, Frequency Domain Description, Decoding Algorithms for BCH and RS Codes.

UNIT-VI: APPLICATIONS

Concatenated Codes, Interleaves, The Compact Disc, Codes for Magnetic recording.

Text Books:

1. Stephen B. Wicker, "Error Control Systems for Digital Communication and storage", US Ed Edition, Prentice Hall, 1995.
2. Bernard Sklar, "Digital communications: Fundamentals and applications", 2nd Edition, Prentice Hall, 2001.
3. Shu lin and Daniel J. Costello, "Error Control Coding", 2nd Edition, Pearson, 2004.

Reference Books:

1. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, 2001.
2. Salvatore Gravano, "Introduction to error control codes", Oxford University press, 2001.
3. John G. Proakis, "Digital communication", 4th Edition, McGraw Hill, 2001.
4. R.P.Singh,S. D. Sapre, "Communication systems", 2nd Edition, MGH, 2008.

III B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
DIGITAL IMAGE PROCESSING *(Professional Elective – I)*							

COURSE OBJECTIVES:

1. Give the students a taste of the applications of the theories taught in the subject. This will be achieved through the project and some selected lab sessions.
2. Introduce the students to some advanced topics in digital image processing.
3. Give the students a useful skill base that would allow them to carry out further study should they be interested and to work in the field.

COURSE OUTCOMES:

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

CO1: Recall the Digital Image Fundamentals & Image Transforms.

CO2: Implement basic image processing algorithms or techniques (Spatial Domain & Frequency Domain

CO3: Summarize Image Restoration using Degradation Model, Algebraic Approach, Inverse Filtering, Least Mean Square Filters, and Constrained Least Squares Filters

CO4: Compare three (RGB, CMY and HIS) color models, pseudo color image processing and full color image processing,

CO5: Illustrate wavelets multi-resolution processing and different image compression techniques.

CO6: Demonstrate the Image Segmentation and Morphological Image Processing.

UNIT–I: DIGITAL IMAGE FUNDAMENTALS & IMAGE TRANSFORMS

Digital Image Fundamentals, Sampling and Quantization, Relationship between Pixels, Image Transforms: 2-D FFT, Properties, Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Haar Transform, Slant Transform, Hotelling Transform.

UNIT–II: IMAGE ENHANCEMENT (SPATIAL &FREQUENCY DOMAIN)

Introduction, Image Enhancement in Spatial Domain, Enhancement Through Point Operation, Types of Point Operation, Histogram Manipulation, Linear and Non — Linear Gray Level Transformation, Local or Neighborhood Operation, Median Filter, Spatial Domain High-Pass Filtering. Image Enhancement (Frequency Domain): Filtering in Frequency Domain, Obtaining Frequency Domain Filters from Spatial Filters, Generating Filters Directly in the Frequency Domain, Low Pass (Smoothing) and High Pass (Sharpening) Filters in Frequency Domain.

UNIT–III: IMAGE RESTORATION AND RECONSTRUCTION

Degradation and Restoration Model, Noise models, Restoration in the presence of noise only, Spatial filtering, Periodic noise reduction by frequency domain filtering, Linear Position Invariant degradations, Estimation of degradation, Restoration, Inverse Filtering, Least Mean Square Filters, Constrained Least Squares Restoration, Interactive Restoration.

UNIT–IV: COLOR IMAGE PROCESSING

Color fundamentals, color models, pseudo color image processing, Basics of full color image Processing, Color transforms, Smoothing and Sharpening, image segmentation based on color, Noise in color images, Color image Compression

UNIT–V: WAVELETS AND MULTI-RESOLUTION PROCESSING

Image pyramids, Sub band coding & Haar transforms, Multi resolution expressions, Wavelet transforms in one dimensions, Fast wavelet transform dimensions, Wavelet packet. Image Compression: Fundamentals, Various compression methods-coding techniques, digital image

water marking.

UNIT–VI: MORPHOLOGICAL IMAGE PROCESSING

Dilation and Erosion: Dilation, Structuring Element Decomposition, Erosion, Combining Dilation and Erosion, Opening and Closing, the Hit or Miss Transformation. Image Segmentation: Detection of Discontinuities, Edge Linking And Boundary Detection, Thresholding, Region Oriented Segmentation.

Text Books:

1. Rafael C. Gonzalez, Richard E. Woods, " Digital Image Processing", 3rd Edition, Pearson, 2008
2. S Jayaraman, S Esakkirajan and T Veerakumar, "Digital Image Processing", TMH, 2010.

Reference Books:

1. Scotte Umbaugh, "Digital Image Processing and Analysis-Human and Computer Vision Application with using CVIP Tools", 2nd Edition, CRC Press, 2011
2. Rafael C. Gonzalez, Richard E Woods and Steven L. Eddings, "Digital Image Processing using MATLAB", 2nd Edition, TMH, 2010.
3. A.K. Jain, " Fundamentals of Digital Image Processing" PHI, 1989
4. Somka, Hlavac Boyle, "Digital Image Processing and Computer Vision", Cengage Learning (Indian edition) 2008.
5. Adrian low, "Introductory Computer Vision Imaging Techniques and Solutions", 2nd Edition, 2008
6. John C. Russ, J. Christian Russ, "Introduction to Image Processing & Analysis", CRC Press, 2010.
7. Vipula Singh, "Digital Image Processing with MATLAB & Lab view", Elsevier, 2012.

III B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	2
DIGITAL SIGNAL PROCESSING LAB							

COURSE OBJECTIVES:

1 Illustrate time and frequency domain response of signals and systems
2 Learn to program a DSP processor to filter signals
3 Develop IIR filters and FIR filters
4 Understand an LTI system and measure of power density spectrum of a sequences

COURSE OUTCOMES:

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

CO1: Outline the architecture of DSP chips – TMS 320C 5X/6X and its instruction set.
CO2: Illustrate time and Frequency domain response of signals and systems through simulation.
CO3: Develop IIR filters and extend it to convert into FIR filters using windowing techniques.
CO4: Interpret the LTI system and measure of power density spectrum of a sequence.
CO5: Demonstrate linear and circular convolution.
CO6: Experiment with FFT algorithm to represent Frequency domain analysis of a sequence with less number of complex additions and multiplications.
CO7: Identify the frequency response of analog LP/HP filters.

LIST OF EXPERIMENTS:

1. To Study the architecture of DSP chips – TMS 320C 5X/6X Instructions.
2. Time domain and Frequency domain Analysis of signals and systems.
3. To obtain spectrum of the discrete time sequence (without using default functions)
4. To obtain output of LTI system (without using default functions).
5. To verify linear and circular convolution.
6. To design FIR filter (LP/HP) using windowing technique
   a) Using rectangular window
   b) Using triangular window
   c) Using Kaiser window
7. To Implement IIR filter (LP/HP) on DSP Processors
8. N-point FFT algorithm.
9. Program to find frequency response of analog LP/HP filters using simulation tools.
10. To compute power density spectrum of a sequence.

III B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	2
MICROWAVE AND OPTICAL COMMUNICATIONS LAB							

COURSE OBJECTIVES:

1. Know about practical application of microwave components
2. Obtain knowledge in microwave parameters
3. Get ability to build analog/digital link setup
4. Identify better optical source for the required applications

COURSE OUTCOMES:

After completion of the course, the students will be able to

CO1: Illustrate the different microwave sources
CO2: Obtain the characteristics of microwave components.
CO3: Measure signal parameters at microwave frequencies.
CO4: Find numerical aperture of an optical fiber.
CO5: Obtain the characteristics of optical sources
CO6: Build Analog/Digital link set up

List of Experiments:

1. Reflex Klystron characteristics.
2. Gunn-diode characteristics.
3. VSWR measurement.
4. Frequency measurement.
5. Directional coupler characteristics.
6. Attenuation measurement.
7. Verification of the expression, $\frac{1}{\lambda_0^2} = \frac{1}{\lambda_c^2} + \frac{1}{\lambda_g^2}$
8. Scattering parameters of Magic Tee.
9. Directional coupler characteristics.
10. Characterization of LED.
11. Characterization of Laser Diode.
12. Analog link set up using optical fiber.
13. Measurement of Numerical aperture.

III B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	-	-	-	-
ADVANCED COMMUNICATION SKILLS							

COURSE OBJECTIVES:

1. To make the students conscious about their Non-Verbal communication
2. Train the students to use the language effectively to face interviews and participate in Group Discussions.
3. To develop effective written communication skills in academic, technical and professional contexts.
4. Develop critical thinking skills necessary to become employable.

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Interpret English language fluently, accurately and appropriately
CO2: Illustrate how body language is used in communication and interpret non-verbal symbols.
CO3: Demonstrate the nuances of the written language and write technical reports effectively.
CO4: Participate in Group discussions and successfully face interviews.

Unit-1: **Non-Verbal Communication**

Unit-2: **Resume Preparation**

Unit-3: **E-mail writing & Professional Letter writing**

Unit-4: **Essay Writing & Paragraph writing**

Unit-5: **Group discussion**

Unit-6: **Interview skills**

Reference Books:

1. Rajendra Pal, J S KorlahaHi, *Essentials of Business Communication*, Sultan Chand & Sons
2. Andrea J. Rutherford, *Basic Communication Skills for Technology*, Pearson Education Asia
3. V. Prasad, *Advanced Communication Skills*, Atma Ram Publications
4. Barun K. Mitra, *Personality Development and Soft Skills*, Oxford University Press
5. Sanjay Kumar, Pushp Lata, *Communication Skills*, Oxford University Press
6. Meenakshi Raman, Sangeeta Sharma, *Fundamentals of Technical Communication*, Oxford University Press

IV B.TECH I SEMESTER

IV B. TECH. - I SEMESTER COURSE STRUCTURE:

S.No.	Subject	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Object Oriented Programming through Java	ES	3	1	-	40	60	100	3
2	Microcontrollers and Embedded Systems	PC	4	-	-	40	60	100	3
3	Computer Networks	PC	4	-	-	40	60	100	3
4	**Professional Elective - II:** vi. Digital IC design vii. Satellite Communications viii. Network Security and Cryptography ix. Bio Medical Instrumentation x. Advanced DSP	PE	4	-	-	40	60	100	3
5	**Professional Elective - III:** vi. Mixed Signal Design vii. Radar Systems viii. Cloud Computing ix. Analytical Instrumentation x. Digital Signal Processors and Architectures	PE	4	-	-	40	60	100	3
6	**Open Elective - III**	OE	4	-	-	40	60	100	3
7	VLSI and Embedded Systems Lab	PC	-	-	3	25	50	75	2
8	Object Oriented Programming through Java Lab	ES	-	-	3	25	50	75	2
Total			**23**	**1**	**6**	**290**	**460**	**750**	**22**

IV B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
OBJECT ORIENTED PROGRAMMING THROUGH JAVA							

COURSE OBJECTIVE:

1. The course provides fundamentals of object-oriented programming in Java and development of user interface.

COURSE OUTCOMES:

After completion of this course, student is able to:

CO1: Summarize the basic Object Oriented concepts.
CO2: Illustrate various programming constructs of Object Oriented Programing.
CO3: Analyze inheritance, packages and Exception handling concepts.
CO4: Apply multi-threading concepts.
CO5: Apply applets, Event Handling and AWT concepts in various UI Applications.

UNIT – I: INTRODUCTION TO OOP

Introduction, Need of Object Oriented Programming, Principles of Object-Oriented Languages(Classes, Objects, Abstraction, Encapsulation, Inheritance, Polymorphism), Procedural languages Vs. OOP, Applications of OOP, History of JAVA, Java Virtual Machine, Java Features(Platform Independence, Object-Oriented, Both Java compiled and interpreted, Robust, Security, Multithreaded, other features), and Program structures, Installation of JDK1.8(Getting started with JDK, JDK Installation notes, Exploring the JDK).

UNIT – II: PROGRAMMING CONSTRUCTS

Variables, Primitive Data types, Identifiers (Naming Conventions, Keywords), Literals, Operators (Binary, Unary and ternary), Expressions, Precedence rules and Associativity, Primitive Type Conversion and Casting, Flow of control (Branching, Conditional, loops).

Classes and Objects: classes, Objects, Creating Objects, Methods (method types, method overloading), constructors (Parameterized Constructors, Constructor overloading), Cleaning up unused objects (Garbage collector, Finalization), Static keyword (static variables, methods, blocks), this keyword, Arrays, Recursion, Command line arguments and String handling.

UNIT – III: INHERITANCE

Types of Inheritance, Deriving classes using extends keyword, Method overriding, super keyword, final keyword, Abstract class.

Interfaces, Packages and Enumeration: Interface (Variables in interface, Extending interface), Interface vs. Abstract classes, Packages (Creating packages, using Packages, Access protection), Understanding CLASSPATH, java.lang package(Object class, String class), enumeration.

Exceptions : Introduction, Exception handling techniques (try...catch, throw, throws, finally block), user defined exception.

UNIT – IV: MULTI-THREADING

java.lang.Thread, Thread life cycle, The main Thread, Creation of new threads (by inheriting Thread class, Implementing the Runnable interface), Thread priority, Multithreading using isAlive() and join(), Synchronization(Synchronizing Methods, Statements), Suspending and Resuming threads, Communication between Threads.

UNIT – V: APPLETS

Applet class, Applet structure, An Example Applet Program, Applet Life Cycle(init()**,** start(), stop(), destroy()), paint(),update() and repaint(), passing parameters to the Applet.

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.

Text Book:

1. The Complete Reference Java, 8ed, Herbert Schildt, TMH.

Reference Books:

1. JAVA Programming, K. Rajkumar, Pearson.
2. Core JAVA, Black Book, Nageswara Rao, Wiley, Dream Tech.

Online References:

1. https://www.coursera.org/learn/object-oriented-java
2. https://www.youtube.com/watch?v=3u1fu6f8Hto
3. https://www.edx.org/course/object-oriented-programming-in-java

IV B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
MICROCONTROLLERS AND EMBEDDED SYSTEMS							

COURSE OBJECTIVES:

1. Learn the features of basic Microcontroller, its instruction set and also other advanced controllers.
2. Know the building blocks of typical embedded system, memory devices and supporting devices.
3. Understand the characteristics and quality attributes of embedded systems
4. Study the application specific and domain specific embedded system
5. 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
6. Understand the concepts of C versus embedded C and compiler versus cross-compiler.
7. Learn about the integrated development environment and software utility tools.

COURSE OUTCOMES:

After completion of the course, student will be able to:

CO1: Explain 8051 architecture and the function of on-chip hardware units in 8051.
CO2: Develop 8051 embedded C programs for interfacing Matrix Keyboard, LCD, DAC, ADC and 7segment LED Display.
CO3: Demonstrate the architecture and function of on-chip peripherals in ARM
CO4: Summarize embedded system architecture and its building blocks.
CO5: Outline embedded system components, and Embedded Firmware designs
CO6: Illustrate RTOS Concepts

UNIT–I: INTRODUCTION TO 8051 MICROCONTROLLER

Overview of 8051 microcontroller, Architecture, I/O Ports, Memory organization, addressing modes and instruction set of 8051, Interrupts, timer/ Counter and serial communication

UNIT–II: INTERFACING AND APPLICATIONS OF 8051

Keyboard, LED, 7- segment display, LCD, stepper motor, ADC, DAC, Relays, Opt isolators and sensor interfacing with 8051 microcontroller.

UNIT–III: ARM 32-BIT MICROCONTROLLER

Introduction to 16/32 Bit processors, ARM Processor families, ARM architecture and organization, ARM / Thumb programming model, ARM / Thumb instruction set.

UNIT–IV: INTRODUCTION TO EMBEDDED SYSTEMS

Definition of Embedded System, Embedded Systems Vs. General Computing, Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems, characteristics and Quality Attributes of Embedded Systems.

UNIT–V: EMBEDDED SYSTEM COMPONENTS AND FIRMWARE

Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Serial/Parallel Communication devices, Embedded Firmware design approaches and Development languages.

UNIT–VI: 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

Text Books:

1. Ayala, K.J., "The 8051 Microcontroller Architecture, Programming and Applications", 3rd Edition, Penram International, 2007.
2. Ajay V Deshmukh, "Microcontrollers", McGraw-Hill Education, 2017.
3. Shibu K.V, "Introduction to Embedded Systems ", Tata McGraw-Hill Education Pvt. Ltd., 2009.

Reference Books:

1. Raj Kamal, "Embedded Systems", Tata McGraw-Hill Education, 2011.
2. N.Sentil Kumar, M. Saravanan, S. Jeevananthan, "Microprocessors and Microcontrollers", Oxford University Press, 2010

IV B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
COMPUTER NETWORKS							

COURSE OBJECTIVES:

1. To gain knowledge in network topology, reference models various transmission media and ISDN techniques.
2. To illustrate data link layer design issues, medium access sub layer protocols, routing and congestion in computer networking
3. To summarize transport layer and application layer functions.

COURSE OUTCOMES:

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

CO1: Describe different types of services, layers and switching techniques in computer networks.
CO2: Identify design issues of various layers in the reference model of computer networks.
CO3: Explain various network topology, transmission media and ISDN techniques.
CO4: Interpret routing and congestion algorithms.
CO5: Classify protocols used in different layers of the computer network.
CO6: Explain concepts of network security, domain name service, network management protocol, www, e-mail and multimedia.

UNIT–I: INTRODUCTION

LAN, MAN, WAN - Comparison of LAN, MAN and WAN - Network topology: Bus, Ring, Star, Mesh, Tree and Hybrid topology – Transmission technology: Broadcast and Point-to-Point transmission, Types of Services: Connection-oriented and Connectionless - ISO-OSI Reference model - TCP/IP Reference model, Problems in OSI Reference model - Problems in TCP/IP Reference model, Examples of Networks: ARPANET and Internet.

UNIT–II: PHYSICAL LAYER

Transmission media: copper wire, twisted pair, coaxial cable and fibre optic cable - Switching techniques: circuit, message and packet switching – comparison of switching techniques - Narrow band ISDN - Broadband ISDN.

UNIT–III: DATA LINK LAYER

Design issues: services provided to network layer, framing techniques, flow control, error control - Error detection and correction: Cyclic Redundancy Code, Elementary protocols: Unrestricted simplex protocol - simple stop-and-wait protocol - Sliding window protocols: 1-bit sliding window protocol, Go back n and Selective Repeat protocols.

Medium access sub layer: Channel allocation methods: Static and dynamic channel allocation – ALOHA: Pure ALOHA and Slotted ALOHA - CSMA protocols: 1-persistance CSMA, Non-persistence CSMA and P-persistence CSMA protocols - CSMA/CD protocol - IEEE 802.3 Standard Ethernet cabling – Bridges: Spanning tree bridge and Remote bridge.

UNIT–IV: NETWORK LAYER

Services provided to transport layer - Communication subnet: Virtual Circuit (VC) and datagram subnets, Routing algorithms: optimality principle - Shortest path routing – Flooding - Distance vector routing - Count-to-infinity problem - Hierarchical routing - Link state routing, Broadcast routing - Multicast routing.

Congestion: General principles, Prevention policies.

UNIT–V: TRANSPORT LAYER

Transport services – Transport service primitives - Connection management: Connection

Establishment protocols – Connection release protocol: two-army problem, Transport protocols - TCP protocol: TCP header format – UDP protocol: UDP header format.

UNIT–VI: APPLICATION LAYER

Network security: Authentication – Cryptography – Encryption types - Substitution ciphers and transposition ciphers – DES (Data Encryption Standard) – DNS (Domain Name Service) - SNMP (Simple Network Management Protocol) model – Basic functions of e-mail (Electronic mail) system - World Wide Web architecture - Salient features and applications of multimedia.

Text Books:

1. Andrew S Tanenbaum "Computer Networks", 5th Edition, PHI, 2013.
2. Behrouz A. Forouzan "Data Communications and Networking", 3rd Edition, TMH, 2002.

Reference Book:

1. W. Stallings, "Data and Computer Communication" , 10th Edition, Pearson Education, 2013.

IV B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
DIGITAL IC DESIGN *(Professional Elective – II)*							

COURSE OBJECTIVES:

1. The student will be able to understand the MOS Design.
2. The students can study Combinational MOS Logic Circuits and Sequential MOS Logic Circuits.
3. The graduate students are motivated to design and to develop the Digital Integrated Circuits for different Applications.
4. The concepts of Semiconductor Memories, Flash Memory, and RAM array organization.

COURSE OUTCOMES:

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

CO1: Explain the concepts of MOS Design.
CO2: Outline the concepts of Combinational MOS Circuits.
CO3: Construct Sequential MOS Circuits
CO4: Classify the Digital IC Design to Different Applications.
CO5: Illustrate the impact of interconnect parasitics on circuit performance.
CO6: List 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, Complex Logic circuits design – Realizing Boolean expressions using NMOS gates and CMOS gates, AOI and OIA gates, CMOS full adder, CMOS transmission gates.

UNIT-III: SEQUENTIAL MOS LOGIC CIRCUITS

Behavior of bistable elements, Clocked latch and flip flop circuits, CMOS D latch and edge triggered flip- flop. VERILOG modeling for larches, flip flops, counters, shift registers, FSMs.

UNIT-IV: DYNAMIC LOGIC CIRCUITS

Basic principle, Voltage Bootstrapping, Synchronous dynamic pass transistor circuits, Dynamic CMOS transmission gate logic, High performance, Dynamic CMOS circuits.

UNIT-V: INTERCONNECTING TECHNIQUES

Capacitive Parasitic, Resistive Parasitic, Inductive Parasitic, 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. Ken Martin, "Digital Integrated Circuit Design", Oxford University Press, 2011.
2. Sung-MoKang Yusuf Leblebici, "CMOS Digital Integrated Circuits Analysis and Design", 3rd Edition, TMH, 2011.

3. Jan M. Rabaey, Anantha Chandrakasan, Borivoje Nikolic, "Digital Integrated Circuits – A Design Perspective", 2nd Edition, PHI, 1995.

References Book:

1. Neil H.E Weste, David Harris, Ayan Banerjee" CMOS VLSI Design "4th Edition, Pearson, 2017.

IV B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
SATELLITE COMMUNICATIONS ***(Professional Elective – II)***							

COURSE OBJECTIVES:

1. Understand the fundamentals and techniques for the design of satellite communication systems.
2. Explain the baseband Processing and the basics of Various Satellite types.
3. Demonstrate the concepts of earth station and applications of GPS and Navigation**.**

COURSE OUTCOMES:

After completion of the course, student will be able to

CO1: Illustrate the orbital and functional principles of satellite communication systems

CO2: Architect, interpret, and select appropriate technologies for implementation of specified satellite communication systems

CO3: Analyse and evaluate a satellite link and suggest enhancements to improve the link performance.

CO4: Select an appropriate modulation, multiplexing, coding and multiple access schemes for a given satellite communication link.

CO5: Specify, design, prototype and test analog and digital satellite communication systems as per given specifications.

CO6: Apply the concepts of satellite navigation and global positioning system.

UNIT–I: INTRODUCTION:

Background, Basic Satellite System:-Space Segment, Ground segment, System Design Considerations, Applications, Future trends, Important milestones.

UNIT–II: ORBITAL MECHANICS AND LAUNCHERS

Orbital Mechanics:-Developing the Equations of the orbit, Describing the orbit of a satellite, Locating the satellite in the orbit, Locating the satellite with respect to the earth, Look Angle determination:-sub satellite point, Elevation Angle calculation, Azimuth Angel calculation, Orbital perturbations:-Longitudinal, Inclination changes, Orbit determination, launches and launch vehicles:-Expendable Launch Vehicles, placing satellite into geostationary orbit-geostationary transfer orbit and AKM, geostationary transfer orbit with slow orbit raising, direct insertion to GEO, Orbital effects in communication systems performance:-Doppler shift, Range Variations, Solar Eclipse, Sun Transit Outage.

UNIT–III: SATELLITE SUBSYSTEMS

Attitude and orbit control system, Telemetry, tracking, Command and monitoring, power systems, communication subsystems, Satellite antennas, Equipment reliability and Space qualification:-Space Qualification, Reliability, Redundancy.

UNIT–IV: SATELLITE LINK DESIGN AND MULTIPLE ACCESS

SATELLITE LINK DESIGN: Basic transmission theory, system noise temperature and G/T ratio, Design of down links:-Link budgets, up link design, Design of satellite links for specified C/N, System design example:-ku band uplink design, ku band downlink design.

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

Design considerations:-International regulations, Technical constraints, General configuration:-

Antenna system, Feed system ,Tracking system ,Main functional elements, Auto-Track system-conical scan, monopulse, step-track, **Characteristics:-**Fixed satellite service earth stations, Mobile satellite service earth stations, Satellite television receivers. Low Earth Orbit And Geo-Stationary Satellite Systems**:** Orbit consideration:-Equatorial orbits, Inclined orbits, Elliptical orbits, coverage and frequency considerations:-General Aspects, Frequency band, Elevation Angle Considerations, Delay & Throughput considerations, System considerations:-Incremental Growth, Interim Operations, End-to-End System Implementation, Operational NGSO constellation Designs:- Ellipse, Global star, New ICO, Iridium, Orbcomm, Sky bridge, Teledesic.

UNIT–VI: SATELLITE NAVIGATION & THE GLOBAL POSITIONING SYSTEM:

Radio and Satellite Navigation, GPS Position Location principles:-position location in GPS,GPS time, GPS Receivers and codes:-C/A code, Satellite signal acquisition, GPS Navigation Message, GPS signal levels, GPS receiver operation, GPS C/A code accuracy:-Dilution of precision, Differential GPS.

Text Books:

1. M. Richharia, "Satellite Communications systems", 2nd Edition, Macmillan Publications, 1997.
2. Timothy Pratt, Charles Bostian and Jeremy Allnutt, "Satellite Communications", 2nd Edition, WSE Wiley Publications, 2003.

References:

1. D.C Agarwal, "Satellite Communication", 7th Edition, Khanna Publications, 1989.
2. K.N. Raja Rao, "Fundamentals of Satellite Communications", PHI, 2004
3. Dennis Roddy, "Satellite Communications", 2nd Edition, McGraw Hill, 1996.

IV B.TECH. – I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
NETWORK SECURITY & CRYPTOGRAPHY *(Professional Elective – II)*							

COURSE OBJECTIVE:

1. 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.
2. During this course the students will gain knowledge in various kinds of software security problems, and techniques that could be used to protect the software from security threats.

COURSE OUTCOMES:

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

CO1: Summarize the fundamentals of Cryptography.

CO2: Analyze how security is achieved and attacks can be countered by using symmetric/asymmetric algorithms.

CO3: Apply Number Theoretic concepts in developing cryptographic algorithms to counter attacks.

CO4: Interpret the role of hash functions and Digital Signatures in Information Security.

CO5: Compare different network security designs using available secure solutions

CO6: Illustrate the use of encryption techniques to secure data in transit across data networks.

UNIT-I: INTRODUCTION

Security Attacks-Passive Attacks, Active Attacks, Security Services-Authentication, Access control, Confidentiality, Integrity, Availability service, Nonrepudiation, Security Mechanisms-Specific Security Mechanisms, Pervasive Security Mechanisms, model for Network Security, Basics of Cryptography - Symmetric Cipher Model, Substitution Techniques- Caesar Cipher, Monoalphabetic Ciphers, Playfair Cipher, Hill Cipher, polyalphabetic Ciphers, One-Time pad. Transposition Techniques-rail fence, Block and Stream Ciphers. Cyber threats and their defense (Phishing Defensive measures, SQL injection & Defense techniques) (TEXT BOOK 2),

UNIT-II: SYMMETRIC KEY CRYPTOGRAPHY

Fiestel Cipher Structure, Block Cipher Design Principles- Design Criteria, Number of Rounds, Design of Function F, Data Encryption Standard (DES), Strength of DES, Triple DES, International Data Encryption algorithm(IDEA), AES- Structure, Transformation functions, Key Expansion, Block Cipher Modes of Operation- ECB, **CBC**, OFB,CFB,CTR Modes.

UNIT-III: NUMBER THEORY

Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems-Proof and Examples, Euler's Totient Function, the Chinese Remainder Theorem, Primitive root and Discrete Logarithms.

Public Key Cryptography: Principles of Public key Cryptosystems-Public-Key Cryptosystems, Applications for Public-Key Cryptosystems, Requirements for Public-Key Cryptography, Public-Key Cryptanalysis, RSA Algorithm: Description of the Algorithm, The Security of RSA, Diffie-Hellman Key Exchange Algorithm, Elgamal encryption & decryption.

UNIT-IV: CRYPTOGRAPHIC HASH FUNCTIONS

Message Authentication Requirements and Functions-Message Encryption, Message Authentication Code, Hash Function, Message Authentication Codes (MAC)-Requirements, Security, Hash Functions-Requirements, Security, Applications of MAC and hash functions, Secure Hash Algorithm (SHA-512), HMAC&CMAC.

Digital Signatures: Digital Signature Schemes, Authentication Protocols- Mutual Authentication, One-Way Authentication, Digital Signature Standards-The DSS Approach, The digital Signature

Algorithm.

UNIT-V: AUTHENTICATION APPLICATIONS

Kerberos: Motivation, Version 4, X.509 Directory Authentication service.

Electronic Mail Security: Pretty Good Privacy (PGP): Notation, Operational Description, S/MIME: RFC 5322, Multipurpose Internet Mail Extensions, S/MIME Functionality.

UNIT-VI: WEB SECURITY

Web Security Considerations, Secure Sockets Layer- SSL Architecture, SSL Record Protocol, Change Cipher Spec Protocol, Alert Protocol, Handshake Protocol, Transport Layer Security, Secure Electronic Transactions (SET).

System Security: Firewalls-Characteristics, Types of Firewalls, Placement of Firewalls, Firewall Configuration.

Text Books:

1. Cryptography and Network Security: Principles and Practice,6th Edition, William Stallings, Pearson Education,2011.
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC Press, 2013.

Reference Books:

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press).
2. Principles of Information Security, Withman , Thomson.
3. Introduction to Cryptography, Buchmann, Springer.
4. Applied Cryptography, 2nd Edition, Bruce Schneier, Johnwiley&Sons.
5. Network Security Essentials and Cryptography, Benard Menezes, Cengage Learning,2011.
6. Cryptography and Network,2nd Edition, Behrouz A.Fourouzan and Debdeep Mukhopadhyay, McGraw-Hill,2010.

Online References:

1. https://onlinecourses.nptel.ac.in/noc18_cs07/preview
2. https://www.coursera.org/learn/cryptography
3. https://www.coursera.org/specializations/computer-network-security
4. https://www.youtube.com/watch?v=Q-HugPvA7GQ&list=PL71FE85723FD414D7

IV B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
BIOMEDICAL INSTRUMENTATION *(Professional Elective – II)*							

COURSE OBJECTIVES:

1. Identify and describe operation of biomedical instrumentation.
2. Analyze and evaluate the effect of different diagnostic and therapeutic methods, their risk potential, physical principles, opportunities and possibilities for different medical procedures.
3. Explain and contrast measurement principles for blood flow, pressure and volume as well as respiratory variables
4. Find the best suitable method for different pathological diagnoses
5. Outline the design of cardiac pacemakers and defibrillators

COURSE OUTCOMES:

After going through this course the student will be able to

CO1: Compare the different bio potential characteristics and recording methods so as to enable to record various bio signals.

CO2: Create an understanding of the nonelectrical parameters measurements so as to enable to record various non-electrical parameters

CO3: Identify the patient safety issues related to biomedical instrumentation.

CO4: Build and operate bio potential amplifiers

CO5: Illustrate the role of bio potential electrodes and the different medical imaging systems.

CO6: Apply the knowledge for the research, design and development of new medical devices.

UNIT-I: FUNDAMENTALS OF BIOMEDICAL INSTRUMENTATION

Age - Development of Biomedical Instrumentation - Man Instrumentation System - Components of the Man - Instrument System - Physiological System of the Body – Sources of biomedical signals - Problems Encountered in Measuring a Living System.

UNIT-II: ELECTRICAL PARAMETERS ACQUISITION AND ANALYSIS

Electrodes – Limb electrodes – Floating electrodes – pregelled disposable electrodes - Micro, needle and surface electrodes – silver-silver Chloride Electrodes – Electrodes for ECG - Electrodes for EEG - Electrodes for EMG - Amplifiers: Preamplifiers, differential amplifiers, chopper amplifiers – Isolation amplifier. ECG – EEG – EMG – ERG – Lead systems and recording methods – Typical waveforms.

UNIT-III: NON-ELECTRICAL PARAMETER MEASUREMENTS

The Heart and Cardiovascular System - Electro Cardiography - Measurement of blood pressure – Cardiac output – Heart rate – Heart sound – Pulmonary function measurements – spirometer – Plethysmography - Photo Plethysmography - Body Plethysmography – Blood Gas analyzers : pH of blood –measurement of blood pCO_2, pO_2.

UNIT-IV: PATIENT CARE MONITORING AND THERAPEUTIC EQUIPMENTS

Elements of Intensive - Care Monitoring - Cardiac Monitor - Patient Monitoring Displays – Diagnosis - Calibration and Repair ability of Patient - Monitoring Equipment - Other Instrumentation for Monitoring Patients - Organization of the Hospital for Patient – Care Monitoring - Pacemakers – Defibrillators – Ventilators – Nerve and muscle stimulators – Diathermy- Heart – Lung machine – Audio meters – Dializers.

UNIT-V: BIOTELEMETRY SYSTEM:

Different types of biotelemetry systems and patient monitoring – Introduction to Biometric

systems - Introduction to Biotelemetry - Physiological Parameters Adaptable to Biotelemetry - The Components of Biotelemetry System - Implantable Units - Telemetry for ECG Measurements during Exercise - Telemetry for Emergency Patient Monitoring.

MEDICAL IMAGING: Principles of Ultrasonic Measurement - Ultrasonography - Ultrasonic Applications of Therapeutic Uses - Ultrasonic Diagnosis - X-Ray and Radio-Isotope Instrumentations - Computer tomography - CAT Scan - Emission Computerized Tomography – MRI - Endoscopy – Thermography.

UNIT-VI: ELECTRICAL SAFETY IN MEDICAL ENVIRONMENT:

Biopotential Amplifiers – Monitors – Recorders - Shock Hazards and Prevention – Physiological Effects and Electrical Current - leakage current - Shock Hazards from Electrical Equipment - Instruments for checking safety parameters of biomedical equipment's - Methods of Accident Prevention - Isolated Power Distribution System.

Text Books:

1. Cromwell, Wiebell, Pfeiffer, "Bio-Medical Instrumentation & Measurements" 2nd Edition, Prentice Hall of India, 2001.
2. Onkar N. Pandey, Rakesh Kumar, "Bio-Medical Electronics and Instrumentation", Katson Books, 2011.

Reference Books:

1. Joseph J. Carr, John Brown, "Introduction to Bio-Medical Equipment Technology", 4th Edition, Pearson Publications, 2018.
2. Khandapur, "Hand Book of Bio-Medical Instrumentation", McGraw Hill, 2014.
3. M. Arumugam, "Bio-Medical Instrumentation", Anuradha Agencies, 2003.
4. L.A. Geddes and L.E. Baker, "Principles of Applied Bio-Medical Instrumentation", 1969.

IV B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ADVANCED DSP ***(Professional Elective – II)***							

COURSE OBJECTIVES:

The course content enables students to:

1. Enhance the analytical ability of the students in facing the challenges posed by growing trends in communication, control and signal processing areas.
2. Develop ability among students for problem formulation, system design and solving skills
3. Demonstrate basic knowledge of Digital Signal Processing by understanding various transformations
4. Understand Various Discrete-time signals and class of linear shift-invariant systems will be studied using the convolution sum, and the frequency domain, using transformations.
5. Design system with digital network composed of adders, delay elements, and coefficient multipliers.
6. Enhance the basic digital filter structures and their realization diagrams.

COURSE OUTCOMES:

At the end of the course students are able to

CO1: Classify the system in Time and Frequency domain through its respective tools.
CO2: Summarize the basics of multi rate digital signal processing.
CO3: Interpret various digital signal processing systems with interfacing sub systems of different sampling rates.
CO4: Illustrate the Analysis of the power spectrum by using different non parametric methods.
CO5: Compare the power spectrum by using different parametric methods like AR, MA, ARMA methods.
CO6: Define the digital filter circuits for generating desired signal wave shapes (Non-sinusoidal) for different applications like computers, control systems and counting and timing systems.

UNIT–I: 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-Direct-Form FIR Filter Structures-Polyphase Filter Structures-Time-Variant Filter Structures.

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: INTRODUCTION TO TIME – FREQUENCY ANALYSIS

Introduction to STFT, Multi Resolution Analysis, Wavelet theory, Discrete Wavelet Transform theory and continous Wavelet Transform theory, Applications.

UNIT–V: NON-PARAMETRIC METHODS OF POWER SPECTRAL ESTIMATION:

Estimation of spectra from finite duration observation of signals-Computation of the Energy Density Spectrum-Estimation of the Autocorrelation and Power Spectrum of Random Signals with the Periodogram-The Use of the DFT in Power Spectrum Estimation,

Non-parametric Methods: The Bartlett Method: Averaging Periodograms, The Welch Method: Averaging Modified Periodograms, the Blackman and Tukey Method: Smoothing the Periodogram, Performance Characteristics of Non parametric Power Spectrum Estimators Comparison of all Non-Parametric methods.

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.

Text Books:

1. J.G.Proakis & D. G. Manolakis, "Digital Signal Processing: Principles, Algorithms & Applications", 4th Edition, Pearson Education, 2007.
2. Alan V Oppenheim & R. W Schaffer, "Discrete Time Signal Processing", 3rd Edition, Pearson Education, 2009.
3. Sanjit K. Mitra, "Digital Signal Processing: A Computer - Based Approach, 4th Edition, McGraw Hill Education, 2013

Reference Books:

1. S. M .Kay, "Modern Spectral Estimation: Theory & Application", PHI, 1988.
2. P.P.Vaidyanathan , "Multi Rate Systems and Filter Banks", Pearson Education, 1993.
3. S.Salivahanan, A.Vallavaraj, C.Gnanapriya, "Digital Signal Processing", TMH, 2000.
4. Stephane Mallat, "A Wavelet Tour of Signal Processing", 3rd Edition, Academic press, 2008.

IV B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
MIXED SIGNAL DESIGN *(Professional Elective – III)*							

COURSE OBJECTIVES:

1. Understand the Switched capacitors Circuits and Operation and Analysis, PLLS.
2. Students can study Data Converter Fundamentals, Nyquist Rate A/D Converters.
3. The graduate students are motivated to study and to analyze the Oversampling Converters and Continuous-Time Filters.
4. The concepts of Continuous-Time Filters**,** CMOS Trans conductors Using Triode and Active Transistors and MOSFET-C Filters.

COURSE OUTCOMES:

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

CO1: Define the concepts of Switched Capacitor circuits.
CO2: Interpret the concepts of PLL.
CO3: Summarize the fundamentals of data converter.
CO4: Construct Nyquist Rate A/D Converters.
CO5: Build the concepts of Oversampling Converters
CO6: Develop the concept of Continuous-Time 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.

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 quantizes, Delta sigma D/A.

UNIT-VI: CONTINUOUS-TIME FILTERS

Introduction to Gm-C Filters, Bipolar Trans conductors, CMOS trans conductors Using Triode and Active Transistors, BiCMOS Tran conductors, MOSFET-C Filters**.**

Text Books:

1. Behzad Razavi, "Design of Analog CMOS Integrated Circuits", TMH Edition, 2002.
2. David A. Johns, Ken Martin "Analog Integrated Circuit Design", Wiley Student Edition, 2013.

Reference Books:

1. R. Jacob Baker, "CMOS Mixed-Signal Circuit Design", Wiley Interscience, 2009.
2. Philip E. Allen and Douglas R. Holberg, "CMOS Analog Circuit Design", Oxford University Press, International Second Edition/Indian Edition, 2010.

IV B.TECH- I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
RADAR SYSTEMS *(Professional Elective – III)*							

COURSE OBJECTIVES:

1. Different Antennas systems and communication equipment required for the operation of RADAR.
2. Different parameters of Transmitter and Receiver of RADAR
3. The concept of Doppler Effect to measure parameters of RADAR.

COURSE OUTCOMES:

After completion of this course, the students are able to

CO1: Demonstrate the basic principles of RADAR System.
CO2: Solve the RADAR Equation and to calculate Transmitter power.
CO3: Description of CW and Frequency Modulated Radar & FM-CW Radar.
CO4: Illustrate the principle of each and every block of MTI and Pulse Doppler Radar.
CO5: Contrast the different methods used for tracking targets.
CO6: Relate the Noise Figure and Noise Temperature in Radar Receivers and describe antennas used for Radars.

UNIT–I: INTRODUCTION

Nature of Radar: Basic 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, Integration of Radar Pulses, Radar Cross Section of Targets (simple targets-sphere, cone-sphere), Transmitter power, PRF and Range Ambiguities, System Losses (Qualitative treatment), Related Problems.

UNIT–II: CW AND FM-CW RADAR

CW Radar: Doppler Effect, CW Radar – Block Diagram, Isolation between Transmitter and Receiver, Non-zero IF Receiver, Bandwidth Requirement, Sign of the radial velocity, Doppler frequency shift, Applications of CW radar.

Frequency Modulated -CW Radar: Range and Doppler Measurement, Block Diagram FM-CW Radar, FM_CW altimeter, Measurement errors, Multiple Frequency CW Radar.

UNIT–III: MTI AND PULSE DOPPLER RADAR

Introduction, Description of operation , MTI Radar with-Power Amplifier Transmitter, 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, Equipment instability, Internal fluctuation, Limiting in MTI Radar, Non-coherent MTI, MTI versus Pulse Doppler radar.

UNIT–IV: TRACKING RADAR

Tracking with Radar, Types of Tracking Radar , Angle Tracking, Sequential Lobing, Conical Scan, Boxcar generator, Automatic gain control, Squint angle, Other considerations, Mono-pulse Tracking, Amplitude comparison mono pulse, Hybrid tracking system, Phase comparison mono pulse, Target Reflection Characteristics and Angular Accuracy, Amplitude fluctuations, Angle fluctuations, Receiver and servo noise, Summary of errors, Frequency agility and glint reduction, Low angle tracking, Tracking in Range, Acquisition, Comparison of Trackers.

UNIT–V: RADAR ANTENNAS

Antenna Parameters: Directive gain, power gain, effective aperture, polarization, side lobe

radiation, aperture efficiency, Parabolic Reflector Antennas, Lens Antennas, Cosecant- Squared Antenna Pattern, Radomes.

Detection of Radar Signals in Noise: Introduction, Matched Filter Receiver, Response Characteristics of Matched Filter Receiver, Derivation of Matched Filter Receiver, Correlation detection, Detection criteria, Detector Characteristics, Automatic Detection, Constant False Alarm Rate Receiver.

UNIT–VI: RADAR RECEIVERS

Introduction, Noise Figure, Noise Temperature, Displays – types, Duplexer – Branch type Duplexer, Balanced type Duplexer, Circulators as Duplexers.

Introduction to Phased Array Antennas: Basic Concepts, Radiation Pattern, Beam Steering, Beam Width changes, Series versus Parallel Feeds, Frequency scan arrays, Radiation for Phased Array, Architecture for Phased Arrays, Applications of the array in radar, Advantages and Limitations.

Text Book:

1. Merrill I. Skolnik, "Introduction to Radar Systems", 3rd Edition, Tata McGraw –Hill, 2001.

Reference Books:

1. G.S.N. Raju, "Radar Engineering and fundamentals of Navigational Aids", I.K International, 2008.
2. Byron Edde,"Radar: Principles, Technologies, Applications", Pearson Education, 2008.

IV B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
CLOUD COMPUTING *(Professional Elective – III)*							

COURSE OBJECTIVES:

1. To gain knowledge about virtualization and Virtual Machines
2. To familiarize Cloud Computing and its services

COURSE OUTCOMES:

After Completion of this course the student should be able to

CO1: Summarize the Virtualization and applications for the state-of-the-art cloud computing

CO2: Carry out the Cloud Scale and value of Cloud Computing

CO3: Analyze the infrastructure of cloud computing including public, private and hybrid clouds and various services like PaaS, SaaS, IaaS etc….

CO4: Monitor the Security and Disaster Management

CO5: Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization

CO6: Assessment of own organizations' needs for capacity building and training in cloud computing-related IT areas

UNIT–I: INTRODUCTION TO VIRTUALIZATION AND VIRTUAL MACHINE

Types Of Virtualization, Server visualization, Application/ desktop visualization, client virtualization, storage virtualization, Network visualization service / application infrastructure virtualization, virtual machines & virtualization middleware, Software as a Service (SaaS), SOA , On-Demand Computing.

UNIT–II: CLOUD COMPUTING

Introduction, What it is and What it isn't, from Collaborations to Cloud, Cloud application architectures, Value of cloud computing, Cloud Infrastructure models, Scaling a Cloud Infrastructure, Capacity Planning, Cloud Scale.

UNIT–III: DATA CENTER TO CLOUD

Move into the Cloud, Know Your Software Licenses, The Shift to a Cloud Cost Model, Service Levels for Cloud Applications

UNIT-IV: SECURITY

Disaster Recovery, Web Application Design, Machine Image Design, Privacy Design, Database Management, Data Security, Network Security, Host Security, Compromise Response.

UNIT–V: DEFINING CLOUDS FOR THE ENTERPRISE

Storage-as-a-Service, Database-as-a-Service, Information-as-a-Service, Process-as-a-Service, Application-as-a-Service, Platform-as-a-Service, Integration-as-a-Service, Security-as-a-Service, Management/Governance-as-a-Service, Testing-as-a-Service Infrastructure-as-a-Service

UNIT–VI: DISASTER RECOVERY

Disaster Recovery Planning, Disasters in the Cloud, Disaster Management, Types of Clouds, Cloud centres in detail.

Text Books:

1. Cloud Computing – Web Based Applications That Change the way you Work and Collaborate Online – Michael Miller, Pearson Education.

2. Cloud Application Architectures, 1st Edition by George Reese O'Reilly Media.

Reference Books:

1. Cloud Computing and SOA Convergence in Your Enterprise: A Step-by-Step Guide David S. Linthicum Addison-Wesley Professional.

2. Distributed & Cloud Computing From Parallel Processing to the Internet of Things by Kai Hwang. Geoffrey C. Fox. Jack J. Dongarra

IV B.TECH- I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ANALYTICAL INSTRUMENTATION *(Professional Elective – III)*							

COURSE OBJECTIVES:

1. Identify the whole Array of modern Analytical Instrumentation with tools, which are useful in further applied Research.
2. List out Different Meters and Analyzers.
3. Indicates the purpose of chromatography in various matters.
4. Select spectrophotometers in source and detection levels.
5. Predict Detectors Used in Analytical Instrumentation.
6. Memorize Basic Concept, Principles and terms of Chromatography.
7. Summarize the need of Nuclear Magnetic Resonance (NMR) and Electron Spin Resonance (ESR).

COURSE OUTCOMES:

After going through this course the student will be able to

CO1: Distinguish Different Analyzers in Analytical Instrumentation.
CO2: State the Knowledge of Different Spectrophotometer's.
CO3: Select the basic Principles of Spectroscopy and Chromatography Techniques.
CO4: Relate Different Analytical Techniques to solve Analytical and Bio-analytical Problems.
CO5: Choose Instrumentation Associated with (NMR) Spectrophotometer and Electron Spin Resonance (ESR).
CO6: Extend the use of spectro photo meters in various aspects.
CO7: Write principles of NMR and their use.

UNIT-I: PH AND CONDUCTIVITY METERS & DISSOLVED COMPONENT ANALYZER

Conductivity meters, pH meters, Dissolved oxygen Analyzer, hydrogen analyzers, Sodium analyzer, Silica analyzer and sampling systems.

UNIT-II: GAS ANALYZERS

Thermal conductivity types, CO monitor, NOX analyzer, Industrial analyzer circuits, Theory and problems on Beer – Lamberts Law.

UNIT-III: CHROMATOGRAPHY

Gas Chromatography, Liquid chromatography, their principles and applications, Oxygen analyzer, paramagnetic type detectors and sampling systems.

UNIT-IV: SPECTROPHOTOMETERS-I

UV, VIS Spectrophotometers – Single beam and double beam instruments, Instrumentation associated with the above Spectrophotometers Sources, and detectors , Sources and detectors for IR Spectrophotometers.

UNIT-V: SPECTROPHOTOMETERS-II

FT IR Spectrometer, Flame Emission and Atomic Absorption Spectrophotometer, Atomic Emission Spectrophotometer, Sources for Flame Photometer.

UNIT-VI: PRINCIPLE OF NUCLEAR MAGNETIC RESONANCE

Instrumentation Associated with (NMR) Spectrophotometer, Introduction to mass spectrophotometers, Principle and brief discussion on ELECTRON SPIN RESONANCE (ESR), Nuclear Radiation Detectors - Ionization chamber, GM Counter, Proportional Counter, Solid state

detectors.

Text Book:

1. R. S.Khandpur, "Handbook of Analytical Instruments", 2nd Edition, TMH, 2006.

Reference Books:

1. Skoog D. A, "Principles of Instrumental Analysis", Weste D.M., Holt Sounder Publication, Philadelphia, 1985.
2. R.K. Jain, "Mechanical & Industrial Measurements", 2nd Edition, Khanna Publishers, New Delhi, 1992.
3. D. Sirisha, D. Srinivas, "Analytical Instrumentation", Sure Publications, 2004.

IV B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
DIGITAL SIGNAL PROCESSORS AND ARCHITECTURES ***(Professional Elective – III)***							

COURSE OBJECTIVES:

1. To impart the knowledge of basic DSP filters and number systems to be used different types of A/D, D /A conversion errors
2. To gain concepts of digital signal processing techniques, implementation of DSP & FFT algorithms
3. To learn interfacing of serial & parallel communication devices to the processor
4. Programming the DSP TMS320C54XX PROCESSOR and decimation interpolation filters, adaptive filters
5. Learn about interfacing of serial & parallel communication devices to the processor

COURSE OUTCOMES:

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

CO1: Recognize the fundamentals of fixed and floating point architectures of various DSPs.
CO2: Learn the architecture details and instruction sets of fixed and floating point DSPs
CO3: Infer about the control instructions, interrupts, and pipeline operations.
CO4: Illustrate the features of on-chip peripheral devices and its interfacing
CO5: Analyze and learn to implement the signal processing algorithms in DSPs
CO6: Learn the DSP programming tools and use them for applications
CO7: Design and implement signal processing modules in DSPs

UNIT-I INTRODUCTION TO DIGITAL SIGNAL PROCESSING

Introduction, Digital signal-processing system, The sampling process, Digital filters, Decimation and Interpolation, Number formats for signals and coefficients in DSP systems, Dynamic Range and Precision, Sources of error in DSP implementations

UNIT-II 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-III PROGRAMMABLE DIGITAL SIGNAL PROCESSORS

Commercial Digital signal-processing Devices, 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-IV IMPLEMENTATIONS OF BASIC DSP ALGORITHMS

The Q-notation, FIR Filters, IIR Filters, Interpolation Filters, Decimation Filters, PID Controller, Adaptive Filters

UNIT-V 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).

UNIT-VI INTERFACING SERIAL CONVERTERS TO A PROGRAMMABLE DSP DEVICE

A Multichannel buffered serial port (McBSP), McBSP Programming, A CODEC interface circuit,

CODEC programming, A CODEC-DSP interface example.

Text Books:

1. Avatar Singh and S. Srinivasan, "Digital Signal Processing", Thomson Publications, 2004
2. Lapsley et al, "DSP Processor Fundamentals, Architectures & Features", S. Chand & Co, 2000.

Reference Books:

1. B. Venkataramani and M. Bhaskar, "Digital Signal Processors, Architecture, Programming and Application's, TMH, 2002.
2. Jonatham Stein, "Digital Signal Processing", John Wiley, 2005.

IV B.TECH- I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	2
VLSI AND EMBEDDED SYSTEMS LAB							

COURSE OBJECTIVES:

1. Students will be able to draw the schematic diagram & layout for the gates, Flip Flops, Counters, Static RAM cell & Differential Amplifier circuits using EDA Tool.
2. Students will be able to programs simulate & test 8051 & ARM processor based circuits & their interfaces.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1: Construct and test gates using CMOS using EDA Tool.

CO2: Construct and test D-Flip flop using CMOS NAND gate using EDA Tools.

CO3: Construct and test Decade Counter using D-Flip Flop using EDA Tool.

CO4: Construct and test static RAM cell and Differential Amplifier using CMOS using EDA Tool.

CO5: Develop basic programs in Serial and Parallel Blinking of LEDs, Serial communication implementation and Delay generation using timers using 8051.

CO6: Develop Interrupt handling, Share resource using MUTEX and Allocate resource using semaphores with ARM.

PART – A: USING SIMULATION TOOLS

1. Design and Implementation of CMOS Inverter, CMOS NOR/NAND gates.
2. Design and Implementation of CMOS XOR and XNOR gates.
3. Design and Implementation of D-Flip flop.
4. Design and Implementation of Decade Counter.
5. Design and Implementation of static RAM cell.
6. Design and Implementation of Differential Amplifier.

PART: – B: USING MICROCONTROLLERS

1. Serial and Parallel Blinking of LEDs using 8051.
2. Serial communication implementation using 8051.
3. Delay generation using timers of 8051.
4. Interrupt handling with ARM.
5. Share resource using MUTEX with ARM
6. Allocate resource using semaphores with ARM

IV B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	2
OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB							

COURSE OBJECTIVE:

1. The course provides user interface and application development program implementation using core java principles.

COURSE OUTCOMES:

After completion of this course, the students would be able to

CO1: Develop JAVA programs using Object Oriented Programing concepts.
CO2: Make use of interfaces, threads, exception handling concepts to develop java programs
CO3: Construct GUI for developing java programs.

List of Programs:

1. Write a JAVA program to display default value of all primitive data types of JAVA.
2. Write a JAVA program to display the Fibonacci sequence
3. Write a JAVA program give example for command line arguments.
4. Write a JAVA program to sort given list of numbers.
5. Write a JAVA program to search for an element in a given list of elements (linear search).
6. Write a JAVA program to search for an element in a given list of elements using binary search mechanism.
7. Write a JAVA program to determine multiplication of two matrices.
8. Write a JAVA program to sort an array of strings
9. Write a JAVA program to check whether given string is palindrome or not.
10. Write a JAVA program for call by value and call by reference.
11. Write a JAVA program to give the example for ‘this’ operator. And also use the ‘this’ keyword as return statement.
12. Write a JAVA program to demonstrate static variables, methods, and blocks.
13. Write a JAVA program using StringTokenizer class, which reads a line of integers and then displays each integer and the sum of all integers.
14. Write a JAVA program to give the example for ‘super’ keyword.
15. Write a JAVA program that illustrates simple inheritance.
16. Write a JAVA program to maintain Student Grading Database using multilevel inheritance. Student is Super class, which contains roll no, name, address. Marks derived from Student

class, which contains subject names and respective marks. Result is derived from Marks class, which contains total, grade.

17. Write a JAVA program demonstrating the difference between method overloading and method overriding.

18. Write a JAVA program demonstrating the difference between method overloading and constructor overloading.

19. Write a JAVA program that describes exception handling mechanism.

20. Write a JAVA program for example of try and catch block. In this check whether the given array size is negative or not.

21. Write a JAVA program to illustrate sub class exception precedence over base class.

22. Write a JAVA program for creation of user defined exception.

23. Write a JAVA program to illustrate creation of threads using runnable interface (start method start each of the newly created thread. Inside the run method there is sleep() for suspend the thread for 500 milliseconds).

24. 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.

25. Write a JAVA program illustrating multiple inheritance using interfaces.

26. Write a JAVA program to create a package named pl, and implement this package in Ex class.

27. Write a JAVA program to create a package named mypack and import it in Circle class.

28. Write a JAVA program 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.

29. Write a JAVA program that describes the life cycle of an applet.

30. Write a JAVA program to create a border layout control.

31. Write a JAVA program to create a grid layout control.

32. Write a JAVA program that displays the x and y position of the cursor movement using Mouse.

Write a JAVA program that allows user to draw lines, rectangles and ovals.

IV B.TECH II SEMESTER

IV B.TECH. – II SEMESTER COURSE STRUCTURE:

S.No.	Subject	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Cellular and Mobile Communications	PC	4	-	-	40	60	100	3
2	**Professional Elective - IV:** vi. Low power IC design vii. Wireless Sensor Networks viii. System-On-Chip ix. PC based Instrumentation x. Speech Processing	PE	4	-	-	40	60	100	3
3	**Professional Elective - V:** vi. FPGA Design vii. Software Defined Radio viii. Distributed Computing ix. Data Acquisition and Transmission x. Embedded System Design	PE	4	-	-	40	60	100	3
4	Self-Study Course (Mandatory Non-credit Course)	MC	-	-	-	-	-	-	-
5	Project Work	PW	-	-	-	80	120	200	10
6	Practical Training/Internship	PW	-	-	-	40	60	100	3
Total			**12**	**-**	**-**	**240**	**360**	**600**	**22**

IV B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
CELLULAR AND MOBILE COMMUNICATIONS							

COURSE OBJECTIVES:

1. To provide the student with an understanding of the Cellular concept, Frequency reuse, Hand-off strategies.
2. To enable the student to analyze and understand wireless and mobile cellular communication systems over a stochastic fading channel
3. To provide the student with an understanding of Co-channel and Non- Co-channel interference
4. To give the student an understanding of cell coverage for signal and traffic, diversity techniques and mobile antennas.
5. To give the student an understanding of frequency management, Channel assignment and types of handoff.

COURSE OUTCOMES:

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

CO1: Illustrate fundamental concept of Cellular Radio System Operation and Design: Frequency Reuse, Co-Channel Interference, Co-Channel Interference Reduction Factor (Q), Desired C/I From a Normal Case in a Omni Directional and directional Antenna System, Cell Splitting, and Cell Sectoring.

CO2: Compare Measurement of C/I value in Omnidirectional & Directional Antenna System, Co-channel, Non Co-channel interference, and Adjacent Channel Interference.

CO3: Interpret cell coverage for signal and traffic, diversity techniques and mobile antennas.

CO4: Demonstrate Frequency management and Channel assignment.

CO5: Classify different types of handoffs.

CO6: Summarize GSM architecture-channels, TDMA architecture-channels and CDMA architecture-channels.

UNIT–I: INTRODUCTION TO CELLULAR MOBILE RADIO SYSTEMS

Limitations of Conventional Mobile Telephone Systems, Basic Cellular Mobile System, First, Second, Third and Fourth Generation Cellular Wireless Systems, Uniqueness of Mobile Radio Environment- Fading -Time Dispersion Parameters, Coherence Bandwidth, Doppler Spread and Coherence Time. Fundamentals of Cellular Radio System Design: Concept of Frequency Reuse, Co-Channel Interference, Co-Channel Interference Reduction Factor, Desired C/I From a Normal Case in a Omni Directional Antenna System, System Capacity, Trunking and Grade of Service, Improving Coverage and Capacity in Cellular Systems- Cell Splitting, Sectoring, Microcell Zone Concept.

UNIT–II: CO-CHANNEL INTERFERENCE

Measurement Of Real Time Co-Channel Interference, Design of Antenna System, Antenna Parameters and Their Effects, Diversity Techniques-Space Diversity, Polarization Diversity, Frequency Diversity, Time Diversity. Non-Co-Channel Interference: Adjacent Channel Interference, Near End Far End Interference, Cross Talk, Effects on Coverage and Interference by Power Decrease, Antenna Height Decrease, Effects of Cell Site Components.

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 V'Iater and Flat Open Area, Near and Long Distance Propagation, Path Loss From a Point to Point Prediction Model in Different Conditions, Merits of Lee Model.

UNIT–III: CELL SITE AND MOBILE ANTENNAS

Space Diversity Antennas, Umbrella Pattern Antennas, Minimum Separation of Cell Site Antennas, Mobile 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: HANDOFFS AND DROPPED CALLS

Handoff Initiation, Types of Handoff, Delaying Handoff, Advantages of Handoff, Power Difference Handoff, Forced Handoff, Mobile Assisted and Soft Handoff, inter system Handoff, Introduction to Dropped Call Rates and their Evaluation.

UNIT–VI: DIGITAL CELLULAR MOBILE SYSTEM

GSM architecture, GSM-channels, TDMA-architecture, TDMA channels, CDMA architecture, CDMA-channels

Text Books:

1. William C.Y. Lee, "Mobile Cellular Telecommunications: Analog and Digital Systems", Mc Graw Hill, 2nd Edition, 2006.
2. Theodore. S. Rapport, "Wireless Communications", Pearson Education, 2010.
3. Gottapu Sashibhushana Rao, "Mobile Cellular Communication" Pearson, 2012.

Reference Books:

1. Gordon L. Stuber,"Principles of Mobile Communications", Springer International, 2nd Edn., 2001.
2. Simon Haykin, Michael Moher,"Modern Wireless Communications", Pearson Education, 2005.
3. Asrar U. H .Sheikh,"Wireless Communications Theory and Techniques", Springer, 2004.
4. Vijay Garg,"Wireless Communications and Networking", Elsevier Publications, 2007.
5. Andrea Goldsmith,"Wireless Communications", Cambridge University Press, 2005.

IV B.TECH- II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
LOW POWER IC DESIGN ***(Professional Elective – IV)***							

COURSE OBJECTIVES:

1. The student will be able to understand the Fundamentals of Low Power VLSI Design.
2. In this course, students can study low-Power Design Approaches, Power estimation and analysis.
3. The graduate students are motivated to study and analyze the Low-Voltage Low-Power Adders, Multipliers.
4. The concepts of Low-Voltage Low-Power Memories and Future Trend and Development of DRAM.

COURSE OUTCOMES:

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

CO1: Illustrate the concepts of Low-Power Design Approaches.
CO2: Apply Power reduction techniques possible at circuit level and logic level.
CO3: Interpret the low voltage technologies and circuits.
CO4: Model the gate level logic circuits in PSPICE tool.
CO5: Extend the Low Power Design to Different Applications.
CO6: List the Low-Voltage Low-Power Memories and Basics of DRAM.

UNIT–I: FUNDAMENTALS OF LOW POWER VLSI DESIGN

Need for low power VLSI chips, Sources of power dissipation on Digital Integrated circuits. Basic principles of Low Power Design, Emerging Low power approaches. Power dissipation in CMOS device, 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

Circuit level: Power consumption in circuits. Flip Flops & Latches design, high capacitance nodes, low power digital cells library

Logic level: Gate reorganization, signal gating, logic encoding, state machine encoding, pre-computation logic.

UNIT–III: 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–IV: POWER ESTIMATION AND ANALYSIS

SPICE circuit simulators, gate level logic simulation, capacitive power estimation, static state power and gate level capacitance estimation.

UNIT–V: LOW VOLTAGE LOW POWER ADDERS, MULTIPLIERS

Introduction, Standard Adder Cells, CMOS Adder's Architectures, Low Voltage Low Power Design Techniques, Current Mode Adders. Overview of Multiplication, Types of Multiplier Architectures- Braun, Baugh-Wooley, Booth, and Wallace Tree Multipliers.

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. Gary K. Yeap,"Practical Low Power Digital VLSI Design", Kluwer Academic Press, 2002.
2. Kiat-Seng Yeo, Kaushik Roy, "Low-Voltage, Low-Power VLSI Subsystems", TMH Professional Engineering, 2004.

Reference Book:

1. Kaushik Roy, Sharat C. Prasad, "Low Power CMOS VLSI Circuit Design", John Wiley & Sons, 2000.

IV B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
WIRELESS SENSOR NETWORKS *(Professional Elective – IV)*							

COURSE OBJECTIVES:

1. Obtain a broad understanding about wireless sensor networking concepts and components
2. Understand the architecture of wireless sensor network (WSN) and optimization goals.
3. Gain the knowledge on networking technologies and protocols for WSN.
4. Study MAC layer, Transport layer Protocols & its security issues in WSN.
5. Implement real time applications based on concepts of WSN.

COURSE OUTCOMES:

After completion of the course, student will able to

CO1: Interpret wireless sensor networks and the key components.
CO2: Illustrate various physical and wireless MAC layers.
CO3: Analyze different Ad hoc routing protocols.
CO4: Recall about transport layer protocols and challenges for providing QOS.
CO5: Demonstrate the security issues in wireless sensor networks and WSN applications.
CO6: Model real time applications based on concepts of wireless sensor networks

UNIT-I: OVERVIEW OF WIRELESS SENSOR NETWORKS

Introduction to sensor networks, Key definitions of sensor networks, Advantages of sensor Networks, Unique constraints and challenges, Driving Applications, Enabling Technologies for Wireless Sensor Networks.

UNIT-II: ARCHITECTURES AND NETWORKING TECHNOLOGIES

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. Physical Layer and Transceiver design Considerations, Personal area networks (PANs), hidden node and exposed node problem, Topologies of PANs, MANETs and 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 AND APPLICATIONS OF WANs

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. Ultra wide band radio communication, Wireless fidelity systems. Future directions, Home automation, smart metering Applications

Text Books:

1. C. Siva Ram Murthy and B. S. Manoj, "Ad Hoc Wireless Networks: Architectures and Protocols", PHI 2004.
2. Holger Karl & Andreas Willig, "Protocols And Architectures for Wireless Sensor Networks", John Wiley, 2005.
3. Feng Zhao & Leonidas J. Guibas, "Wireless Sensor Networks- An Information Processing Approach", Elsevier, 2007.
4. Jagannathan Sarangapani, "Wireless Ad- hoc and Sensor Networks: Protocols, Performance and Control", CRC Press, 2007.

Reference Books:

1. Kazem Sohraby, Daniel Minoli, & Taieb Znati, "Wireless Sensor Networks- Technology, Protocols, and Applications", John Wiley, 2007.
2. C.K. Toh, "Ad- Hoc Mobile Wireless Networks: Protocols & Systems", 1st Edition, Pearson Education, 2007.
3. C. S. Raghavendra, Krishna M. Sivalingam,"Wireless Sensor Networks", 2004, Springer.
4. S Anandamurugan, "Wireless Sensor Networks", Lakshmi Publications, 2010.

IV B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
SYSTEM-ON-CHIP *(Professional Elective – IV)*							

COURSE OBJECTIVES:

1. To introduce the architectural features of system on chip and complexities, concepts of processors
2. Students will be able to understand the fundamentals of memory design for SoC
3. Students will be able to understand the mapping, reconfiguration design approaches and image compression.
4. Students will be able to understand the interconnection necessities between computational block and memory block.

COURSE OUTCOMES:

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

CO1: Infer basics of System Architecture and Processor Architecture.

CO2: List different Types of Processors like VLIW Processors, Superscalar Processors etc., and Basic concepts in Processor Micro Architecture.

CO3: Interpret Cache memory, Multilevel Caches, SOC external memory and data encryption algorithm for the security needs.

CO4: Outline the Concept of Inter Connect Architectures, SOC Standard Buses and Reconfiguration Technologies.

CO5: Classify bus architectures use in SOC design and approach.

CO6: Recognize several SOC application studies in various areas like image compression with an example.

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.

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", John Wiley & Sons, 2011.

Reference Books:

1. Steve Furber, "ARM System on Chip Architecture", 2nd Edition, Addison Wesley Professional, 2000.
2. Prakash Rashinkar, Peter Paterson and Leena Singh L, "System on Chip Verification– Methodologies and Techniques", Kluwer Academic Publishers 2001.
3. Ricardo Reis, "Design of System on a Chip: Devices and Components", 1st Edition, Springer 2004.
4. Jason Andrews – Newnes, BK and CDROM, "Co-Verification of Hardware and Software for ARM System on Chip Design", Embedded Technology.

IV B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
PC BASED INSTRUMENTATION *(Professional Elective – IV)*							

COURSE OBJECTIVES:

1. Provide and ensure a comprehensive understanding of using personal computers in measurement and control instrumentation.
2. Learn the process of collecting information/ data through PC from real world sources.
3. Learn remote and networked data acquisition and operating system.
4. Learn programmable logic controllers, and its application.

COURSE OUTCOMES:

After completion of the course, the student is able to

CO1: Recall the main functional units in a PC and be able to explain how they interact.

CO2: Interpret the standard serial and parallel interfacing buses and able to distinguish account for different generations of PCs.

CO3: Infer the basics of PLC and its programming.

CO4: Demonstarte different PLC functions to applications.

CO5: Illustrate the basics of SCADA.

CO6: Develop DAQ using I/O systems.

UNIT-I: REVIEW OF COMPUTER INSTRUMENT COMMUNICATION

Personal Computer, Overview of operating System, I/O Ports, Plug-in-slots, PCI bus, Operators Interface. Computer Interfacing for Data Acquisition and Control – Interfacing Input Signals, Output system with continuous actuators. Data Acquisition and Control using Standard Cards: PC expansion systems, Plug-in Data Acquisition Boards; Transducer to Control room, Backplane bus – VXI.

UNIT-II: PROGRAMMABLE LOGIC CONTROLLER (PLC) BASICS

Definition, Overview of PLC systems, input/output modules, Power supplies and Isolators.

BASIC PLC PROGRAMMING: Programming On-Off inputs/ outputs. Creating Ladder diagrams, Basic PLC functions, register basics, timer functions, counter functions.

UNIT-III: PLC INTERMEDIATE AND ADVANCED FUNCTIONS

Arithmetic functions, Number comparison functions, Skip and MCR functions, data move systems. Utilizing digital bits, sequencer functions, Matrix functions. PLC Advanced functions: Analog PLC operation, Networking of PLC.

UNIT-IV: APPLICATION OF PLC

Controlling of Robot using PLC, PID control of continuous processes, Continuous Bottle-filling system, Batch mixing system, 3-stage air conditioning system, Automatic frequency control of Induction heating.

RELATED TOPICS: Alternate programming languages. Auxiliary commands and functions. PLC installation, troubleshooting and maintenance. Field bus: Introduction, concept. HART protocol: Method of operation, structure, and applications. Smart transmitters, smart valves and smart actuators.

UNIT-V: SCADA BASICS

Computer Process interface for Data Acquisition and control – Computer control loops.– Supervisory Digital Control (SCADA) - introduction and brief history of SCADA – SCADA Hardware and software – Landlines for SCADA – use of modems in SCADA – SCADA with LAN

UNIT-VI: DATA ACQUISITION ON THE PC

The PC as a platform for data acquisition: types of pc, the processor, memory, input and outputs ports, buses and adapter card slots. Software considerations: an overview of DA&C software, DA and control in real time, implementing real time systems on the PC and robustness reliability and safety

Text Books:

1. John. W .Webb Ronald A Reis , "Programmable Logic Controllers – Principles and Applications", Fourth edition, Prentice Hall Inc., New Jersey, 2003.
2. M.Chidambaram,"Computer Control of Processes", Narosa 2003.

Reference Books:

1. Gary Dunning,"Introduction to Programmable Logic Controllers", Thomson Delmar Learning 2nd Edition Second reprint 2003.
2. S.A.Boyer ,"Supervisory control and data acquisition", 4th edition,2010
3. Mike Tooley, "PC Based Instrumentation and Control", 3rd Edition, Elsevier.
4. Kevin James, "PC Interfacing and Data Acquisition Techniques for Measurement, Instrumentation and Control", Elsevier.
5. John Park and Steve Mackay, "Practical Data Acquisition for Instrumentation and Control Systems", Elsevier, 2003.
6. Frank D. Petruzella, "Programmable Logic Controllers", 2nd Edition, Mc Graw Hill, Newyork, 1997.

IV B.TECH- II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
SPEECH PROCESSING *(Professional Elective – IV)*							

COURSE OBJECTIVES:

1. To introduce the models for speech production and develop time and frequency domain techniques for estimating speech parameters.
2. To introduce a predictive technique for speech compression
3. To understand speech recognition, synthesis and speaker identification.

COURSE OUTCOMES:

After going through this course the student will be able to

CO1: Describe human speech generation system

CO2: Apply standard digital signal processing tools to analyze speech signals

CO3: Employ signal processing techniques to analyze speech in time and frequency domains

CO4: Experiment on different type of speech samples to extract some features and illustrate the results in MATLAB

CO5: Design speech and speaker recognition systems for computer applications

CO6: Develop software to implement text to speech and speech to text applications

UNIT-I: SPEECH PRODUCTION AND ACOUSTIC PHONETICS

The process of speech production, Acoustic theory of speech production, Digital models of speech signals of speech signal, Articulator phonetics, Acoustic Phonetics, Co- articulation, Prosody.

UNIT-II: SPEECH ANALYSIS

Time and frequency domain analysis of speech, linear predictive coding (LPC) analysis, Cepstral analysis, Speech parameter (pitch) estimation.

UNIT-III: CODING OF SPEECH SIGNALS

Introduction, Quantization, Speech redundancies, Time domain waveform coding, linear predictive coding, linear delta modulation, Adaptive delta modulation, Adaptive differential pulse code modulation, Filter bank analysis, Phase vocoders and Channel vocoders, Adoptive Multirate Coders.

UNIT-IV: SPEECH ENHANCEMENT

Introduction, Nature of interfering sounds speech enhancement techniques, spectral subtraction and filtering, harmonic filtering, Spectral subtraction, Adaptive noise cancellation.

UNIT-V: SPEECH RECOGNITION

Introduction, Bayes' rule, Segmental feature extraction, MFCC, DTW, HMM and DNN approaches for speech recognition

UNIT-VI: SPEECH SYNTHESIS

Principles of speech synthesis, Methods, Techniques and Algorithms, Articulatory synthesis, Formant synthesis and LPC synthesis, Applications of speech synthesis.

Text Books:

1. Lawrence R. Rabiner and Ronald W. Schafer, "Digital Processing of Speech Signals", Pearson Education, Fourth Impression 2009.
2. JR Deller, Jr, JG Proakis & JHL Hansen, "Discrete-Time Processing of Speech Signals", Macmillan 1993.
3. L R Rabiner, B-H Juang and B Yegnanarayana, "Fundamentals of Speech Recognition," Pearson, 2009 (Indian subcontinent adaptation).

Reference Books:

1. Ben Gold & Nelson Morgan, "Speech and Audio Signal Processing", John Wiley and Sons, 2006.
2. Thomas F. Quatieri, "Discrete Time Speech Signal Processing: Principles and Practice", Prentice Hall, 2002.
3. J. L. Flanagan, "Speech Analysis Synthesis and Perception", 2nd Edition, Springer-Verlag, 1983.

IV B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
FPGA DESIGN *(Professional Elective – V)*							

COURSE OBJECTIVES:

1. To introduce the advanced design and analysis of digital circuits with HDL. The primary goal is to provide in depth understanding of logic and system design.
2. The course enables students to apply their knowledge for the design of advanced digital hardware systems with help of FPGA tools.

COURSE OUTCOMES:

After completion of the course, students will be able to

CO1: Recall combinational and sequential digital circuits, Logic Families, LSI and VLSI Components.
CO2: Classify the various memory architectures.
CO3: Explain the Programmable Logic Devices on FPGA logic blocks.
CO4: Build the architecture of digital IC logic families for given specifications.
CO5: Develop test benches to simulate combinational and sequential circuits.
CO6: Apply the knowledge of FPGA architectures for different applications.

UNIT-I: SYSTEM IMPLEMENTATION STRATEGIES

Introduction to FPGA, FPGA Paradigm, Design and Implementation using FPGA, Implementation styles, design styles, design methodologies.

UNIT-II: REVIEW OF LOGIC DESIGN AND ELECTRICAL ASPECTS

Combinational circuit design, Sequential circuit design, State Machines, Petri Nets for State machines, Electrical Aspects.

UNIT-III: SRAM PROGRAMMABLE FPGAS

Introduction, Programming Technology, Device Architecture, The Xilinx XC2000, XC3000 and XC4000 Architectures.

UNIT-IV: ANTI-FUSE PROGRAMMED FPGAS

Introduction, Programming Technology, Device Architecture, The Actel ACT1, ACT2 and ACT3 Architectures.

UNIT-V: DESIGN PROCESS FLOWS AND SOFTWARE TOOLS

Software Tool box, FPGA Design Dichotomy, Design Process Flow, ASIC Route, Libraries and Design Idioms, Placement, Routing and Wirability.

UNIT-VI: DESIGN APPLICATIONS

General Design Issues, Counter Examples, A Fast Video Controller, A Position Tracker for a Robot Manipulator, A Fast DMA Controller, Designing Counters with ACT devices, Designing Adders and Accumulators with the ACT Architecture.

Text Books:

1. John V. Oldfield, Richard C. Dorf, "Field Programmable Gated Arrays" John Wiley, Reprint 2008.
2. Wayne Wolf, "FPGA Based System Design", Prentice Hall Modern Semiconductor Design Series. 3rd Edition, 2004.
3. Stephen M. Trimberger, "Field Programmable Gate Array Technology", Springer International Edition. 2012.

Reference Books:

1. Stephen Brown & Zvonko Vranesic, "Digital Logic Design with Verilog HDL" 2nd Edition, TATA Mc Graw Hill Ltd. 2007.
2. T. R. Padmanabhan and B. Bala Tripura Sundari, "Design through Verilog HDL" A John Wiley & Sons, Inc., Publication, IEEE press. October 2003.

IV B.TECH- II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
SOFTWARE DEFINED RADIO *(Professional Elective – V)*							

COURSE OBJECTIVES:

1. Know the basics of the software defined radios.
2. Learn the design of the wireless networks based on the cognitive radios
3. Understand the concepts of wireless networks and next generation networks

COURSE OUTCOMES:

After going through this course the student will be able to

CO1: Describe the basics of the software defined radios.
CO2: Design the wireless networks based on the cognitive radios
CO3: Explain the concepts behind the wireless networks.
CO4: Compare SDR with traditional Hardware Radio HDR.
CO5: Illustarte the concept of Cognitive Radio.
CO6: Develop open projects and explore their capability to build their own communication system.

UNIT-I: INTRODUCTION TO SOFTWARE RADIO CONCEPTS

The need for Software radios and its definition, Characteristics and benefits of Software radio, Design principles of a software radio.

Radio Frequency Implementation Issues: Purpose of RF front – end, Dynamic range, 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 & DAC distortion, Pre-distortion, Flexible RF systems using micro-electromechanical systems.

UNIT-II: MULTIRATE SIGNAL PROCESSING IN SDR

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: SMART ANTENNAS

Introduction, Vector channel modeling, Benefits of smart antennas, Structures for beamforming systems, Smart antenna algorithms, Diversity and Space time adaptive signal processing, Algorithms for transmit STAP, Hardware implementation of smart antennas, Array calibration.

UNIT-V: THE SOFTWARE DEFINED RADIO AS A PLATFORM FOR COGNITIVE RADIO

Introduction, Hardware Architecture, Software Architecture, SDR Development and Design, Applications, Development, Cognitive Waveform Development.

UNIT-VI: COGNITIVE RADIO: THE TECHNOLOGIES REQUIRED

Introduction, Radio Flexibility and Capability, Aware, Adaptive, and CRs, Comparison of Radio Capabilities and Properties, Available Technologies for CRs.

Text Books:

1. Jeffrey Hugh Reed, "Software Radio: A Modern Approach to Radio Engineering," Prentice

Hall Professional, 2002.
2. Bruce A. Fette, "Cognitive Radio Technology", Elsevier, 2009.

Reference Books:

1. Ian F. Akyildiz, Won – Yeol Lee, Mehmet C. Vuran, Shantidev Mohanty, "Next generation / dynamic spectrum access / cognitive radio wireless networks: A Survey" Elsevier Computer Networks, May 2006.
2. Simon Haykin, "Cognitive Radio: Brain –Empowered Wireless Communications", IEEE Journal on selected areas in communications, Feb 2005.
3. Alexander M. Wyglinski, Maziarnekovee, Y. Thomas Hu, "Cognitive Radio Communication and Networks", Elsevier, 2010.

IV B.TECH. II – SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
DISTRIBUTED COMPUTING *(Professional Elective – V)*							

COURSE OBJECTIVES:

1. The aim of this module is to study, learn, and understand the main concepts of advanced operating systems (parallel processing systems, distributed systems, real time systems, network operating systems, and open source operating systems);
2. Hardware and software features that support these systems.

COURSE OUTCOMES:

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

CO1: Outline the potential benefits of distributed systems

CO2: Interpret synchronization techniques in distributed systems.

CO3: Analyze various distributed deadlock detection and prevention techniques.

CO4: Summarize process scheduling techniques, threads and fault tolerance in distributed environments.

CO5: Interpret distributed file system implementations and shared memory**.**

CO6: Relate distributed system functions in MACH and DCE.

UNIT–I: INTRODUCTION TO DISTRIBUTED SYSTEMS

Goals of distributed system, hardware and software concepts, design issues. Communication in Distributed systems: Layered protocols, ATM networks, the Client - Server model, remote procedure call and group communication.

UNIT–II: SYNCHRONIZATION IN DISTRIBUTED SYSTEMS

Clock synchronization, Mutual exclusion, E-tech algorithms, the Bully algorithm, a ring algorithm, atomic transactions.

UNIT-III: DEADLOCKS

Deadlock in distributed systems, Distributed deadlock prevention, and distributed dead lock detection.

UNIT–IV: PROCESSES

Processes and Processors in distributed systems: Threads, system models, Processor allocation, Scheduling in distributed system, Fault tolerance and real time distributed systems.

UNIT-V: DISTRIBUTED FILE SYSTEMS

Distributed file systems design, distributed file system implementation, trends in distributed file systems. Distributed shared memory : What is shared memory, consistency models, page based distributed shared memory, shared variable distributed shared memory, object based DSM.

UNIT-VI: CASE STUDY MACH

Introduction to MACH, process management in MACH, memory management in MACH, communication in MACH, UNIX emulation in MACH. Case study DCE : Introduction to DCE threads, RPC's, Time service, Directory service, security service, Distributed file system.

Text Books:

1. Distributed Operating System - Andrew. S. Tanenbaum, PHI
2. Operating Systems' – Internal and Design Principles Stallings, Fifth Edition–2005, Pearson education/PHI

Reference Books:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI.

Online References:

1. http://www.cs.colostate.edu/~cs551dl/externalLinks.php
2. http://www.personal.kent.edu/~rmuhamma/OpSystems/os.html
3. https://www.sanfoundry.com/operating-system-questions-answers-distributed-operating-system/
4. https://link.springer.com/journal/446
5. https://www.ukessays.com/.../the-distributed-operating-system-info...
6. https://www.youtube.com/watch?v=sK9MC5GREXg

IV B.TECH- II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
DATA ACQUISITION AND TRANSMISSION *(Professional Elective – V)*							

COURSE OBJECTIVES:

1. To understand different types of data acquisition systems.
2. To understand different types of data transmission systems.
3. To understand different types of digital instruments

COURSE OUTCOMES:

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

CO1: Define a data acquisition system.
CO2: Compare analog and digital data acquisition system.
CO3: Infer different data transmission systems.
CO4: Explain different display systems.
CO5: Infer different types of digital instruments.
CO6: List different recorders used in data acquisition and transmission.

UNIT-I: DATA ACQUISITION SYSTEM

Definition and generalized block diagram of data acquisition system (DAS), Classification of Data Acquisition System.

UNIT-II: ACQUISITION SYSTEMS

Analog data acquisition system using time division multiplexing, Analog data acquisition system using frequency division multiplexing, Digital data acquisition system with different configurations and Data logger.

UNIT-III: DATA TRANSMISSION SYSTEMS

Definition, Generalized block diagram of Telemetry system, Classification of Telemetry system and working principle, Block diagram, Construction, Landline Telemetry system, Radio frequency amplitude modulated and frequency modulated telemetry system, Pulse telemetry system, Modem based telemetry system, Satellite Telemetry system and Fiber optic Telemetry system.

UNIT-IV: DISPLAY SYSTEMS

Construction, principle of operation and salient features of LED, Nixie tube, LCD, segmental gas discharge type, single and multi-digit LED 7-segmental display system , Nixie tube based display system for numeric display (study of BCD to decimal decoder), to design LED Dot Matrix (3 x 5) numeric display system and LCD 7- segmental numeric display system.

UNIT-V: DIGITAL INSTRUMENTS

Digital Frequency Meter: working principle, construction, range selection and operation of time period meter, frequency ratio meter, Digital Clock: block diagram construction and working, Analog Storage Oscilloscope and Digital storage oscilloscope: working principle, construction, operation and salient features.

UNIT-VI: RECORDERS

The working principle, construction, operation and salient features of X-t strip chart recorder, X-Y strip chart recorder and Magnetic tape recorder.

Text Books:

1. Sawhney A K, "Electric and Electronic Measurement and Instrumentation", Dhanpat Rai and Sons, New Delhi, 2007.
2. David A. Bell, "Electronic Instrumentation and Measurements", 3rd Edition, Oxford University Press India, 2013.

Reference Books:

1. Doebelin E O, "Measurement systems – Applications and Deign", McGraw Hill, New Delhi, 2003.
2. Mani and Rangan, "Instrumentation Devices and Systems", Tata McGraw Hill, New Delhi, 1997.

IV B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
EMBEDDED SYSTEM DESIGN *(Professional Elective – V)*							

COURSE OBJECTIVES:

1. The method of designing a real time systems
2. Implementation and testing an embedded system
3. Summarize special concerns that real-time systems present and how these concerns are addressed

COURSE OUTCOMES:

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

CO1: Recall the fundamentals of Core of the Embedded system.
CO2: Define process models and technologies to design an Embedded system.
CO3: Demonstrate the customization of Hardware/Software.
CO4: Delineate the unique characteristics of Embedded systems.
CO5: Make use of system design techniques to develop Hardware/Software for embedded systems.
CO6: Develop an embedded system with real time constraints.

UNIT-I: INTRODUCTION

Embedded systems overview, Design Challenges, Processor Technology, IC Technology, Design Technology, Trade-offs.

UNIT-II: CUSTOM SINGLE PURPOSE PROCESSORS: HARDWARE

Combinational logic, Sequential logic, Custom single-purpose processor Design, RT-level Custom single-purpose processor Design, Optimizing Custom single-purpose processor.

UNIT-III: GENERAL PURPOSE PROCESSORS: SOFTWARE

Basic Architecture, Operation, Programmer's view, Development Environment, Application specific Instruction set processors, Selecting a processor, General purpose processor design.

UNIT-IV: MEMORY

Common memory types, composing memory, memory hierarchy and cache.
INTERFACING: Arbitration, Multilevel bus architectures, advanced communication principles.

UNIT-V: STATE MACHINE AND CONCURRENT PROCESS MODELS

Models vs Languages, Basic state machine model, HCFSM and state charts language, program state machine model, Role of appropriate model and language, concurrent process model, communication among processes, Synchronization among processes, Implementation, Real time systems.

UNIT-VI: IC TECHNOLOGY

Full custom IC technology, Semi-custom IC technology, PLD IC technology.
DESIGN TECHNOLOGY: Automation: Synthesis, Verification: Hardware/Software co-simulation, Reuse: Intellectual property cores, Design process models.

Text Book:

1. Frank Vahid, Tony D. Givargis "Embedded System Design: A Unified Hardware/Software Introduction", Wiley India Edition, 2002.

Reference Books:

1. KVKK Prasad, "Embedded / Real Time Systems", Dreamtech Press, 2005.
2. Shibu K.V, "Introduction to Embedded Systems ", Tata Mc Graw Hill, 2009.
3. David E. Simon, "An Embedded Software Primer", Pearson Education, Eighth Impression 2009.