

Academic Regulations, Course Structure and Syllabus

B. TECH.
Civil 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 -All Grade; ISO 9001:2008 Certified Institution.
Phone: 08647239905 Website: www.nrtec.ac.in

ACADEMIC REGULATIONS - 2016 FOR B.TECH (REGULAR)
(Effective for the students admitted into I year from the Academic Year 2016-17 and onwards)

1. QUALIFICATION FOR ADMISSION

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 fulfills 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 candidate registers for 180 credits and secures all the 180 credits.

3. COURSES OF STUDY

The following courses of study are offered at present as specializations in the B.Tech. courses with English as medium of instruction.

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 Subject / 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.

Each Objective type test question paper shall contain 10 objective questions (Covering Multiple choice / Fill in the blanks / True or False / Matching etc.,) for 10 marks covering syllabus from 3 units, which are considered for descriptive type test (10X1M = 10M). The Objective Examination will be conducted for 15 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.

b. EXTERNAL EVALUATION

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

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

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.

DRAWING SUBJECTS

For the subject having design and / or drawing, (such as Engineering Graphics, Engineering Drawing, Machine Drawing etc.) and estimation, 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 charts)

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.

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 packages

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 packages 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)

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. PRACTICAL TRAINING / INTERNSHIP

Practical training / Internship will be evaluated for 100 marks. Out of 100 marks 40 marks will be awarded at Industry / Training Agency by the concerned authority for day-to-day work / performance. And the remaining 60 marks will be awarded at the college by a committee constituted by the authorities consisting of concerned department HOD, senior faculties and an external examiner as follows:

Report Submission - 20 marks

Presentation - 20 marks

Viva-voce - 20 marks

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.

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:

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

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 are 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 fulfills the attendance requirement in the present semester, he shall not be eligible for re-admission into the same semester.

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 fulfills 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 fulfills 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 registrations in audit courses/ mandatory courses i.e. Advanced Communication skills, Quantitative Aptitude, Verbal Ability, 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) 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) 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

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 candidate who passed all the subjects in that semester.

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

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

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

CONSOLIDATED GRADE MEMO

A Consolidated Grade Memo containing credits and grades obtained by the candidate will be issued after completion of the four year B.Tech program.

11. RECOUNTING /REVALUATION

1. Student can submit the application for recounting / revaluation, along with the prescribed fee for recounting / 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 recounting / revaluation of such answer script(s).
3. An External examiner, other than the first examiner shall recount / reevaluate 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.

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.

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.

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.

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.

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 fulfills 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 are 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 fulfills 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:

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.

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 IN EXAMINATIONS

- 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
	<i>If the candidate:</i>	
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 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	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.

DEPARTMENT OF CIVIL ENGINEERING

	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 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.

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 CIVIL ENGINEERING****COURSE STRUCTURE****I B. Tech. - I SEMESTER**

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

HS: Humanities and Social Sciences

ES: Engineering Sciences

BS: Basic Sciences

PC: Professional Course

PE: Professional Elective

OE: Open Elective

PW: Project Work

MC: Mandatory Course (No Credits)

L: Lecture

T: Tutorial

P: Practical

DEPARTMENT OF CIVIL ENGINEERING

I B. Tech. - II SEMESTER

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

II B.TECH - I SEMESTER

S.No	Subject Name	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Probability & statistics	BS	3	1	-	40	60	100	3
2	Building materials and construction	PC	4	-	-	40	60	100	3
3	Building planning and drawing	PC	1	-	4	40	60	100	3
4	Surveying –I	PC	3	1	-	40	60	100	3
5	Fluid mechanics	ES	3	1	-	40	60	100	3
6	Mechanics of solids	ES	3	1	-	40	60	100	3
7	Surveying Laboratory-I	PC	-	-	3	25	50	75	2
8	Mechanic of solids Laboratory	ES	-	-	3	25	50	75	2
9	Verbal Ability (Mandatory Non Credit Course)	MDC	3	-	-	-	-	-	-
	TOTAL		20	4	10	290	460	750	22

DEPARTMENT OF CIVIL ENGINEERING

II B.TECH - II SEMESTER

S.No	Subject Name	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Structural analysis-1	PC	3	1	-	40	60	100	3
2	Hydraulics and hydraulic machinery	PC	3	1	-	40	60	100	3
3	Engineering geology	PC	4	-	-	40	60	100	3
4	Surveying-II	PC	3	1	-	40	60	100	3
5	Hydrology & Irrigation Engineering	PC	3	1	-	40	60	100	3
6	Surveying Laboratory-II	PC	-	-	3	25	50	75	2
7	FM&HM Laboratory	ES	-	-	3	25	50	75	2
8	Engineering geology Laboratory	PC	-	-	3	25	50	75	2
9	Mini Project on surveying field work	PRC	-	-	3	25	50	75	1
10	Quantitative Aptitude and Reasoning	MDC	3	-	-	-	-	-	-
	TOTAL		19	4	12	300	500	800	22

III B.TECH - I SEMESTER COURSE STRUCTURE

S.No	Subject Name	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Structural Analysis-II	PC	3	1	-	40	60	100	3
2	Concrete Technology	PC	4	-	-	40	60	100	3
3	Geotechnical Engineering –I	PC	3	1	-	40	60	100	3
4	Design And Drawing Of Concrete Structures	PC	3	1	-	40	60	100	3
5	Transportation Engineering-I	PC	4	-	-	40	60	100	3
6	Open Elective-I (See The List Of Open Electives)	OE	4	-	-	40	60	100	3
7	Geotechnical Engineering Laboratory	PC	-	-	3	25	50	75	2
8	Concrete Technology Laboratory	PC	-	-	3	25	50	75	2
9	Advanced Communication Skills (Mandatory Non Credit Course)	MDC	3	-	-	-	-	-	-
10	Sports And Games (Mandatory Non Credit Course)	MDC	-	-	2	-	-	-	-
	TOTAL		24	3	8	290	460	750	22

III B.TECH - II SEMESTER COURSE STRUCTURE

S.No	Subject Name	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Design And Drawing Of Steel Structures	PC	3	1	-	40	60	100	3
2	Environmental Engineering-I	PC	3	1	-	40	60	100	3
3	Geotechnical Engineering –II	PC	3	1	-	40	60	100	3
4	Transportation Engineering-II	PC	4	-	-	40	60	100	3
5	Professional Elective-I	PE	3	1	-	40	60	100	3
	Advanced Structural Analysis								
	Alternative Building Materials & Technologies								
	Ground Improvement Techniques								
	Ground Water Hydrology								
	Rural Water Supply & Sanitation								
6	Open Elective-II (See The List Of Open Electives)	OE	4	-	-	40	60	100	3
7	Transportation Engineering Laboratory	PC	-	-	3	25	50	75	2
8	Computer Applications In Civil Engineering Laboratory	ES	-	-	3	25	50	75	2
9	Quantitative Aptitude And Reasoning-II (Mandatory Non Credit Course)	MDC	3	-	-	-	-	-	-
	TOTAL		23	4	6	290	460	750	22

IV B.TECH- I SEMESTER COURSE STRUCTURE

S.No	Subject Name	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Estimation Costing & Valuation	PC	3	1	-	40	60	100	3
2	Environmental Engineering-II	PC	3	1	-	40	60	100	3
3	Construction Technology & Management	HS	4	-	-	40	60	100	3
4	Open Elective-III (See The List Of Open Electives)	OE	4	-	-	40	60	100	3
5	Professional Elective-II	PE							
	Matrix Methods Of Structural Analysis		3	1	-	40	60	100	3
	Advanced Design Of R C Structures								
	Earth And Earth Retaining Structures								
	Highway Geometric Design								
	Open Channel Hydraulics								
	Advanced Surveying								
6	Professional Elective-III	PE							
	Numerical Methods In Civil Engineering		3	1	-	40	60	100	3
	Theory Of Elasticity								
	Pavement Materials And Construction								
	Air Pollution And Control								
	Photogrammetry And Remote Sensing								
	Advanced Design Of Steel Structures								
	Bridge Engineering								
7	Environmental Engineering Lab	PC	-	-	3	25	50	75	2
8	Mini Project On Planning, Analysis & Design Of G+2building	PRC	-	-	3	25	50	75	2

IV B.TECH- II SEMESTER COURSE STRUCTURE

S.No	Subject Name	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Business Management Concepts For Engineers	PC	4	-	-	40	60	100	3
2	Professional Elective-IV	PE							
	Pre-Stressed Concrete Structures								
	Advanced Foundation Engineering.								
	Pavement Design								
	Earthquake Resistant Design Of Structures		3	1	-	40	60	100	3
	Industrial Waste Water Treatment								
	Pre-Fabricated Structures								
	Design And Drawing Of Hydraulic Structures								
3	Professional Elective-V	PE							
	Finite Element Analysis								
	Reinforced Earth Structures								
	Urban Transport Planning								
	Geographic Information System		3	1	-	40	60	100	3
	Water Resources Engineering								
	Environmental Impact Assessment								
4	Project Work	PRC	-	-	-	80	120	200	10
5	Practical Training/Intern Ship	PRC	-	-	-	40	60	100	03
	TOTAL		10	2	-	240	360	600	22

LIST OF OPEN ELECTIVES:

Open Elective – I Subject Title	Department Offering the Subject	No.of periods per week		No.of Credits
		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,ECE & ME)	EEE	4	-	3
Industrial Electronics (Other Than EEE)	EEE	4	-	3
Principles Of Signals, System & 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 CSE & ECE)	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 Micro Controllers (Other Than ECE & EEE)	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 CSE & ECE)	CSE	4	-	3
Disaster Management	CE	4	-	3
Building Services (Other Than CE).	CE	4	-	3

DEPARTMENT OF CIVIL ENGINEERING

Open Elective – III	Department Offering the Subject	No.of periods per week		No.of Credits
		L	T	
Subject Title				
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	ECE	4	-	3
Computer Networks (Other Than CSE & ECE)	CSE	4	-	3
Web Animation And Interactivity Using Flash	CSE	4	-	3
Web Services	CSE	4	-	3
Water Shed 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

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

HS: Humanities and Social Sciences

ES: Engineering Sciences

BS: Basic Sciences

PC: Professional Course

PE: Professional Elective

OE: Open Elective

PW: Project Work

MC: Mandatory Course (No Credits)

L: Lecture

T: Tutorial

P: Practical

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:

1. To enable the engineering students develop their basic communication skills in English for academic and social purposes.
2. To equip the students with appropriate oral and written communication skills.
3. To inculcate the skills of listening, reading and critical thinking.
4. To integrate English Language learning with employability skills and training.
5. To enhance the students' proficiency in reading skills enabling them meet the academic demands of their course

COURSE OUTCOMES:

Learners are able to

1. Read and comprehend complex texts actively; guess the meanings of words; recognize key passages; raise questions; draw inferences, summarize texts.
2. Write paragraphs, essays, emails and letters.
3. Learn grammatical structures and write grammatically correct sentences.
4. Enhance word power and usage of lexicons

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:

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

OUTCOME: demonstrate reading speed and comprehend the gist of passage. Intensive reading, Extensive reading, predicting the content, skimming, scanning, Inferring meanings: lexical and contextual.

TEXTBOOK:

1. Using English – Orient Black Swan Pvt. Ltd. Publishers

REFERENCE BOOKS:

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>

DEPARTMENT OF CIVIL ENGINEERING

I B.TECH-I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	3
FUNCTIONAL 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 DIFFERENTIATION: Function of two or more variables, Partial derivatives, Total derivatives, change of variables, Jacobian - functional dependence, Taylor'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 BOOKS:

1. Dr. B.S. Grewal -Higher Engineering Mathematics II, 42nd Edition, Khanna Publishers, 2012.

REFERENCES:

1. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, -Engineering Mathematics||,
2. 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
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 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 ordinary differential equations of first order.
- Solve the second and higher order, Identify the maxima and minima of single variable functions
- Evaluate the maxima and minima of function of two variables..
- Analyze the basic concept of partial differentiation and interpret the one dimension wave equation and one dimension of heat equation.

UNIT - I: LINEAR SYSTEMS OF EQUATIONS: Rank of a matrix - Echelon form, Normal form, Solution of linear systems, Direct Methods, Gauss elimination, Gauss Jordan 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, Trapezoidal rule, Simpson's (1/3)rd rule, Simpons's (3/8)th rule.

TEXT BOOK:

1. B.S.Grewal, Higher Engineering Mathematics, 42nd Edition, Khanna Publisher.

REFERENCES:

1. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, -Engineering Mathematics, University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.
2. V. Ravindranath and P. Vijayalaxmi, Mathematical Methods, Himalaya Publishing House.
3. Dean G Duffy, advanced Engineering Mathematics with MATLAB, CRC Press.
4. Erwyn Kreyszig, Advanced Engineering Mathematics, 9th Edition, wiley-India.
5. Srimanta Pal and Suboth C. bhunia, "*Engineering Mathematics*", oxford University Press, 2015.
6. Steven C.Chapra, Raymond P.Canale -Numerical Methods for Engineers| Tata Mc-Graw Hill.

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 Jordan 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, Simpson’s (1/3)rd rule, Simpons’s (3/8)th rule.

TEXT BOOKS:

1. B.S.Grewal, Higher Engineering Mathematics, 42nd Edition, Khanna Publisher.

REFERENCES:

1. N.P. Bali, Bhavanari Satyanarayana, Indrani Promod Kelkar, -Engineering Mathematics, University Science Press, (An Imprint of Lakshmi Publications Pvt., Ltd) New Delhi, 2012.
2. V. Ravindranath and P. Vijayalaxmi, Mathematical Methods, Himalaya Publishing House.
3. Dean G Duffy, advanced Engineering Mathematics with MATLAB, CRC Press.
4. Erwyn Kreyszig, Advanced Engineering Mathematics, 9th Edition, wiley-India.
5. Srimanta Pal and Suboth C. bhunia, “*Engineering Mathematics*”, oxford University Press, 2015.
6. Steven C.Chapra, Raymond P.Canale -Numerical Methods for Engineers, Tata Mc-Graw Hill.

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	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:

- Analyze the water technology deals with the processes and mechanisms that are required to manage the human water cycle.
- Importance of different types of polymers.
- Inspect the materials like nanomaterial, fullerenes and liquid crystals, solar cells and cement.
- Distinguish electrical energy sources and importance of corrosion science
- Analyze the various characterization techniques of fuels and their economics
- Analyze the basics of photochemistry, Law of absorption of light and applications of Lambert Beer's law.

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: Nanomaterial's: 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. Engineering Chemistry, P.C. Jain and M. Jain, Dhanpat Rai & Sons, Delhi.
2. A Textbook of Engineering Chemistry, Shashi Chawla, Dhanpat Rai & Sons, Delhi.

3. A Textbook of Engineering Chemistry, S.S. Dara, S. Chand & Co. New Delhi.
4. A Text Book of Engineering Chemistry, N.Y.S. Murthy, V. Anuradha, K. Rama Rao, Maruthi Publications.
5. Engineering Chemistry, B. Sivasankar, (2010), McGraw-Hill companies

REFERENCES:

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

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
PROGRAMMING WITH C (Common to ECE,EEE,CIVIL and Mechanical)							

COURSE OBJECTIVE:

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

COURSE OUTCOME:

CO1: Study and Understand basics of computer Hardware and Software.

CO2: Study, Analyze and Understand logical structure of computer programming and different constructs to develop programs in C language.

CO3: Understand and Analyze simple data structures and use of pointers and dynamic memory allocation technique.

CO4: Create files and apply file I/O operations.

UNIT - I:

INTRODUCTION: Computer systems, Hardware and Software Concepts,

PROBLEM SOLVING: Algorithm / Pseudo code, flowchart, program development steps, computer languages: machine, symbolic and high-level languages, Creating and Running Programs: Writing, Editing(vi/emacs editor), Compiling(gcc), Linking and Executing in under Linux.

BASICS OF C: Structure of a C program, identifiers, basic data types and sizes. Constants, Variables, Arithmetic , relational and logical operators, increment and decrement operators, conditional operator, assignment operator, expressions, type conversions, Conditional Expressions, precedence and order of evaluation, Sample Programs.

UNIT - II:

SELECTION – MAKING DECISION: TWO WAY SELECTION: if-else, null else, nested if, examples, Multi-way selection: switch, else-if, examples.

ITERATIVE: loops- while, do-while and for statements, break, continue, initialization and updating, event and counter controlled loops, Looping applications: Summation, powers, smallest and largest.

ARRAYS: Arrays- concepts, declaration, definition, accessing elements, storing elements, Strings and String Manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays, array applications: Matrix operations, checking the symmetricity of a Matrix.

STRINGS: concepts, c strings.

UNIT - III:

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

UNIT - IV:

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

UNIT - V:

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

UNIT - VI:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

I B.TECH I SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
PROFESSIONAL ETHICS, VALUES AND PATENTS (Common to All Branches)							

OBJECTIVE:

- To equip the student with the basic knowledge relating to the ethical behavior in engineering discipline.
- To make the students understand the rules and regulation relating to intellectual property rights (Patents, copyrights, trademarks etc.,)

OUTCOME:

- Interpret the fundamentals of Human values
- Analyse the ethical issues and role of engineers in industry
- List out the duties and rights of engineers.
- 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. –Professional Ethics and Morals by Prof. A.R.Arasri, Dharanikota Suyodhana- Maruthi Publications.

REFERENCES:

1. Deborah e. Bouchoux: -Intellectual property||. Cengage learning, New Delhi.
2. Kompal Bansal & Parishit Bansal|| Fundamentals of IPR for Engineers BS a 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. -Engineering Ethics and Human Values|| by M. Govindarajan, S. Natarajan and V.S. Senthil kumar- PHI Learning PVT. Ltd-2009

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:

1. To build confidence in the students to communicate effectively in English.
2. To strengthen the oral communication to enable them to interact with the people in various social situations.
3. To enable the learners develop better pronunciation through emphasis on word accent, intonation and Rhythm

COURSE OUTCOMES:

Learners should be able to

1. Improve their basic communication skills to interact with peers and others in various social situations
2. Speak English effortlessly with good pronunciation
3. Take part in various conversations/discourses using the formal and informal expressions they have learned.

UNIT - I:

- a. Greeting, Introducing and Taking leave
- b. Pure Vowels

UNIT - II:

- a. Giving information and Asking for information
- b. Diphthongs

UNIT - III:

- a. Inviting, Accepting and Declining Invitations
- b. Consonants

UNIT - IV:

- a. Commands, Instructions and Requests
- b. Accent and Rhythm

UNIT - V:

- a. Suggestions and Opinions
- b. Intonation
- c.

TEXT BOOK:

1. Strengthen Your Communication Skills – Maruthi Publications, 2013

REFERENCE BOOKS:

1. Personality Development and Soft Skills (Oxford University Press, New Delhi)
2. J.D.O Conner, Better English Pronunciation, Cambridge University Press 1980
3. T.Balasubramanian, A Text Book of English Phonetics for Indian Students, Macmillan, 1981
4. Sanjay Kumar, Pusph Latha, Communication skills, Oxford University Press 2005

I B.TECH I 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:

On completion of this course, students will have the knowledge in,

- Develop and perform analytical chemistry techniques to address the water related problems (hardness, alkalinity, Chlorine, DO).
- Explain the functioning of different analytical instruments
- Measure molecular/system properties such as strength of solutions, conductance of solutions and acid number of lubricating oils, etc.

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:

1. Determination of hardness of water sample by EDTA method
2. Determination of alkalinity of water sample
3. Determination of free chlorine in bleaching powder
4. Determination of turbidity of water sample

CONDUCTOMETRIC TITRATIONS:

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

FOOD ANALYSIS:

1. Estimation of Vitamin-C

PREPARATION OF POLYMERIC RESINS:

1. Preparation of phenol formaldehyde resin
2. Preparation of urea formaldehyde resin

PRESCRIBED BOOKS:

1. Practical Engineering Chemistry by K. Mukkanti, etal, B.S. Publications, Hyderabad.
2. A text book on experiments and calculation Engg. S.S. Dara.
3. Instrumental methods of chemical analysis, Chatwal, Anand, Himalaya Publications
4. Chemistry Practical Manual, Lorven Publications
5. Inorganic quantitative analysis, Vogel.

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

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

COURSE OBJECTIVE:

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

COURSE OUTCOMES:

- Study, analyse and understand logical structure of computer programming and different constructs to develop programs in C Language
- Compare and contrast various data types and operator precedence
- Analyse the use of conditional and looping statements to solve problems associated with conditions and repetitions.
- Make use of functions and file I/O operations in developing C Programs

SYLLABUS:

EXERCISE 1:

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

EXERCISE 2:

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

EXERCISE 3:

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

EXERCISE 4:

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

EXERCISE 5:

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

EXERCISE 6:

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

EXERCISE 7:

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

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

EXERCISE 8:

Write a C Program for the following.

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

EXERCISE 9:

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

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

EXERCISE 10:

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

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

EXERCISE 11:

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

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

EXERCISE 12:

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

EXERCISE 13:

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

EXERCISE 14:

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

EXERCISE 15:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

I B.TECH II SEMESTER

I B. Tech. - II SEMESTER

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

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:

1. To enable the engineering students develop their basic communication skills in English for academic and social purposes.
2. To equip the students with appropriate oral and written communication skills.
3. To enhance the skills of listening, reading and critical thinking.
4. To integrate English Language learning with training for employability skills.

COURSE OUTCOMES:

Learners are able to

1. Read and comprehend complex texts actively; guess the meanings of words; recognize key passages; raise questions; draw inferences, summarize texts
2. Write paragraphs, essays, emails and letters
3. Learn grammatical structures and write grammatically correct sentences
4. Enhance word power and usage of lexicons

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:

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:

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.

EFFECTIVE COMMUNICATION:

1. Role and significance of communication
2. Features of Human Communication

3. Process of Communication
4. Types of Communication, barriers to communication

ORAL COMMUNICATION:

1. Importance of Listening for effective communication
2. Interpersonal communication
3. Models of Interpersonal relationship development
4. Styles of communication
5. Persuasion techniques
6. Telephone and Cell phone etiquette

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 (Fundamentals of technical communication Pg No. 119 - 153)

REMEDIAL ENGLISH:

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

PART - II

READING FOR ENRICHMENT

PART - II:

OBJECTIVES:

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:

OUTCOMES:

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.

REFERENCE BOOKS:

1. Raman, Meenakshi & 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, Cabridge 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
ENGINEERING PHYSICS (Common to All Branches)							

COURSE OBJECTIVE:

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:

Students will 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 ultra-Sonic'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.

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. Solid state Physics by A.J. Dekker (Mc Millan India Ltd)
2. A text book of Engineering Physics by M.N. Avadhanulu & P.G. Kshirasagar (S. Chand publications)
3. Engineering Physics by Palanisamy (Scitech Publishers)
4. Engineering Physics by M.R. Srinivasan (New Age international publishers)

REFERENCE BOOKS:

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

I B.TECH-I- 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:

VECTOR DIFFERENTIATION: Gradient, Divergence, Curl, Laplacian and second order operators, vector identities, Equation of continuity, potential surfaces.

UNIT - IV:

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.

UNIT – V:

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 – VI:

FOURIER TRANSFORMS: Introduction, Definition, Fourier Integrals, Fourier Sine and Cosine Integral, Fourier Transforms, Fourier sine and cosine transforms, Finite Fourier transforms.

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 McGrawhill.
3. Erwyn Kreyszig, Advanced Engineering Mathematics, 9th Edition, Wiley-India.
4. Peter V. O'Neil, -Advanced Engineering Mathematics, 7th Edition, Cengage Learning, 2011.
5. Srimanta Pal and Suboth C. bhunia, "*Engineering Mathematics*", oxford University Press, 2015.

I B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
ENGINEERING MECHANICS (Common to ME,CE STUDENTS)							

COURSE OBJECTIVES:

The course is mainly intended

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

COURSE OUTCOMES:

At the end of this course student will acquire ability to

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

UNIT – I:

Introduction to Engineering Mechanics-Basic concepts

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

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

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

UNIT - II:

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

UNIT - III:

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

UNIT - IV:

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

UNIT – V:

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

UNIT - VI:

KINETICS: Analysis as a particle, Newton's laws of motion, D'Alembert's principle –simple applications- analysis as a rigid body in translation-fixed axis rotation-Simple applications.

WORK-ENERGY METHOD: Equations for Translation, work-Energy applications to particle motion, connected system-Impulse momentum method-simple applications.

TEXT BOOKS:

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

REFERENCES:

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

I B.TECH-II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	1	0	4	40	60	100	4
ENGINEERING DRAWING (COMMON TO ME, CE STUDENTS) (NOTE: USE IST ANGLE PROJECTION ONLY)							

COURSE OBJECTIVES:

The course is mainly intended to

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

COURSE OUTCOMES:

At the end of this course student will acquire ability to

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

UNIT - I:

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

UNIT - II:

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

UNIT - III:

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

UNIT – IV:

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

UNIT - V:

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

UNIT - VI:

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

I B.TECH II SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
ENVIRONMENTAL STUDIES (Common to All Branches)							

COURSE OBJECTIVES:

1. To make the students aware about the environment and it's inter-disciplinary, Basic understanding of the ecosystem and its diversity.
2. 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.
3. Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
4. 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.
5. Overall understanding of the natural resources.

COURSE OUTCOMES:

1. 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.
2. 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.
3. Students can develop eco-friendly technologies for a healthy growth, and development of a nation which can prevent the environmental hazards by appropriate decisions and alternate remedies.
4. To make the students understand the adverse effects of environmental pollution, its causes and measures to control it.

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, Water pollution, Soil pollution, 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. An Introduction to Environmental Studies by B. Sudhakara Reddy, T. Sivaji Rao, U. Tataji & K. Purushottam Reddy, Maruti Publications.
2. Anubha Kaushik & C.P. Kaushik. 2014, Environmental Studies, Fourth edition, New Age International (P) Ltd., New Delhi.

REFERENCES:

1. Text Book of Environmental Studies by Deekshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies by K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada.
3. Text Book of Environmental Sciences and Technology by M. Anji Reddy, BS Publications.
4. Publications.
5. Bharucha, E. 2005, Text book of Environmental Studies, First edition, Universities Press (India) Pvt., Ltd., Hyderabad.
6. Dr. S. Keerthinarayana & Dr. C. Daniel Yesudian. 2004, Principles of Environmental Science and Engineering, First edition, Anuradha Publications (P) Ltd., Kumbakonam.

7. P. Anandan & R. Kumaravelan. 2010, Environmental Science & Engineering, Sixth reprint, Scitech Publications (India) (P) Ltd., Chennai.
8. Dr. Surinder Deswal & Dr. Anupama Deswal. 2008-09, A Basic Course in Environmental Studies, Second revised edition, Dhanpat Rai & Co (P) Ltd., New Delhi.

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:

1. Give presentations and attend job interviews confidently
2. Speak confidently in challenging situations.
3. Know the importance of Non-verbal communication and interpret nonverbal symbols

COURSE OUTCOMES:

Learners are able to

1. Give presentations and attend job interviews confidently.
2. Speak confidently in challenging situations.
3. Know the importance of Non-verbal communication and interpret nonverbal symbols
4. Face computer based competitive exams like GRE, TOFEL, and IELTS.

UNIT - I: Body Language

UNIT - II: Dialogues

UNIT - III: Presentation Skills

UNIT - IV: Group Discussion

UNIT - V: Interviews and Telephonic Interviews

UNIT - VI: Debates

TEXT BOOK:

1. Strengthen your Communication Skills by Maruthi Publications, 2013

REFERENCE BOOKS:

1. Personality Development and Soft Skills (Oxford University Press, New Delhi)
2. M Ashraf Rizvi, Effective Technical Communication skills, McGraw-Hill, 2005
3. Barun K Mitra, Personality Development and Soft Skills, Oxford University Press, 2011
4. Konar N, Communication Skills for Professionals, PHI Learning Private Limited, 2011

I B.TECH- II-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:

- Explain the principle of physics and interpret them in engineering field and compares the results with theoretical calculations.
- Utilize modern engineering physics techniques and tools in real time applications in engineering studies.
- Identify the characteristics and the behavior of materials in a practical manner and gain knowledge and its usage.
- Apply the analytical techniques and graphical analysis to the experimental data

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. Engineering Physics Lab Manual by Dr.Y. Aparna & Dr.K.Venkateswarao (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
	0	0	3	25	50	75	2
ENGINEERING WORKSHOP (COMMON TO ME,CE STUDENTS)							

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

- Make Use of the various carpentry tools, machines, devices used in engineering practice for preparing different carpentry joints.
- Make Use of the various fitting tools, machines, devices used in engineering practice for preparing different Fits.
- Develop funnel and square box thorough knowledge of various Tin Smithy tools
- Demonstrate the various house wiring connections for different house wiring Connections.

LIST OF EXPERIMENTS:

TRADES FOR EXERCISE:

❖ **CARPENTRY**

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

❖ **FITTING**

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

❖ **TINSMITHY**

1. Funnel
2. Square box without lid
3. Tapper tray

❖ **HOUSE WIRING**

1. Two lamps series connection & parallel connection
2. Fluorescent Tube Wiring & Stair Case Wiring

TRADES FOR DEMONSTRATION

❖ **BLACK SMITHY**

1. S-Hook
2. Round rod to square rod

❖ WELDING

1. Lap Joint
2. Butt Joint

TEXT BOOKS:

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

REFERENCE BOOKS:

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

II B.TECH - I SEMESTER

II B.TECH - I SEMESTER COURSE STRUCTURE

S.No	Subject Name	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Probability & statistics	BS	3	1	-	40	60	100	3
2	Building materials and construction	PC	4	-	-	40	60	100	3
3	Building planning and drawing	PC	1	-	4	40	60	100	3
4	Surveying –I	PC	3	1	-	40	60	100	3
5	Fluid mechanics	ES	3	1	-	40	60	100	3
6	Mechanics of solids	ES	3	1	-	40	60	100	3
7	Surveying Laboratory-I	PC	-	-	3	25	50	75	2
8	Mechanics of solids Laboratory	ES	-	-	3	25	50	75	2
9	Verbal Ability (Mandatory Non Credit Course)	MDC	3	-	-	-	-	-	-
	TOTAL		20	4	10	290	460	750	22

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

PROBABILITY AND STATISTICS

(CIVIL)

COURSE OBJECTIVES:

To acquaint students with the fundamental concepts of probability and statistics and to develop an understanding of the role of statistics in engineering.

COURSE OUTCOMES:

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

- Understand the elementary concepts and techniques of probability, random variables.
- Apply the different kind of distributions and forming the movement generating.
- Understand the means of the population distributions, sampling distributions and the different kinds of esti
- Identify the proper test statistics to test the hypothetical data by Tests of Hypothesis.
- Select suitable curves for fitting the data that available and form the correspond equations by using different types of correlation and Regression.
- Apply Statistical Quality controlling methods to given data.

UNIT-I:

PROBABILITY, RANDOM VARIABLES, DISTRIBUTIONS:

Sample Spaces and Events , Probability ,The Axioms of Probability , Some Elementary Theoromes , Conditional Probability, Bayes' Theorom, Random Variables, The Binomial Distribution, The Mean and the Variance of a Probability Distribution, The Poisson Approximation to the Binomial Distribution, Continuous Random Variables.

UNIT-II:

CONTINUOUS DISTRIBUTIONS & MOMENT GENERATING FUNCTION

The Normal Distribution, The Normal Approximation to the Binomial Distribution, The Gamma Distribution, The Weibull Distribution. Introduction, Moments, Moment generating function, Characteristic Function.

UNIT-III:

SAMPLING DISTRIBUTIONS:

Populations and samples, Sampling distribution of the mean(σ known),Sampling distribution of the mean(σ unknown), Sampling distribution of the variance ,Point Estimation, , Interval Estimation.

UNIT-IV:

TESTS OF HYPOTHESIS

Tests of Hypotheses (Introduction), Null hypotheses and tests of hypothesis, hypothesis concerning one mean, inference concerning two means, hypothesis concerning one variance, hypothesis concerning two variances, Hypotheses concerning one Proportion, Hypotheses concerning several Proportions, goodness of fit.

UNIT-V: CURVE FITTING, CORRELATION AND REGRESSION

Introduction, Fitting a straight line, second degree curve, exponential curve, power curve by method of least squares. Types of correlation, coefficient of correlation, rank correlation. Regression- regression equations.

UNIT-VI: STATISTICAL QUALITY CONTROL METHODS

Quality Control – control charts for measurements ,control charts for attributes, tolerance limits.

TEXT BOOKS:

1. Miller and John E.Freund, -Probability and Statistics for Engineers, Seventh edition, Pearson education, Prentice Hall of India,2005.
2. K. Murugesan,P .Gurusamy, Probability, Statistics and Random Processes ,Anuradha Publications

REFERENCES:

1. S.C. Gupta and V.K. Kapoor, "*Fundamentals of Mathematical Statistics*", Ninth Revised Edition , Sultan Chand & Sons Educational Publishers, 2007.
2. Probability and Statistics for Engineers and Scientists: Ronald E.Walpole, Sharon L. Mayers and Keying Ye: Pearson
3. Kreyszig E, "*Advanced Engineering Mathematics*", 8th Edition. John Wiley, Singapore, 2001.
4. S.C. Gupta and V.K. Kapoor, "*Fundamentals of Mathematical Statistics*", Ninth Revised Edition, Sultan Chand & Sons Educational Publishers, 2007.

II B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	0	0	40	60	100	3
BUILDING MATERIALS & CONSTRUCTION							

COURSE OBJECTIVES:

- In recognizing the good materials to be used for the construction work.
- In supervision of different types of masonry.
- In selection of materials, design and supervision of suitable type of floor and roof.
- In Select suitable materials for buildings and adopt suitable construction techniques
- In effectively deals with the types of form work and rehabilitation work of building.
- In investigation of soil condition, Deciding and design of suitable foundation for different structures

COURSE OUTCOMES:

- Students will be able to get knowledge about various building materials.
- Students can select required masonry work and bond for the construction.
- Students will gain knowledge regarding acoustics of building.
- Students are able to know how to use the form work, scaffolding before and after construction, design of suitable foundation for different structures

UNIT-I: STONES, BRICKS AND TILES:

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

UNIT- II: MASONRY:

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

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

UNIT- III: LIME AND CEMENT:

Various ingredients of lime- constituents of lime stone classification of lime- various methods of manufacture of lime.

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

UNIT- IV: BUILDING COMPONENTS:

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

UNIT-V: FINISHINGS:

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

PAINTS: Constituents of paint – Types of paints – Painting of new/old wood- Varnish. Form Works and Scaffoldings.

UNIT- VI: FOUNDATION:

Function and requirements of good foundation, types of foundation, introduction to spread, combined, strap, mat and pile foundation

TEXT BOOKS:

1. S.S. Bhavikatti, *-Building Materials* , Vices publications House private ltd.
2. S.S. Bhavikatti, *-Building Construction*|| Vices publications House private ltd.
3. B.C. Punmia, Laxmi *“Building Materials”* Publications private ltd.
4. B.C. Punmia, Laxmi *-Building Construction*|| by Publications (p) ltd Sushil Kumar
- 5.

REFERENCES:

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

II B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	1	-	4	40	60	100	3
BUILDING PLANNING & DRAWING							

COURSE OBJECTIVES:

- To give knowledge about various building elements and their specifications.
- Presents the basics of planning strategies, building bye laws and acoustics of building
- To draw conventional signs, symbols of materials and building services.
- To draw plan, section and elevations of buildings and various building components.

COURSE OUTCOMES:

- Plan a building following building rules and bye laws aesthetically
- Various conventional signs, symbols of materials and building services.
- Draw the doors, windows & stair cases
- Drawing plan, section and elevations of buildings and various building components

UNIT-I: BUILDING BYELAWS AND REGULATIONS:

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

UNIT- II: RESIDENTIAL BUILDINGS:

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

UNIT- III: PUBLIC BUILDINGS:

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

UNIT-IV: SIGN CONVENTIONS AND BONDS:

Brick, stone, plaster, sand filling, concrete, glass, steel, cast, iron, copper alloys, aluminium alloys etc., lead, zinc, tin etc., earth, rock, timber and marbles. English bond and Flemish bond- odd and even courses for one, one-half, two and two & half brick walls in thickness at the junction of a corner.

UNIT-V: DOORS, WINDOWS, STAIR CASES AND ROOFS:

Panelled door, panelled and glassed door, glassed windows, panelled windows, dog legged stair case, open well stair case, foundation, steel roof, Sloped and flat roof buildings: drawing Plans, Elevations and Cross sections of given sloped Roof Buildings.

UNIT VI: PLANNING AND DESIGNING OF BUILDINGS:

Drawing the Plan, Elevation and sections of a Residential & Public buildings from the given line

TEXT BOOKS:

1. Y.S. Sane, *Planning and Design of buildings*.
2. Gurucharan Singh and Jagadish Singh, *-Planning, designing and scheduling*
3. M. Chakravarthi , *-Building planning and drawing*.
4. _A' Series & _B' Series of JNTU Engineering College, Anantapur.
5. Dr. N. Kumara Swamy & A. Kameswararao-*Building planning and drawing*”Charotar.

REFERENCES:

1. Shah and Kale. *-Building drawing*”.

FINAL EXAMINATION PATTERN:

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

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

COURSE OBJECTIVES:

This course will enable students to:

- Understand the classifications and its basic principles of surveying.
- Learn the measurement of horizontal distances by chaining/taping and concepts of chain surveying.
- Employ conventional surveying data capturing techniques and process the data for computations.
- Analyze the obtained spatial data for draw contours and preparation of maps.

COURSE OUTCOMES:

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

- Possess a sound knowledge of fundamental principles of surveying.
- Analyze chain, compass and plane table surveying techniques for measuring distances, horizontal angles and preparing plans to solve complex surveying problems
- Analyze leveling and contouring techniques for finding elevations to solve complex surveying problems following ethics and considering society besides communicating effectively in
- Analyze the obtained spatial data to draw contours and preparation of maps by plane table surveying

UNIT-I: INTRODUCTION:

Definition of Surveying, Classification of Surveys, Uses of Surveying Units of Measurements, Map & Classification, Survey of India topographical Maps and their numbering, Basic principles of surveying, Errors, Classification, Precision and accuracy.

MEASUREMENT OF HORIZONTAL DISTANCES:

Chain and types, Tape and types, EDM devices, Ranging of lines, Direct and Indirect measurement of distances over sloping grounds, Chain and Tape corrections - Numerical problems.

UNIT-II: CHAIN SURVEYING:

Accessories required, Selection of stations and lines, Offsets and types, Setting out of right angles, Working principle and use of optical square, prism square, cross staff, Linear methods of setting out right angles, Booking of chain survey work, Field book, entries, conventional symbols, Obstacles in chain survey, Numerical problems, Errors in chain survey and precautions to be taken.

UNIT-III: INTRODUCTION TO COMPASS SURVEYING:

Meridians and bearings, Principle, working and use of - Prismatic compass, Surveyor's compass, Magnetic bearing, true bearings, WCB and Reduced bearing. Dip and Declination, Accessories required for compass surveying.

TRAVERSE - closed and open traverse, Computation of bearings of legs of closed traverse given the bearing of one of the legs, Computation of included angles given the bearings of legs of a closed traverse. Compass Traversing Local attraction, determination and corrections, Dependent and independent co-ordinates, Checks for closed traverse and determination of

closing error and its direction, Bowditch's graphical method of adjustment of closed traverse, Bowditch's rule and transit rule, Omitted measurements (Only Length and corresponding bearing of one line).

UNIT-IV: LEVELLING:

Principles and basic definitions, Fundamental axes and part of a dumpy level, Types of adjustments and objectives, Temporary adjustments of a dumpy level, Sensitiveness of bubble tube, Curvature and refraction correction, Type of levelling, Simple levelling, Reciprocal levelling, Profile levelling, Cross sectioning, Fly levelling, Booking of levels, Rise and fall method and Height of instrument method, comparison Arithmetic checks, Fly back levelling, Errors and precautions.

UNIT-V: CONTOURING:

Contours and their characteristics, Methods of contouring, direct and indirect methods, Interpolation techniques, Uses of contours, Numerical problems on determining inter-visibility, Grade contours and uses.

UNIT-VI: PLANE TABLE SURVEYING:

Plane table and accessories, Advantages and limitations of plane table survey, Orientation and methods of orientation, Methods of plotting – Radiation, Intersection, Traversing, Resection method, Two point and three point problems, Solution to two point problem by graphical method, Solution to three point problem Bessel's graphical method, Errors in plane table survey.

TEXT BOOKS:

1. B.C. Punmia, "*Surveying Vol.1*", Laxmi Publications pvt. Ltd., New Delhi – 2009.
2. S.K. Duggal, "*Surveying Vol.1*", Tata McGraw Hill Publishing Co. Ltd. New Delhi. – 2009.
3. K.R. Arora, "*Surveying Vol. 1* Standard Book House, New Delhi. – 2010

REFERENCES:

1. R Subramanian, "*Surveying and Leveling, Second edition*", Oxford University Press, New Delhi
2. KanetkarTPandSVKulkarni, "*Surveying and Leveling PartI*", PuneVidyarthi GrihaPrakashan, 1988
3. A. Bannister, S. Raymond , R. Baker, "*Surveying*", Pearson, 7th ed., New Delhi.

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

COURSE OBJECTIVES:

- The Fundamental properties of fluids and its applications.
- Hydrostatic laws and application to practical problem solving.
- Principles of Kinematics and Hydro-Dynamics for practical applications
- Basic design of pipes and pipe networks considering flow, pressure and its losses.
- The basic flow rate measurements

COURSE OUTCOMES:

- Possess a sound knowledge of fundamental properties of fluids and fluid continuum
- Compute and solve problems on hydrostatics, including practical applications
- Apply principles of mathematics to represent kinematic concepts related to fluid flow
- Apply fundamental laws of fluid mechanics and the Bernoulli’s principle for practical applications, discharge through pipes and over notches and weirs.

UNIT-I: FLUIDS & THEIR PROPERTIES:

Concept of fluid, Systems of units. Properties of fluid; Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Cohesion, Adhesion, Surface tension & Capillarity. Fluid as a continuum, Newton’s law of viscosity (theory & problems). Capillary rise in a vertical tube and between two plane surfaces (theory & problems). Vapour pressure of liquid, compressibility and bulk modulus, capillarity, surface tension, pressure inside a water droplet, pressure inside a soap bubble and liquid jet. Numerical problems.

UNIT-II: FLUID PRESSURE AND ITS MEASUREMENTS:

Definition of pressure, Pressure at a point, Pascal’s law, Variation of pressure with depth. Types of pressure. Measurement of pressure using simple, differential & inclined manometers (theory & problems). Introduction to Mechanical and electronic pressure measuring devices.

HYDROSTATIC FORCES ON SURFACES: Definition, Total pressure, centre of pressure, total pressure on horizontal, vertical and inclined plane surface, total pressure on curved surfaces. Numerical Problems.

UNIT-III: FUNDAMENTALS OF FLUID FLOW (KINEMATICS):

Introduction, methods of describing fluid motion. Velocity and Total acceleration of a fluid particle. Types of fluid flow, Description of flow pattern. Basic principles of fluid flow, three-dimensional continuity equation in Cartesian coordinate system. Derivation for Rotational and irrotational motion. Potential function, stream function, orthogonality of streamlines and equipotential lines. Numerical problems on Stream function and velocity potential. Introduction to flow net.

UNIT-IV: FLUID DYNAMICS:

Introduction, forces acting on fluid in motion. Euler’s equation of motion along a streamline and Bernoulli’s equation. Assumptions and limitations of Bernoulli’s equation. Modified Bernoulli’s equation. Problems on applications of Bernoulli’s equation (with and without losses). Vortex motion; forced vortex, free vortex, problems Momentum equation problems on pipe bends.

APPLICATIONS: Introduction. Venturimeter, Orificemeter, Pitot tube. Numerical Problems.

UNIT-V: ORIFICE AND MOUTHPIECE:

Introduction, classification, flow through orifice, hydraulic coefficients, Numerical problems. Mouthpiece, classification, Borda's Mouthpiece (No problems).

NOTCHES AND WEIRS: Introduction. Classification, discharge over rectangular, triangular, trapezoidal notches, Cippolletti notch, broad crested weirs. Numerical problems. Ventilation of weirs, submerged weirs.

UNIT-VI: FLOW THROUGH PIPES:

Introduction, major and minor losses in pipe flow. Darcy-Weisbach equation for head loss due to friction in a pipe. Pipes in series, pipes in parallel, equivalent pipe-problems. Minor losses in pipe flow, equation for head loss due to sudden expansion. Numerical problems. Hydraulic gradient line, energy gradient line. Pipe Networks, Hardy Cross method, Numerical problems.

TEXT BOOKS:

1. Modi & Seth , "*Fluid Mechanics, Hydraulic and Hydraulic Machines*", Standard book house.
2. R.K. Bansal, "*A Text book of Fluid Mechanics and Hydraulic Machines*", Laxmi Publications, New Delhi
3. S K SOM and G Biswas, "*Introduction to Fluid Mechanics and Fluid Machines*", Tata McGraw Hill, New Delhi
- 4.

REFERENCES:

1. K Subramanya, "*Fluid Mechanics and Hydraulic Machines*", Tata McGraw Hill Publishing Co. Ltd.
2. Mohd.Kaleem Khan, "*Fluid Mechanics and Machinery*", Oxford University Press
3. Victor L Streeter, Benjamin Wylie E and Keith W Bedford, "*Fluid Mechanics*", Tata McGraw Hill Publishing Co Ltd., New Delhi, 2008(Ed).

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

COURSE OBJECTIVES:

This course will enable students:

- To understand the basic concepts of the stresses and strains for different materials and strength of structural elements.
- To know the development of internal forces and resistance mechanism for one dimensional and two dimensional structural elements.
- To analyze and understand different internal forces and stresses induced due to representative loads on structural elements.
- To analyze and understand principal stresses due to the combination of two dimensional stresses on an element and failure mechanisms in materials.
- To evaluate the behavior of torsional members, columns and struts.

COURSE OUTCOMES:

After studying this course, students will be able to:

- Evaluate the strength of various structural elements internal forces such as compression, tension, shear, bending and torsion.
- Suggest suitable material from among the available in the field of construction and manufacturing
- Evaluate the behavior and strength of structural elements under the action of compound stresses and thus understand failure concepts.
- Analyze and design the members subjected to torsion and design the structural elements such as columns and struts.

UNIT-I: SIMPLE STRESSES AND STRAIN:

Introduction- Definition and concept of stress and strain- Hooke's law- Stress-Strain diagrams for ferrous and non-ferrous materials - factor of safety, Elongation of tapering bars of circular and rectangular cross sections, Elongation due to self-weight. Saint Venant's principle, Compound bars, Temperature stresses, Compound section subjected to temperature stresses, state of simple shear, Elastic constants and their relationship.

UNIT-II: COMPOUND STRESSES:

Introduction, state of stress at a point, General two dimensional stress system, Principal stresses and principal planes. Mohr's circle of stresses

THEORIES OF FAILURE: Introduction, maximum principal stress theory (Rankine's theory), Maximum shearing stress theory (Tresca's theory), Strain energy theory (Beltrami and Haigh), and maximum strain theory (St. Venant's theory).

UNIT-III: SHEAR FORCE AND BENDING MOMENT IN BEAMS:

Introduction to types of beams, supports and loadings. Definition of bending moment and shear force, Sign conventions, relationship between load intensity, bending moment and shear force. Shear force and bending moment diagrams for statically determinate beams subjected to points load, uniformly distributed loads, uniformly varying loads, couple and their combinations.

UNIT-IV: BENDING AND SHEAR STRESSES IN BEAMS:

Introduction, pure bending theory, Assumptions, derivation of bending equation, modulus of rupture, section modulus, flexural rigidity. Expression for transverse shear stress in beams, Bending and shear stress distribution diagrams for circular, rectangular, I , and T sections.

UNIT-V: COLUMNS AND STRUTS:

Introduction, short and long columns. Euler's theory; Assumptions, Derivation for Euler's Buckling load for different end conditions, Limitations of Euler's theory. Rankine-Gordon's formula for columns.

UNIT-VI: TORSION IN CIRCULAR SHAFT:

Introduction, pure torsion, Assumptions, derivation of torsion equation for circular shafts, torsional rigidity and polar modulus Power transmitted by a shaft, combined bending and torsion.

THIN CYLINDERS: Introduction, Thin cylinders subjected to internal pressure; Hoop stresses, longitudinal stress and change in volume.

TEXT BOOKS:

1. R.K. [Rajput](#), -*Strength of Materials*", S. Chand Publishing (6th Edition) (2015)
2. R K Bansal, "*A Textbook of Strength of Materials*", 4th Edition, Laxmi Publications, 2010
3. S.S. Rattan "*Strength of Materials*|| McGraw Hill Education (India) Pvt. Ltd., 2nd Edition (Sixth reprint 2013).

REFERENCES:

1. Ferdinand P. Beer, E. Russell Johnston and Jr. John T. DeWolf "*Mechanics of Materials*", Tata McGraw-Hill, Third Edition, SI Units
2. D.H. Young, S.P. Timoshenko "*Elements of Strength of Materials*" East West Press Pvt. Ltd., 5th Edition (Reprint 2014).
3. [Egor P. Popov](#), "*Mechanics of Material*" Pearson; 2 edition (7 April 1976)

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

COURSE OBJECTIVES:

This course will enable students to:

- Apply the basic principles of engineering surveying and measurements
- Follow effectively field procedures required for a professional surveyor
- Use techniques, skills and conventional surveying instruments necessary for engineering practice.

COURSE OUTCOMES:

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

- Apply the basic principles of engineering surveying and for linear and angular measurements.
- Comprehend effectively field procedures required for a professional surveyor.
- Use techniques, skills and conventional surveying instruments necessary for engineering practice.

LIST OF EXPERIMENTS:

1. a) To measure distance between two points by direct ranging
 b) To set out perpendiculars at various points on given line using cross staff, optical Square and tape - Setting out building plan
2. Setting out of rectangle, hexagon using tape/chain and other accessories.
3. Measurement of bearing of sides of a closed traverse and adjustment of closing error by Bowditch method and Transit method.
4. To determine the distance between two inaccessible points using chain/tape and compass.
5. To locate points using radiation and intersection method of plane table.
6. To solve 3-point problem in plane using Bessel's graphical solution.
7. To determine difference in elevation between two points using fly levelling technique and to conduct fly back levelling by Height of Instrument method and Rise and Fall methods.
8. To determine difference in elevation between two points using reciprocal levelling and determine the collimation error.
9. To conduct profile levelling for water supply / sewage line and to draw the longitudinal section to determine the depth of cut and depth of filling for a given formation level.

TEXT BOOKS:

1. B.C. Punmia, "*Surveying Vol.1*", Laxmi Publications pvt. Ltd., New Delhi – 2009.
2. Kanetkar T P and S V Kulkarni, *Surveying and Levelling Part I*, Pune VidyarthiGrihaPrakashan, 1988.

REFERENCES:

1. S.K. Duggal, "*Surveying Vol.1*", Tata McGraw Hill Publishing Co. Ltd. New Delhi. – 2009.
2. K.R. Arora, "*Surveying Vol. 1*" Standard Book House, New Delhi. – 2010.

II B.TECH I-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2
MECHANICS OF SOLIDS LABORATORY							

COURSE OBJECTIVES:

The objective of this course is to make students to gain:

- Ability to apply knowledge of mathematics and engineering in calculating the mechanical properties of structural materials.
- Ability to function on multi-disciplinary teams in the area of materials testing.
- Ability to use the techniques, skills and modern engineering tools necessary for engineering.
- Understanding of professional and ethical responsibility in the areas of material testing.
- Ability to communicate effectively the mechanical properties of materials.

COURSE OUTCOMES:

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

- Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion.
- Determine the hardness of given unhardened steel material by using Vickers's, Brinell's and Rockwell apparatus.
- Determine the Young's modulus and deflection by using simply supported and Cantilever beams.
- Determine the impact strength for the given mild steel specimen by using Charpy and Izod test.

LIST OF EXPERIMENTS:

1. Tension test on mild steel and HYSD bars.
2. Compression test on mild steel, Brick and wood.
3. Torsion test on mild steel of circular sections.
4. Bending Test on Wood Under two point loading
5. Shear Test on Mild steel- single and double shear.
6. Impact test on Mild Steel (Charpy).
7. Impact test on Mild Steel (Izod).
8. Hardness tests on ferrous and non-ferrous metals – Brinell's, Rockwell and Vicker's.
9. To determined young's modulus of elasticity of material by
i) simply supported beam and ii) Cantilever beam.
10. Verification of Maxwell's Reciprocal theorem on beams.

REFERENCES:

1. Suryanarayana A K, "*Testing of Metallic Materials*", Prentice Hall of India Pvt. Ltd. New Delhi.
2. Fenner, "*Mechanical Testing of Materials*", George Newnes Ltd. London.
3. Relevant IS Codes

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

COURSE OBJECTIVES:

- To make students understand the usage of words, relationships; the alternatives and their meanings.
- To give fair idea about understanding and comprehension skills
- To make students understand arguments, draw conclusions and to deal in critical manner
- 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

- Use appropriate words effectively in their communication
- Identify and correct Grammar and vocabulary related errors
- Construct the sentences effectively using appropriate verbal reasoning abilities
- Demonstrate understanding and comprehensive skills

UNIT – I:

Synonyms¹, Synonyms², Antonyms¹, Antonyms², One-Word Substitution, Phrasal Verbs, Idioms & Phrases, Word Family Operation, Commonly Confused words, Odd man out.

UNIT – II:

Tenses, Voice, Parts of speech, Direct & Indirect Speech, Sentence Completion & Correction, Reconstruction of Sentences, Sentence Improvement, Choosing the Incorrect Sentences, Transformation.

UNIT – III:

Common Errors¹, Common Errors², Common Errors³, Common Errors⁴, Common Errors⁵, Indianisms¹, Indianisms².

UNIT - IV:

Direct / simple Analogy, Completing the analogous pair, choosing the Analogous pair, Double Analogy, Choosing a similar word, Detecting Analogies, Multiple-word Analogy.

UNIT – V:

Reading Comprehension¹, Reading Comprehension², Reading Comprehension³, Reading Comprehension⁴, Cloze Passage¹, Cloze Passage², Cloze Passage³, Cloze Passage⁴.

UNIT – VI:

Hidden Assumptions, Fallacies, Induction & Deduction Methods, Arguments, Truth, Validity, Soundness.

TEXT BOOKS:

1. 30 Days to a More Powerful Vocabulary by Funk.
2. Practical English Usage by Michael Swan
3. Practice & Pass Professional: Verbal Reasoning Tests: Practice Questions and Expert Coaching to Help You Pass by Alan Redman

4. Kaplan MCAT Verbal Reasoning and Writing Review
5. The Verbal Reasoning Test Workbook: Unbeatable Practice for Verbal Ability by Mike Bryon
6. Understanding and Using English Grammar by Betty Schramper Azar

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> .

II B.TECH - II SEMESTER

II B.TECH - II SEMESTER

S.No	Subject Name	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Structural analysis-1	PC	3	1	-	40	60	100	3
2	Hydraulics and hydraulic machinery	PC	3	1	-	40	60	100	3
3	Engineering geology	PC	4	-	-	40	60	100	3
4	Surveying-II	PC	3	1	-	40	60	100	3
5	Hydrology & Irrigation Engineering	PC	3	1	-	40	60	100	3
6	Surveying Laboratory-II	PC	-	-	3	25	50	75	2
7	FM&HM Laboratory	ES	-	-	3	25	50	75	2
8	Engineering geology Laboratory	PC	-	-	3	25	50	75	2
9	Mini Project on surveying field work	PRC	-	-	3	25	50	75	1
10	Quantitative Aptitude and Reasoning	MDC	3	-	-	-	-	-	-
	TOTAL		19	4	12	300	500	800	22

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

COURSE OBJECTIVES:

This course will enable students to

- Apply knowledge of mathematics and engineering in calculating slope and deflections
- Identify, formulate and solve engineering problems
- Analyse structural systems and interpret data
- Engage in lifelong learning with the advances in Structural Engineering.

COURSE OUTCOMES:

After studying this course, students will be able to:

- Evaluate the forces in determinate trusses by method of joints and sections.
- Evaluate the deflection of cantilever, simply supported and overhanging beams by different methods, energy principles and energy theorems and its applications to determine the deflections of trusses and bent frames
- Determine the stress resultants in arches and cables.
- Draw influence lines and construct the ILD diagram for the moving loads.

UNIT-I: INTRODUCTION AND ANALYSIS OF TRUSSES:

Introduction and Analysis of Plane Trusses Structural forms - Conditions of equilibrium, Compatibility conditions, Degree of freedom, Linear and non-linear analysis - Static and kinematic indeterminacies of structural systems, Types of trusses, Assumptions in analysis, Analysis of determinate trusses by method of joints and method of sections.

UNIT-II: DOUBLE INTEGRATION AND MACAULAY'S METHOD:

Deflection of Beams Definition of slope - Deflection and curvature - Sign conventions, Derivation of moment-curvature equation. Double integration method and Macaulay's method: Slope and deflection for standard loading cases and for determinate prismatic beams subjected to point loads, UDL, UVL and couple.

UNIT-III: MOMENT AREA AND CONJUGATE BEAM METHOD:

Moment area method: Derivation, Mohr's theorems, Sign conventions, Application of moment area method for determinate prismatic beams. Conjugate beam method: Real beam and conjugate beam, conjugate beam theorems, Application of conjugate beam method of determinate beams.

UNIT-IV: ENERGY METHODS:

Energy Principles and Energy Theorems Principle of virtual displacements, Principle of virtual forces, Strain energy and complimentary energy, Strain energy due to axial force, bending, shear and torsion, Deflection of determinate beams and trusses using total strain energy, Deflection at the point of application of single load, Castigliano's theorems and its application to estimate the deflections of trusses, beams, Special applications-Dummy unit load method.

UNIT-V: ARCHES AND CABLES:

Arches and Cable Structures Three hinged parabolic arches with supports at the same and different levels. Determination of normal thrust, radial shear and bending moment. Analysis of

cables under point loads and UDL. Length of cables for supports at same and at different levels- Stiffening trusses for suspension cables.

UNIT-VI: INFLUENCE LINES:

Influence Lines and Moving Loads Concepts of influence lines-ILD for reactions, SF and BM for determinate beams-ILD for axial forces in determinate trusses Reactions, BM and SF in determinate beams using rolling loads concepts.

TEXT BOOKS:

1. Reddy C S, *-Basic Structural Analysis*, Tata McGraw Hill, New Delhi.
2. Muthu K U. etal, *“Basic Structural Analysis*, 2nd edition, IK International Pvt. Ltd., New Delhi, 2015.
3. Bhavikatti, *“Structural Analysis*, Vikas Publishing House Pvt. Ltd, New Delhi, 2002.

REFERENCES:

1. Hibbeler R C, *“Structural Analysis*, Prentice Hall, 9th edition, 2014
2. Devadoss Menon, *“Structural Analysis*, Narosa Publishing House, New Delhi, 2008.

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	3
HYDRAULICS AND HYDRAULIC MACHINERY							

COURSE OBJECTIVES:

- To get knowledge about open channel hydraulic and the working of hydraulic machinery.

COURSE OUTCOMES:

At the end of course the student will have:

- Knowledge regarding various theories dealing with the flow phenomenon of fluid in an open channel.
- Ability to use dimensional analysis in solving fluid problems and plan hydraulic similitude studies.
- Understanding of basics of the hydro-machinery and the components,
- Function and use of different types of turbines and pumps.

UNIT-I: OPEN CHANNEL FLOW:

Types of flows - Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy’s, Manning’s; and Bazin formulae for uniform flow – Most Economical sections. Critical flow: Specific energy-critical depth – computation of critical depth – critical sub-critical and super critical flows.

UNIT-II: HYDRAULIC SIMILITUDE:

Dimensional analysis-Rayleigh’s method and Buckingham’s pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and Prototype relations.

UNIT- III: BASIC OF TURBO MACHINERY:

Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular momentum principle, Applications to radial flow turbines.

UNIT-IV: HYDRAULIC TURBINES:

Layout of a typical Hydropower installation – Heads and efficiencies-classification of turbines-pelton wheel-Francis turbine-Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and function efficiency. Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation.

UNIT-V: CENTRIFUGAL – PUMPS:

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

UNIT- VI: HYDROPOWER ENGINEERING:

Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential.- Case studies.

TEXT BOOKS:

1. Modi & Seth , “*Fluid Mechanics, Hydraulic and Hydraulic Machines*”, Standard book house
2. K,Subramanya , -*Open Channel flow*”, Tata Mc.Grawhill Publishers..
3. Narayana pillai ,—*Fluid Mechanics & Fluid machines*||, Universities press.

REFERENCES:

1. Dr. R.K. Bansal , “ *Fluid mechanics and hydraulic machines* ” - Laxmi Publications (P) Ltd., New Delhi
2. Ranga Raju, -*Elements of Open channel flow*|| by Tata Mc.Graw Hill, Publications.
3. Rajput, S.Chand &Co., “*Fluid mechanics and fluid machines*||
- 4.V.T.Chow, -*Open Channel flow*|| Mc.Graw Hill book company.

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
ENGINEERING GEOLOGY							

COURSE LEARNING OBJECTIVES:

The objective of this course is:

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

COURSE OUTCOMES:

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

- Identify and classify the geological minerals. Measure the rock strengths of various rocks
- Classify and measure the earthquake prone areas to practice the hazard zonation. monitor and measure the Landslides and subsidence
- Prepares, analyses and interpret the Engineering Geologic maps Analyses the ground conditions through geophysical surveys
- Test the geological material and ground to check the suitability of civil engineering project construction. Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc...

UNIT-I: INTRODUCTION:

Branches of Geology, Importance of Geology in Civil Engineering with case studies. Weathering: Weathering of rocks, Geological agents, weathering process of Rock, River process and their development.

UNIT-II: MINERALOGY AND PETROLOGY:

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

UNIT-III: STRUCTURAL GEOLOGY:

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

UNIT-IV: GROUND WATER:

Water table, Cone of depression, Geological controls of Ground Water Movement, Ground Water Exploration Techniques. Earthquakes And Land Slides: Terminology, Classification, causes and effects, Shield areas and Seismic bells, Richter scale intensity, Precautions of building constructions in seismic areas. Classification of Landslides, Causes and Effects, measures to be taken prevent their occurrence at Landslides.

UNIT-V: GEOPHYSICS:

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

UNIT-VI: GEOLOGY OF DAMS, RESERVOIRS AND TUNNELS:

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

TEXT BOOKS:

1. Subinoy Gangopadhyay, „*Engineering Geology*“ Oxford University press.
2. D. Venkat Reddy, „*Engineering Geology*“ Vikas Publishing House pvt. Ltd, 2013.
3. N. Chenn Kesavulu, „*Engineering Geology*“ Trinity Press and (Laxmi Publications), 2 Edition, 2014.
4. Vasudev Kanithi, „*Engineering Geology*“ University Press.

REFERENCES:

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

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

COURSE OBJECTIVES:

- The students will understand the working of Theodolite
- The students will understand determination of heights and distances by tachometry
- The students will understand the various types of curves used in practice
- The students will have the knowledge of setting out civil engineering works

COURSE OUTCOMES:

- Analyze theodolite and tacheometric surveying techniques for finding distances, angles and elevations to solve complex surveying problems
- Design different types of curves to solve transportation engineering problems using appropriate techniques following ethics and considering society besides communicating effectively in graphical form
- Apply the concept of Tacheometry for surveying in difficult and hilly areas to obtain the topographical map of area
- Study the concepts of advanced Surveying Instruments

UNIT-1 THEODOLITE SURVEYING:

Theodolite - Types - Description - Horizontal and vertical angles - Temporary and permanent adjustments – Heights and distances– Tangential and Stadia Tacheometry – Subtense method - Stadia constants - Anallactic lens.

TRANSIT VERNIER THEODOLITE: setting, use and temporary adjustments. Use of micro-optic theodolite, Measurement of horizontal angles and bearings by repetition and reiteration methods.

UNIT-II: THEODOLITE TRAVERSING AND COMPUTATIONS:

Traversing by included angles, and bearings, conditions of closed traverse, Gale's traverse table, closing errors and its adjustment, accuracy of traverse. Advantage of plotting traverse by coordinates, omitted measurements in traverse and their computations. Errors in theodolite survey.

MEASUREMENT OF VERTICAL ANGLES: Trigonometrical levelling, calculation of elevations and distances of accessible and inaccessible objects, problems. Trigonometrical levelling, geodetic observations, refraction and curvature corrections, axis signal correction, determination of difference in elevation by single and reciprocal observation, problems.

UNIT-III: CURVES:

Theory of simple curves. Setting out simple curves by linear and instrumental methods. Obstructions in curve ranging. Compound curves. Reverse curves.

UNIT-IV: TRANSITIONS AND VERTICAL CURVES:

Transition curves, computations and setting out of transition curves. Vertical curves, computations and setting out of vertical curves.

UNIT-V: TACHOMETRY:

Theory and use of stadia wires in levelling instruments and theodolite. Fixed and movable hair tachometers. Reduction by calculations; tacheometric tables; use of tacheometric alidade in contouring by plane table. Tangential method of tacheometry, Theory and use of Jeffcott Direct Reading Tacheometer. Use of RD's self-reducing Tacheometer. Principle and use of substance bar and Beaman's stadia arc.

UNIT-VI: HYDROGRAPHIC SURVEY:

Brief introduction, methods and applications

TOTAL STATION: Features, concepts, types and applications.

TEXT BOOKS:

1. B.C. Punmia, “*Surveying Vol.II*”, Laxmi Publications pvt. Ltd., New Delhi – 2009.
2. S.K. Duggal, “*Surveying Vol.II*”, Tata McGraw Hill Publishing Co. Ltd. New Delhi. – 2009.
3. K.R. Arora, –*Surveying Vol.III*|| Standard Book House, New Delhi. – 2010.

REFERENCES:

1. R Subramanian, –*Surveying and Leveling, Second edition*”, Oxford University Press, New Delhi
2. Kanetkar T P and S V Kulkarni , –*Surveying and Leveling Part I*”, Pune Vidyarthi Griha Prakashan, 1988
3. A. Bannister, S. Raymond , R. Baker, –*Surveying*||, Pearson, 7th ed., New Delhi.

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	3
HYDROLOGY AND IRRIGATION ENGINEERING							

COURSE LEARNING OBJECTIVES:

The course is designed to

- Introduce hydrologic cycle and its relevance to Civil engineering.
- Make the students understand physical processes in hydrology and, Components of the hydrologic cycle.
- Appreciate concepts and theory of physical processes and Interactions.
- Learn measurement and estimation of the components hydrologic Cycle.
- Provide an overview and understanding of Unit Hydrograph theory and its analysis
- Understand flood frequency analysis, design flood, flood routing.
- Introduce the types of irrigation systems
- introduce the concepts of planning and design of irrigation systems
- Discuss the relationships between soil, water and plant and their Significance in planning an irrigation system.
- learn design principles of canal structures.

COURSE OUTCOMES:

At the end of the course the students shall be able to :

- Have a thorough understanding of the theories and principles governing the hydrologic Processes.
- Develop Intensity-Duration-Frequency and Depth-Area Duration Curves to design hydraulic structures
- Develop design storms and carry out frequency analysis. estimate irrigation water requirements
- Design irrigation canals and canal network Plan an irrigation system.

UNIT-I: INTRODUCTION & PRECIPITATION:

Introduction , Hydrologic cycle (Horton’s representation). Water budget equation Precipitation: introduction, forms of precipitation, types of precipitation, measurement of precipitation (Simon’s gauge & Syphon gauge only), selection of rain gauge station. Adequacy of rain gauges, methods of computing average rainfall, interpolation of missing data, adjustment of missing data by double mass curve method. Hyetograph and mass curve of rainfall.

UNIT-II: LOSSES FROM PRECIPITATION & RUN OFF:

Evaporation: Definition, factors affecting, measurement (ClassA pan). Evapo-transpiration: Definition, factors affecting, measurement, Infiltration: Definition, factors affecting, measurement (doublinging infiltrometer), infiltration indices, Horton’s equation of infiltration. **RUN OFF** : Definition, factors affecting, empirical formulae, stream gauging, flow mass curve and flow duration curve.

UNIT-III: HYDROGRAPHS:

Definition, components of hydrographs, unit hydrograph and its derivation from simple storm hydrograph, base flow separation, Propositions of unit hydrograph- problems.

ESTIMATION OF FLOOD

Definition of flood, factors affecting flood, methods of estimation (envelope curves, empirical formulae, rational method).

UNIT-IV: INTRODUCTION:

Introduction, need for irrigation, advantages and disadvantages of irrigation, environmental impacts of irrigation, Systems of irrigation: Gravity irrigation, lift irrigation, well irrigation, tubewell irrigation, infiltration galleries, sewage irrigation, supplemental irrigation.

UNIT-V: SOIL-WATER-CROP RELATIONSHIP:

Introduction, soil profile, physical properties of soil, soilclassification. Indian soils, functions of irrigation soils,maintaining soil fertility, soil-water-plant relationship, soil-moisture. Irrigation relationship, frequency of irrigation.

WATER REQUIREMENT OF CROPS:

Introduction, definitions, crop seasons of India, water requirement of a crop, duty, delta, base period. Consumptive use. Irrigation efficiencies. Assessment of irrigation water.

UNIT-VI: CANALS:

Definition, Types of canals, Alignment of canals, Design of canals by Kenedy's and Lacey's methods- Problems.

TEXT BOOKS:

1. Subramanya. K, *Engineering Hydrology* Tata Mc Graw-Hill Education Pvt. Ltd, (2013), New Delhi.
2. Jayarami Reddy. P, *Engineering Hydrology*, Laxmi Publications Pvt. Ltd., (2013), New Delhi
3. Chow V.T., D.R Maidment and L.W. Mays, *Applied hydrology* Tata McGraw Hill Education Pvt. Ltd., (2011), New Delhi.
4. Ojha C.S.P, R. Berndtsson and P. Bhunya , *Engineering Hydrology* Oxford University Press, (2010).

REFERENCES:

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

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

COURSE OUTCOMES:

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

CO.1 Enhance the knowledge in using Auto level, theodolite instruments.

CO.2 Design and set out a simple circular curve for roads.

CO.3 Assess required excellence in using the Total Station Instrument by avoiding manual errors

LIST OF EXPERIMENTS:

1. Study of theodolite in detail - practice for measurement of horizontal and vertical angles.
2. Measurement of horizontal angles by method of repetition and reiteration.
3. Trigonometric Levelling - Heights and distance problem (Two Exercises)
4. Heights and distance using Principles of tacheometric surveying (Two Exercises)
5. Curve setting – different methods. (Two Exercises)
6. Setting out works for buildings & pipe lines.
7. Determination of area using total station
8. Traversing using total station
9. Contouring using total station
10. Determination of remote height using total station
11. Stake-out using total station
12. Distance, gradient, Diff, height between two inaccessible points using total stations.

LIST OF EQUIPMENT:

1. Theodolites, and levelling staffs.
2. Tachometers.
3. Total station.

DEPARTMENT OF CIVIL ENGINEERING

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2
FLUID MECHANICS AND HYDRAULIC MACHINERY LAB							

COURSE OUTCOMES:

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

CO.1 Use the equipment for flow measurement.

CO.2 Identify the coefficient of discharge and loss of head through different flow conditions.

CO.3 Study working performance test on types of turbines.

LIST OF EXPERIMENTS:

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

LIST OF EQUIPMENT:

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

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

COURSE OBJECTIVES:

The objective of this course is:

- To identify the megascopic types of Ore minerals & Rock forming minerals.
- To identify the megascopic types of Igneous, Sedimentary, Metamorphic rocks.
- To identify the topography of the site & material selection.

COURSE OUTCOMES:

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

- Identify megascopic minerals & their properties. Identify megascopic rocks & their properties.
- Identify the site parameters such as contour, slope & aspect for topography.
- Know the occurrence of materials using the strike & dip problems.

LIST OF EXPERIMENTS:

1. Physical properties of minerals: Megascopic identification.
2. a) Rock forming minerals – Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc.
b) Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc.
3. Megascopic description and identification of rocks.
a) Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc.
b) Sedimentary rocks – Sand stone, Ferruginous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc.
c) Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite & Biotiteschist, Marble, Khondalite, etc.
4. Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc.
5. Simple Structural Geology problems.
6. Field work – To identify Minerals, Rocks, Geomorphology & Structural Geology.

LAB EXAMINATION PATTERN:

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

REFERENCES:

1. M T Mauthesha Reddy, „*Applied Engineering Geology Practicals*“ by New Age International Publishers, 2nd Edition.
2. Tony Waltham, „*Foundations of Engineering Geology*“ Spon Press, 3rd edition, 2009.

II B.TECH II-SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	0	0	3	25	50	75	1

MINI PROJECT ON SURVEYING FIELD WORK

COURSE OUTCOMES:

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

- CO 1 Gain knowledge in field works like contour map, profile levelling.
- CO .2 Gain knowledge in field works like reservoir capacity, alignment of roads, canals,
- CO .3 Gain knowledge in field works like water supply lines, sewage lines,
layout of a colony

The field work is needed to be done on any of the mentioned works like contour map, profile leveling, reservoir capacity, alignment of roads, canals, water supply lines, sewage lines, layout of a colony etc., and a report is required to be submitted.

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

COURSE OBJECTIVES:

- To train students in analyzing real life scenarios considering all factors
- To educate the students on principles of mathematical problems and problem solving methods
- To train students for campus placements

COURSE OUTCOMES:

After thorough learning of Quantitative Aptitude and Reasoning, a student:

- Will be able to prepare well for clearing Quantitative Aptitude and Reasoning tests for campus placements
- Will be able to critically evaluate various real life situations by resorting to Analysis of key issues and factors.
- Will be able to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions.
- Will be able solve complex mathematical problems in the shortest time possible by applying shortcuts.

UNIT - I: SIMPLE EQUATIONS:

Definition of Linear Equations, Formation of simple equations, Problems on Ages, Fractions and Digits, Indeterminate system of equations, Special cases in indeterminate system of equations

RATIO AND PROPORTION: Definition of Ratio, Properties of Ratios, Comparison of Ratios, Problems on Ratios Compound Ratio, Problems on Proportion, Mean proportional and Continued Proportion

VARIATION: Direct variation, Inverse variation, Joint variation, Problems on Variations.

UNIT – II: PERCENTAGES:

Introduction, converting a percentage into decimals, Converting a Decimal into a percentage equivalent of fractions, Problems on percentages.

PROFIT AND LOSS: Problems on Profit and Loss percentage, Relation between Cost Price and Selling price, Discount and Marked Price, Two different articles sold at same Cost Price, Two different articles sold at same Selling Price, Gain% / Loss% on Selling Price .

PARTNERSHIP: Introduction, Relation between capitals, Period of investments and Shares

SIMPLE INTEREST: Definitions, Problems on interest and amount, Problems when rate of interest and time period are numerically equal.

COMPOUND INTEREST: Definition and formula for amount in compound interest, Difference between simple interest and compound interest for 2 years on the same, principle and time period.

QUADRATIC EQUATIONS: General form of Quadratic equations, Finding the roots of Quadratic equations, Nature of the roots, Relation between the roots, Maximum and minimum value of Quadratic Expression.

PROGRESSIONS: Arithmetic Progression, Geometric Progression, Harmonic Progression, Arithmetic Mean, Geometric Mean and Harmonic Mean and their relation.

UNIT – III: DEDUCTIONS:

Finding the conclusions using Venn diagram method, Finding the conclusions using syllogism method.

CONNECTIVES: Definition of a simple statement, Definition of compound statement, +finding the Implications for compound statements, Finding the Negations for compound statements

UNIT – IV: TIME AND DISTANCE:

Relation between speed, distance and time, Converting km/h into m/s and vice versa, Problems on average speed, Problems on relative speed, Problems on trains, Problems on boats and streams, Problems on circular tracks, Problems on races

TIME AND WORK: -Problems on Unitary method, Relation between Men, Days, Hours and Work, Problems on Man-Day-Hours method, Problems on alternate days, Problems on Pipes and Cisterns.

UNIT – V: ANALYTICAL REASONING PUZZLES:

Problems on Linear arrangement, Problems on Circular arrangement, Problems on Double line-up, Problems on Selections, Problems on Comparisons.

UNIT – VI: CLOCKS:

Finding the angle when the time is given, Finding the time when the angle is known, Relation between Angle, Minutes and Hours, Exceptional cases in clocks

CALENDARS: Definition of a Leap Year, Finding the number of Odd days, framing the year code for centuries, Finding the day of any random calendar date.

BLOOD RELATIONS: Defining the various relations among the members of a family, Solving Blood Relation puzzles, 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:

1. www.careerbless.com/aptitude/qa/home.php
2. www.affairsclooud.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.practiceaptitudetests.com/numerical-reasoning-tests

III B.TECH I SEMESTER

III B.TECH - I SEMESTER COURSE STRUCTURE

S.No	Subject Name	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Structural Analysis-II	PC	3	1	-	40	60	100	3
2	Concrete Technology	PC	4	-	-	40	60	100	3
3	Geotechnical Engineering –I	PC	3	1	-	40	60	100	3
4	Design And Drawing Of Concrete Structures	PC	3	1	-	40	60	100	3
5	Transportation Engineering-I	PC	4	-	-	40	60	100	3
6	Open Elective-I (See The List Of Open Electives)	OE	4	-	-	40	60	100	3
7	Geotechnical Engineering Laboratory	PC	-	-	3	25	50	75	2
8	Concrete Technology Laboratory	PC	-	-	3	25	50	75	2
9	Advanced Communication Skills (Mandatory Non Credit Course)	MDC	3	-	-	-	-	-	-
10	Sports And Games (Mandatory Non Credit Course)	MDC	-	-	2	-	-	-	-
	TOTAL		24	3	8	290	460	750	22

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

COURSE OBJECTIVES

- To introduce the students to concept of theory of structural analysis- and methods in structural analysis.

COURSE OUTCOMES:

Students who successfully complete this course will be able to:

- Draw the shearing force and bending moment diagrams for Propped and fixed beams by consistent deformation method.
- Draw the shearing force and bending moment diagrams for Propped and fixed beams and find the forces in indeterminate trusses by strain energy method.
- Apply the Clapeyron's theorem of three moments to analyse continuous beams.
- Apply the slope-deflection method to analyze statically indeterminate structures.
- Apply the moment distribution method to analyze statically indeterminate structures.

UNIT-1

ANALYSIS OF BEAMS: Consistent deformation method – Propped cantilever and fixed beams.

UNIT-II ANALYSIS OF BEAMS AND PLANE TRUSSES BY STRAIN ENERGY

Analysis of beams (Propped cantilever and Fixed beams) and indeterminate trusses using strain energy and unit load methods.

UNIT-III CLAPEYRON'S THEOREM OF THREE MOMENTS

Clapeyron's theorem of three moments – continuous beams and fixed beams.

UNIT-IV SLOPE DEFLECTION METHOD:

Introduction- Sign convention- Development of slope-deflection equations and Analysis of Beams and Orthogonal Rigid jointed plane frames (non-sway) with kinematic redundancy less than/equal to three. (Members to be axially rigid).

UNIT -V MOMENT DISTRIBUTION METHOD:

Introduction- Definition of terms Distribution factor- Carry over factor- Development of method and Analysis of beams and orthogonal rigid jointed plane frames (nonsway) with kinematic redundancy less than/equal to three. (Members to be axially rigid).

UNIT - VI SWAY ANALYSIS:

Analysis of rigid jointed plane frames (sway- members assumed to be axially rigid and kinematic redundancy ≤ 3) by slope deflection and moment distribution methods. Introduction to Kani's Method.

TEXT BOOKS:

1. R. Vaidyanathan and P. Perumal- Comprehensive Structural Analysis Volume I & II- Laxmi Publications (P) Ltd.
2. Reddy. C.S.- Basic Structural Analysis- Tata McGraw Hill
3. BhavaiKatti- S.S- "Structural Analysis – Vol. 1 & Vol. 2"- Vikas Publishing Pvt Ltd.- NewDelhi- 2008.

REFERENCES:

1. Hibbeler- RC- Structural analysis- Pearson Education.
2. Daniel L Schodak- Structures- Pearson Education.
3. S.S. Bhavikatti- Structural Analysis II- Vikas Publication Houses (P) Ltd.
- 4 Wang C. K.- Intermediate Structural Analysis- Tata McGraw Hill.

III B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
CONCRETE TECHNOLOGY							

COURSE OBJECTIVES:

- To study the properties of cement.
- To study properties of aggregates.
- To conduct laboratory tests on concrete materials.
- To know the properties of fresh and hardened concrete.
- To know the different special concrete.
- To know about mix design procedure of different countries.

COURSE OUTCOMES:

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

- Explain the properties and tests of various constituents present in Concrete.
- Understand various manufacturing process of concrete and properties and workability tests of fresh concrete.
- Design concrete mix as per IS and ACI standards .
- Enumerate the mechanical behavior and properties of hardened Concrete.
- Demonstrate the long term properties of concrete and identify the solutions for field problems.
- Select the suitable type of special concrete for real time situations Concrete making Materials:

UNIT-I

CEMENT- Raw materials- composition - Hydration- chemistry of cement – Types and grades of cement - Tests and specifications – consistency- setting time- soundness and fineness test.

UNIT-II

AGGREGATES - Source- natural and artificial.

FINE AGGREGATES- Gradation- fineness modulus- specific gravity- bulk density - bulking of sand-water absorption- moisture content and measurement methods- presence of deleterious content .

COARSE AGGREGATES – Size and shape- gradation- fineness modulus- specific gravity- bulk density sieve analysis- water absorption. Tests on coarse aggregates- impact- crushing- abrasion and attrition- water absorption- alkali aggregate reaction.

WATER- Qualities of water for concreting- tolerable concentrations of impurities- use of sea water and its effects.

UNIT-III

Admixtures - Types of Admixtures- super plasticisers-plasticisers- retarders- accelerators- air entrained admixtures and pozzolanic admixtures.

CONCRETE PRODUCTION & FRESH CONCRETE:

Batching of Ingredients- mixing- transporting- and placing - Compacting- finishing- and curing of concrete- Workability- bleeding and segregation of concrete - Factors influencing it - Tests on workability of concrete.

UNIT-IV

CONCRETE MIX DESIGN: Concept of Mix design-Quality acceptance criteria as per Indian standard method. Design of concrete mixes as per IS-10262- ACI method (procedure only).

Mechanical properties of concrete: Compressive strength and parameters affecting it - Tensile strength - direct and indirect- Modulus of elasticity and Poisson's ratio flexural strength of concrete- Non-destructive test - partially destructive test.

UNIT-V

DIMENSIONAL STABILITY AND DURABILITY OF CONCRETE:

Creep - parameters affecting - Shrinkage of concrete - types and its significance - Introduction to durability- relation between durability and permeability - Chemical attacks on concrete- sulphate attack- chloride- acid attacks- sea water attacks- carbonation attacks - Corrosion of steel rebars- corrosion preventive measures.

UNIT-VI

SPECIAL CONCRETES: Properties and applications of: high strength- high performance and reactive powder concrete - Lightweight- heavyweight- and high density concrete- Shot Crete- Self-compacting concrete.

TEXT BOOKS:

1. Shetty M.S.- -Concrete Technology||- 7th edition- S.Chand and company Limited- 2012.
2. Nevile A.M.- -Properties of concrete||- 5th edition- Pearson India- 2012.

REFERENCE BOOKS:

1. Mehta- P.K.- "Concrete: Microstructure- Properties and Materials " 4th edition- Tata McGraw Hill Education Private Limited- 2013
2. Gambhir- -Concrete Technology||- 5th edition- McGraw Hill Education (India) Private Limited- 2013.
3. Santha Kumar A.R.- -Concrete Technology||- Oxford University Press- New Delhi- 2009.
4. www.nptel.ac.in

IS CODES

1. IS: 10262-2009- recommended guidelines for Concrete Mix Design.
2. IS: 456 - 2000- Plain and Reinforced concrete – code of practice
3. SP: 23-1982- Handbook on concrete.
4. ACI Committee 211.1- 91- standard practice for selecting proportions for normal- heavy weight and mass concrete- Part I- ACI manual of concrete practice- 1994.

III B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
GEO TECHNICAL ENGINEERING – I							

COURSE OBJECTIVES:

- To study the soil structure-
- To study consistency limits and IS Classification of soils.
- To conduct laboratory tests on soils.
- To know the permeability- flow nets- seepage- Boussinesq and Westergaard's analysis.
- To understand the compaction- Liquefaction- Consolidation
- To find out the shear strength of soils.

COURSE OUTCOMES:

At the end of course the student will be able to

- Understand formation of soil properties and basic definition.
- Determined and classify the soil for engineering and index properties of soil.
- Coefficient of permeability and various methods.
- Principle of effective stress and point load different shapes.
- Determination of compaction characteristics of soil and consolidation.
- Determination of shear strength and compressibility of soil application.

UNIT – 1**INTRODUCTION**

Soil formation and soil types- Regional soil deposits of India.

BASIC DEFINITIONS AND RELATIONS

Phase diagrams- Simple definitions- some important relationships.

UNIT – II**SOIL CLASSIFICATION**

Clay Mineralogy: Introduction to soil classification- Particle size classification as per IS-code- Unified soil classification system- Indian standard soil classification system- Index Properties- Grain size distribution- Atterberg Limits- Significance of other Soil Aggregate properties.

UNIT – III**PERMEABILITY**

Capillary rise- Darcy's law and its Validity- Determination of coefficient of permeability - constant and Variable head methods- indirect methods- Factors affecting permeability- Permeability of stratified soil deposits.

UNIT – IV**SEEPAGE THROUGH SOILS**

Principle of effective stress- physical meaning of effective stress- Types of head- seepage forces and quicksand condition.

STRESS DISTRIBUTION IN SOIL

Boussinesq's and Westergaard's theories for point loads and areas of different shapes – Newmark's influence chart.

UNIT – V

COMPACTION OF SOILS

Introduction- Laboratory tests- Factors affecting compaction- Structure and engineering behavior of Compacted cohesive soils- Compaction in the field- Compaction specifications and field control.

COMPRESSIBILITY OF SOIL AND CONSOLIDATION

Introduction- Compressibility- Time-rate of consolidation- Consolidation test- Computation of Settlement- extrapolation of field consolidation curve- Settlement analysis.

UNIT – VI

SHEAR STRENGTH OF SOILS

Introduction- Stress at a point- Mohr Circle of stress- Mohr–coulomb Failure Criterion- Measurement of Shear Strength- Shear strength of Clayey soils- Shear Strength of Sands- Drainage conditions and Strength parameters.

TEXT BOOKS:

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao- New Age International Publishers
2. Soil Mechanics and Foundation Engg (7th edition) by Dr. Arora- K.R.- Standard Publisher and Distributors- Delhi- 2010.
3. A Text book of Soil Mechanics and Foundation Engineering – B.C.Punmia Laxmi Publications.

REFERENCES:

1. Foundation Analysis & Design by Bowles- J.E.- McGraw- Hill Book Co.
2. A Text book of Soil Mechanics and Foundation Engineering – P.Purushothama Raj- Pearson Education
3. Introduction to Soil Mechanics- Braja M Das

E-LEARNING RESOURCES:

<http://nptel.ac.in/courses.php>

<http://jntuk-coerd.in/>

III B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
DESIGN AND DRAWING OF CONCRETE STRUCTURES							

COURSE OBJECTIVES:

This course will enable students:

- Familiarize Students with different types of design philosophies.
- Equip student with concepts of design of flexural members.
- Understand Concepts of shear- bond and torsion.
- Familiarize students with different types of compressions members and Design.
- Understand different types of footings and their design.

COURSE OUTCOMES:

After studying this course- students will be able to:

- Work on different types of design philosophies.
- Carryout analysis and design of flexural members- structures subjected to shear- bond and torsion.
- Design different types of compression members and footings.
- Design of slabs and stair case.

UNIT-I: INTRODUCTION

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

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

UNIT-II: DESIGN FOR FLEXURE

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

UNIT-III: DESIGN FOR SHEAR- TORSION AND BOND

Limit state analysis and design of section for shear and torsion–concept of bond- anchorage and development length- I.S .code provisions. Design examples in simply supported and continuous beams- detailing.

LIMIT STATE DESIGN FOR SERVICEABILITY: Deflection- cracking and code provision.

UNIT–IV:DESIGN OF COMPRESSION MEMBERS

Effective length of a column- Design of short and long columns –under axial loads- uniaxial bending and biaxial bending–concepts of Braced and un-braced columns– I S Code provisions- SP16 charts.

UNIT–V: DESIGN OF FOOTINGS

Different types of footings–Design of isolated rectangular and circular footings - combined rectangular and trapezoidal footings- subjected to axial loads.

UNIT–VI: DESIGN OF SLABS

CLASSIFICATION OF SLABS: design of one–way slabs- two-way slabs and continuous slabs using IS Coefficients (conventional)- design of waist-slab staircase.

NOTE:

1. The students has to prepare the following charts
(a) Columns (b) Footings (c) Slabs

TEXT BOOKS:

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

REFERENCES:

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

IS Codes: (Permitted to use in examination hall) 1) IS -456-2000

III B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	0	40	60	100	3
TRANSPORTATION ENGINEERING-I							

COURSE LEARNING OBJECTIVES:

The objective of this courses:

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

COURSE OUTCOMES:

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

- Plan highway network for a given area.
- Design highway geometrics.
- Design Intersections and prepare traffic management plans.
- Judge suitability of pavement materials and design flexible and rigid pavements.

UNIT-I

HIGHWAY NETWORK PLANNING AND ALIGNMENT: Different modes of transportation- History of road development- Highway development in India-Classification of Roads- Road Network Patterns- Planning Surveys- preparation of plans- master plan- evaluation by saturation system- 20 year Road Development Plans- Highway Alignment- Factors affecting Alignment-Engineering Surveys–Drawings and Reports.

UNIT-II

HIGHWAY GEOMETRIC DESIGN: importance of geometric design- design controls and criteria- cross section elements- pavement surface characteristics- camber- carriageway-kerbs- road margins- formation- right of way- typical cross sections. Sight distance- stopping sight distance- overtaking sight distance- sight distance at intersections. Design of horizontal alignment- super elevation- transition curves. Design of vertical alignment- gradients- vertical curves.

UNIT-III

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

UNIT-IV

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

UNIT-V

DESIGN OF PAVEMENTS: Types of pavements- Functions and requirements of different components of pavements- Design Factors

FLEXIBLE PAVEMENTS: Design factors–Flexible Pavement Design Methods– CBR method –IRC method–Burmister method–Group index method– IRC Method for Low volume Flexible pavements.

RIGID PAVEMENTS: Design Considerations – wheel load stresses – Temperaturestresses–Frictionalstresses–Combinationofstresses–Design of slabs–Design of Joints–IRCmethod–Rigid pavements for low volume roads

UNIT-VI

HIGHWAY CONSTRUCTION AND MAINTENANCE: Types of Highway Construction– Earthwork- Construction of Earth Roads- Gravel Roads - Water Bound Macadam Roads- Bituminous Pavements and Construction of Cement Concrete Pavements .Pavement Failures- Maintenance of Highways- pavement evaluation- strengthening of existing pavements.

TEXTBOOKS:

1. Kadiyali L.R. Traffic Engineering and Transport Planning- Khanna Publishers- New Delhi- India- 1997.
2. Khanna- S.K. and C.E.G. Justo Highway Engineering- Nem Chand and Bros- Roorkee- India- 2001.

REFERENCES:.

1. Ministry of Road Transport and Highways. Specifications for Road and Bridge Works- Fourth Edition- Indian Roads Congress- New Delhi- India- 2001.
2. IRC Codes of Practices

III B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
PRINCIPLES OF WATER QUALITY MANAGEMENT							

COURSE OBJECTIVES:

- To build understanding of water quality parameters- procedures for quantitative analysis- and their relation to public health and environment.

COURSE OUTCOMES:

- Understand meaning of important parameters for measuring water quality.
- Water quality criteria and standards- and their relation to public health- environment and urban water cycle.
- Plan water quality surveillance for a given aquatic environment and to understand what a test result means in terms of the health of the ecosystem.

UNIT - I INTRODUCTION :World water resources- water resources in India- water as finite resource- variability of water in time & space- history of water resources development- water infrastructure-problems and perspectives- present institutional framework for water management.
WATER LAWS: Constitutional provisions- National Water Policy- riparian rights / ground water owner ship- prior appropriation- permit systems- acquisition and use of rights- scope for privatization.

UNIT-II ECONOMICS & PARADIGM SHIFT IN WATER MANAGEMENT

ECONOMICS OF WATER :Water as economic good- intrinsic value- principles of water pricing & water allocation- capital cost- opportunity cost- internal rate of return- benefit cost analysis- principles of planning and financing of water resources project : Discussion on any two case studies.

PARADIGM SHIFT IN WATER MANAGEMENT:

Global and national perspectives of water crisis- water scarcity- water availability and requirements for human and nature- concepts of ‘_blue water’- ‘_Green water’- and ‘_virtual water’- and their roles in water management. Sustainability principles for water management- framework for planning a sustainable water future.

UNIT- III: BASIN SCALE HYDROLOGY

Estimation of surface water- estimation of ground water draft/recharge import/export of water (inter basin water transfer)- recycling and reuse and storage- control of water logging- salinity- & siltation of storages.

FLOOD & DROUGHT MANAGEMENT: causes of floods- structural and non-structural measures- mitigation plan- flood damage assessment- use of geo informatics for flood management- Types of droughts- severity index- drought forecasting- damage assessment- mitigation plan- use of geo informatics for drought management.

UNIT- IV: WATER DEMAND AND SUPPLY BASED MANAGEMENT

Consumptive & non consumptive demands- irrigation demand estimation- water utilization- irrigation efficiency- water management in irrigation sector- Demand estimation in hydro/thermal/nuclear power sector- estimation & forecasting of water demands of domestic & industrial sector- navigation and recreational water demands

UNIT V: ENVIRONMENTAL AND SOCIAL ASPECTS

ENVIRONMENTAL MANAGEMENT: protection of vital ecosystem- water requirements for environmental management- aquaculture- minimum flows- water quality management for various uses.

SOCIAL IMPACT OF WATER RESOURCES DEVELOPMENT: direct/ indirect benefits- employment generation- industrial growth- agro-industry- enhanced living standards- education & health- co-operative movement- management of rehabilitation & resettlement.

UNIT VI: BASIN PLANNING & WATERSHED MANAGEMENT

PERSPECTIVE PLAN FOR BASIN DEVELOPMENT & MANAGEMENT- Decision support system for Integrated Water Resources Management (IWRM)- use of data driven techniques like Artificial Neural Networks- Genetic programming- Model Tree in water resources planning- development & management.

WATER QUALITY PARAMETERS: Physical- Chemical and Biological analysis of water- WHO- BIS- ICMR standards for water quality.

TEXT BOOKS:

- 1) Water Resources Systems Engg- D. P. Loucks- Prentice Hall
- 2) Water Resources Systems Planning and Management- Chaturvedi- M.C. Tata McGraw Hill
- 3) Economics of Water Resources Planning- James L.D and Lee R.R- McGraw Hill
- 4) Water resources hand book; Larry W. Mays- McGraw International Edition
- 5) Design of Water Resources Systems- Arthur Mass- MacMillan 1962

REFERENCE BOOKS:

- 1) Economics of Water Resources Planning- L. D. James & R.R.Leo- McGraw Hills- NY 1971.
- 2) Water Resources Systems Engineering- W. A. Hill & J. A. Dracup.
- 3) Water shed Management – B.M. Tideman
- 4) Watershed management –J. V. S. MURTY- new Age International Publisher.

E – RESOURCES

1. [nptel.iitm.ac.in/courses/webcourse-contents/IISc-Bang/water resource management](http://nptel.iitm.ac.in/courses/webcourse-contents/IISc-Bang/water_resource_management).

III B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
REMOTE SENSING AND GIS							

COURSE LEARNING OBJECTIVES:

- The course is designed to
- Introduce the basic principles of Remote Sensing and GIS techniques.
- Learn various types of sensors and platforms
- Learn concepts of visual and digital image analyses
- Understand the principles of spatial analysis
- Sustainable planning and management of civil Engineering projects.

COURSE OUTCOMES

- Demonstrate the concepts of Electro Magnetic energy, spectrum and spectral signature curves.
- Apply the concepts of satellite and sensor parameters and characteristics of different platforms
- Compute an image visually and digitally with digital image processing techniques
- Analyze raster and vector data and modelling in GIS
- Understand the importance of remote sensing and GIS application in civil engineering

UNIT – I

INTRODUCTION TO REMOTE SENSING: Basic concepts and fundamentals of remote sensing- electromagnetic radiation- electromagnetic spectrum- remote sensing terminology and units- interaction with atmosphere- energy interaction with the earth surfaces characteristics of remote sensing systems.

SENSORS AND PLATFORMS: Introduction- types of sensors- airborne remote sensing- spaceborne remote sensing- image data characteristics- digital image data formats-band interleaved by pixel- band interleaved by line- band sequential- over view of Indian Remote sensing satellites and sensors IRS- LANDSAT- SPOT.

UNIT – II

IMAGE ANALYSIS: Introduction- elements of visual interpretations- digital image processing- image preprocessing- image enhancement- image classification- supervised classification- unsupervised classification- Classification accuracy assessment.

UNIT – III

GEOGRAPHIC INFORMATION SYSTEM: Introduction- key components- Fundamental operations of GIS- A theoretical framework for GIS. Application areas of GIS- map projections
DATA ENTRY AND PREPARATION: spatial data input- raster data models- vector data models. Fundamental concepts of GPS- Types of GPS- GPS satellite- Application of GPS in resource surveys- mapping and navigation.

UNIT – IV

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

UNIT – V

RS AND GIS APPLICATIONS GENERAL: Land cover and land use- agriculture- forestry- geology- geomorphology- urban applications; Assessment of physical transformation in an urban area.

UNIT – VI

APPLICATION TO HYDROLOGY AND WATER RESOURCES: Flood zoning and mapping- groundwater prospects and potential recharge zones- watershed management- Reservoir sedimentation and Identification of sites for artificial Recharge structures.

TEXT BOOKS:

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

REFERENCES:

1. ‘Remote Sensing and its Applications’ by Narayan LRA- Universities Press- 2012.
2. ‘Concepts and Techniques of Geographical Information System’ by Chor Pang Lo and A K W Yeung- Prentice Hall (India)- 2006
3. ‘Introduction to Geographic Information Systems’ by Kand Tsung Chang- McGraw Hill Higher Education- 2009.
4. ‘Basics of Remote sensing & GIS’ by Kumar S- Laxmi Publications- New Delhi- 2005.
5. ‘Principals of Geographical Information Systems’ by Burrough P A and R.A. McDonnell- Oxford University Press- 199

DEPARTMENT OF CIVIL ENGINEERING

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

COURSE OBJECTIVES:

- To calculate the physical and mechanical properties of soils and to identify their suitability for construction.
- To conduct various field tests on soils for getting the accurate results and avoid approximately.

COURSE OUTCOMES:

After performing the experiments listed in the syllabus- the students will have skills:

- To determine basic soil properties and classify the soil for Engineering application
- Determine permeability of soils.
- Determine compaction and consolidation of soils.
- Determine shear strength characteristics of soils

LIST OF EXPERIMENTS:

1. Atterberg's Limits
2. (a) Field density-core cutter
(b) sand replacement method
3. Grain size analysis
4. (a) Permeability of soil
(b) Constant and variable head test
5. Compaction test
6. CBR Test
7. Consolidation test
8. Unconfined compression test
9. Tri-axial Compression test
10. Direct shear test.
11. Vane shear test

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

COURSE OBJECTIVES:

1. To know the tests on cement.
2. To know the tests on aggregate
3. To know the tests on concrete

COURSE OUTCOMES

1. Conduct test on properties of cement
2. Conduct test on properties of Aggregates
3. Conduct test on properties of concrete
4. Conduct test on properties of Concrete in hardened state.

LIST OF EXPERIMENTS:

I. TEST ON CEMENT.

1. Consistency
2. Specific gravity
3. Fineness
4. Soundness

II. TEST ON AGGREGATES

1. Specific gravity
2. Fineness modulus

III. TESTS ON FRESH CONCRETE

1. Slump cone test
2. Flow table
3. Compaction factor
4. Vee bee test.

IV. TESTS ON HARDENED CONCRETE

1. Compressive strength - Cube & Cylinder
2. Flexure test
3. Modulus of Elasticity

III B.TECH I- 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

1. Use English language fluently, accurately and appropriately
2. Know how body language is used in communication and interpret non-verbal symbols.
3. Understand the nuances of the written language and write technical reports effectively.
4. Participate in Group discussions and successfully face interviews.

UNIT-I: NON-VERBAL COMMUNICATION

UNIT-II: RESUME PREPARATION

UNIT-III: E-MAIL WRITING & PROFESSIONAL LETTER WRITING

UNIT-IV: ESSAY WRITING & PARAGRAPH WRITING

UNIT-V: GROUP DISCUSSION

UNIT-VI: INTERVIEW SKILLS

REFERENCES:

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

III B.TECH - II SEMESTER

III B.TECH - II SEMESTER COURSE STRUCTURE

S.No	Subject Name	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Design And Drawing Of Steel Structures	PC	3	1	-	40	60	100	3
2	Environmental Engineering-I	PC	3	1	-	40	60	100	3
3	Geotechnical Engineering –II	PC	3	1	-	40	60	100	3
4	Transportation Engineering-II	PC	4	-	-	40	60	100	3
5	Professional Elective-I	PE							
	Advanced Structural Analysis		3	1	-	40	60	100	3
	Alternative Building Materials & Technologies								
	Ground Improvement Techniques								
	Ground Water Hydrology								
	Rural Water Supply & Sanitation								
Traffic Engineering									
6	Open Elective-II (See The List Of Open Electives)	OE	4	-	-	40	60	100	3
7	Transportation Engineering Laboratory	PC	-	-	3	25	50	75	2
8	Computer Applications In Civil Engineering Laboratory	ES	-	-	3	25	50	75	2
9	Quantitative Aptitude And Reasoning-II (Mandatory Non Credit Course)	MDC	3	-	-	-	-	-	-
	TOTAL		23	4	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
DESIGN AND DRAWING OF STEEL STRUCTURES							

COURSE OBJECTIVES:

This course will enable students:

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

COURSE OUTCOMES:

After studying this course- students will be able to:

- Work with relevant IS codes.
- Carryout analysis and design of flexural members- compression members- tension members an trusses
- Design of columns and its foundations
- Design Plate Girder and Gantry Girder

UNIT-I : PLASTIC ANALYSIS & CONNECTIONS

Introduction to plastic analysis- shape factor- load factor- mechanism- upper bound theorem- lower bound theorem.

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

UNIT-II: DESIGN OF BEAMS

Allowable stresses- design requirements as per IS Code- laterally supported beams- laterally unsupported beams- check for shear- deflection.

UNIT-III: DESIGN OF TENSION MEMBERS- COMPRESSION MEMBERS AND ROOF TRUSSES

General Design of members subjected to direct tension –effective length of columns. Slenderness ratio–permissible stresses. Design of compression members- struts etc.

Different types of trusses–Economical span- Design loads–Load combinations as per IS-875-part-3 Codal recommendations- structural details–Design of simple roof trusses involving the design of purlins-I- angle section- and tubular trusses.

UNIT-IV: DESIGN OF COLUMNS

Built up compression members –Design of lacings and battens. Splicing of columns of same size and different sizes.

UNIT-V: DESIGN OF COLUMN FOUNDATIONS

Design of slab base and gusseted base subjected to axial load.

UNIT-VI

DESIGN OF GANTRY GIRDER: Impact factors-longitudinal forces- Design of Gantry girder-various checks.

DESIGN OF PLATE GIRDER: Design consideration –IS Code recommendations Design of plate girder-Welded –Curtaiment of flange plates- stiffeners– splicing and connections.

NOTE:

1. Either Riveting or Welding connections should be used in Units II – VI.
2. The students has to prepare the following charts
 - (a) Lacings and Battens
 - (b) Slab Base and Gusseted Base
 - (c) Gantry Girder and Plate Girder

TEXT BOOKS

1. __Design of Steel Structures‘ by S.S.Bhavikatti- I.K. International Publishing House Pvt. Ltd.- New Delhi.
2. __Design of steel structures‘ by S.K. Duggal- Tata Mcgraw Hill- and New Delhi.
3. __Design of Steel Structures‘ by Ramachandra- Vol – 1- Universities Press.
4. __Steel Structures Design and Practice‘ by N.Subramanian- Oxford University Press.

REFERENCES

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

IS Codes:

- 1) IS:800 – 2007
- 2) IS: 875(Part-3)
- 3) Steel Tables.

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

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

COURSE LEARNING OBJECTIVES:

The course will address the following:

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

COURSE OUTCOMES:

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

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

UNIT-I

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

WATER DEMAND AND QUANTITY ESTIMATION: Estimation of water demand for a town or city- Per capita Demand and factors influencing it - Types of water demands and its variations- factors affecting water demand- Design Period- Factors affecting the Design period- Population Forecasting.

UNIT-II

SOURCES OF WATER: Lakes- Rivers- Impounding Reservoirs- comparison of sources with reference to quality- quantity and other considerations- Capacity of storage reservoirs- Mass curve analysis. Groundwater sources of water: springs- Wells and Infiltration galleries.

COLLECTION AND CONVEYANCE OF WATER: Factors governing the selection of the intake structure- Types of Intakes. Conveyance of Water: Gravity and Pressure conduits- Types of Pipes- Pipe Materials- Pipe joints- Design aspects of pipe lines- laying and testing of pipe lines.

UNIT-III

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

UNIT-IV

WATER TREATMENT: Flowchart of water treatment plant- Treatment methods: Theory and Design of Sedimentation- Flash mixers- flocculators Coagulation- Sedimentation with Coagulation- Filtration.

UNIT-V

DISINFECTION: Theory of disinfection-Chlorination and other Disinfection methods like UV and Ozonation- Softening of Water- Removal of colour and odours - Iron and manganese removal –Adsorption-fluoridation and defluoridation–aeration -Ion exchange–Ultra filtration. – Design- operation and maintenance of Reverse Osmosis units.

UNIT-VI

WATER DISTRIBUTION AND SUPPLY TO BUILDINGS: Requirements- Methods of Distribution system- Layouts of Distribution networks- Pressures in the distribution layouts- Analysis of Distribution networks: Hardy Cross and equivalent pipe methods-Components of Distribution system: valves such as sluice valves- air valves- scour valves and check valves- hydrants- and water meters.

TEXTBOOKS:

1. Garg- S.K.- "Environmental Engineering"- Vol.1 Khanna Publishers- New Delhi- 2005.
2. Modi- P.N. "Water Supply Engineering"- Vol. I Standard Book House- New Delhi- 2005.
3. Punmia- B.C.- Ashok K Jain and Arun K Jain- "Water Supply Engineering"- Laxmi Publications Pvt. Ltd.- New Delhi- 2005
- 4.K.V.S.G Murali Krishna- -Rural-Municipal and Industrial water management||- REEM publications- NewDelhi-2010.

REFERENCES:

1. Government of India- "Manual on Water Supply and Treatment"- CPHEEO- Ministry of Urban Development- NewDelhi-2003
2. Syed R. Qasim and Edward M. Motley Guang Zhu- "Water Works Engineering Planning"- Design and Operation- Prentice Hall of India Private Limited- New Delhi- 2006.
- 3.MOOC's by JNTUK.EDU.in by K.V.S.G Murali Krishna.

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

GEOTECHNICAL ENGINEERING – II

COURSE OBJECTIVES:

- To know the soil exploration- field tests involved in assessing the quality of soils-
- To calculate the earth pressures.
- To check the stability of stability of slopes and retaining walls.
- To calculate the Safe Bearing Capacity (SBC) of soils.
- To find out settlement analysis
- To find out the importance and suitability of pile and well foundations.

COURSE OUTCOMES:

At the end of course the student will be able to

- Collection of soil sample below ground surface disturbed and undisturbed the soil exploration.
- Find out earth pressure.
- Principle and design of retaining walls & slope stability of soil.
- Design of various types shallow foundation and bearing capacity of soil.
- Understand allowable settlement analysis.
- Understand various types of files and design of well foundation.

UNIT – I**SUB–SOIL INVESTIGATION AND SAMPLING**

Introduction; Methods of exploration; Methods of Boring; Soil Samples; Soil samplers and sampling; Number and disposition of trial pits and borings; Depth of exploration; Plate load test; Penetrometer tests.

UNIT – II**LATERAL EARTH PRESSURE**

Introduction; Effect of wall movement on Earth Pressure; Earth Pressure at rest; Rankin’s theory of Earth pressure; Coulomb’s theory of earth pressure; Cullman’s graphical method for active earth pressure.

UNIT – III**RETAINING WALLS**

Types of retaining walls; Design considerations for retaining walls- Stability of retaining walls.

STABILITY OF SLOPES

Introduction; Infinite slopes and translational slides; Definitions of factor of safety; Finite slopes forms of slip surface; Method of slices; Location of most Critical Circle; Stability of Earth Dam Slopes; Friction Circle Method; Taylor’s Stability Number.

UNIT –IV**BEARING CAPACITY OF SHALLOW FOUNDATION**

Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation. Terminology relating to bearing capacity; Bearing Capacity of Shallow Foundations – Terzaghi’s Bearing Capacity theory; Skempton’s Bearing Capacity Analysis for Clay soils; IS-Code Recommendations for Bearing Capacity; Influence of water table on bearing capacity.

UNIT – V

PILE FOUNDATIONS

Introduction; Uses of Piles-Types of Piles- Cast- in-situ Pile construction- Selection of Pile type- Pile driving-Pile load carrying capacity in compression – Static Pile Load formula- Load tests- Dynamic Pile formulae-Correlations with Penetration test data-Group action of Piles – load carrying capacity and settlement- Negative skin friction.

UNIT – VI

SETTLEMENT ANALYSIS

Settlement of Shallow foundation – types; Methods to reduce differential settlements; Allowable Bearing Pressure; Immediate settlement –Terzaghi's Method; Allowable Bearing pressure of Granular Soils based on Standard Penetration Test Value – Terzaghi's and IS methods.

WELL FOUNDATIONS

Types of wells; Components of well foundation- Shapes of wells- Forces acting on well foundation- Construction and Sinking of wells.

TEXT BOOKS:

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao- New Age International Publishers
2. Soil Mechanics and Foundation Engg. (7th edition) by Dr. Arora- K.R.- Standard Publisher and distributors- Delhi- 2010.
3. A Text book of Soil Mechanics and Foundation Engineering – B.C.Punmia Laxmi Publications.

REFERENCES:

1. Foundation Engineering by B. J. Kasmalkar; Pune Vidyarthi Griha Prakashan- Pune
- Foundation Analysis & Design by Bowles- J.E.- McGraw- Hill Book Company.
2. Foundations of Expansive Soils- F.H. Chen. Elsevier Publications.
3. Geotechnical Engineering by SK Gulati & Manoj Datta- Tata McGraw- Hill Publishing Company Limited.
4. Principles of Foundation Engineering(1999)- B.M. Das.- PWS Publishing Company- 4th edition- Singapore
5. Geotechnical Engineering- - Codutu- Pearson Education.

E-LEARNING RESOURCES:

<http://nptel.ac.in/courses.php>
<http://jntuk-coeerd.in/>

III B.TECH II- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
TRANSPORTATION ENGINEERING-II							

COURSE LEARNING OBJECTIVES:

The objective of this course:

- To know various components and their functions in a railway track
- To acquire design principles of geometrics in a railway track.
- To know various techniques for the effective movement of trains.
- To acquire design principles of airport geometrics and pavements.
- To know the planning- construction and maintenance of Docks and Harbors.

COURSE OUTCOMES:

At the end of course- Student can

- Design geometrics in a railway track.
- Provide good transportation network
- Design airport geometric sand airfield pavements.
- Plan- construct and maintain Docks and Harbours.

UNIT-I RAILWAY ENGINEERING

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

UNIT-II

GEOMETRIC DESIGN OF RAILWAY TRACK: Alignment –Engineering Surveys- Gradients-Grade Compensation- Cant and Negative Super elevation-Cant Deficiency–Degree of Curve–safe speed on curves–Transition curve–Compound curves–Reverse curves–Extra clearance on curves–widening of gauge on curves– vertical curves– cheek rails on curves.

UNIT-III

TURNOUTS CONTROLLERS: Track layouts–Switches–Design of Tongue Rails –Crossings –Turnouts–Layout of Turnout–Double Turnout–Diamond crossing– Scissors crossing. Signal Objectives–Classification–Fixed signals –Stop signals–Signaling systems– Mechanical signaling system– Electrical signaling system– System for Controlling Train Movement– Interlocking –Modern signaling Installations.

UNIT-IV AIRPORT ENGINEERING

AIRPORT PLANNING DESIGN: Airport Master plan–Airport site selection– Aircraft characteristics –Zoning laws–Airport classification–Runway orientation– Wind rose diagram– Runway length– Taxiway design– Terminal area and Airport layout– Visual aids and Air traffic control.

UNIT-V

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

UNIT-VI

DOCKS&HARBOURS

PLANNING- LAYOUT- CONSTRUCTION & MAINTENANCE OF DOCKS & HARBOURS: Classification of ports–Requirement of a good port– classification of Harbours– Docks-Dry& wet docks–Transition sheds and workhouses–Layouts; Quays–construction of Quay walls–Wharves– Jetties– Tides-Tidal data and Analysis– Breakwaters– Dredging– Maintenance of Ports and Harbours– Navigational aids.

TEXT BOOKS:

1. Chandra S. and M.M. Agarwal- Railway Engineering- Oxford University Press- New Delhi- India- 2007.

REFERENCES:

1. Saxena- S.C. and S.P. Arora- Railway Engineering- Dhanpat Rai and Sons- New Delhi- India- 1997

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

COURSE OBJECTIVES:

- To introduce the students to concept of- theory of structural analysis- and methods in structural analysis.

COURSE OUTCOMES:

- Students who successfully complete this course will be able to:
- Apply the Kani's method to analyse statically indeterminate structures
- Calculate the internal forces in two hinged parabolic and circular arches.
- Apply flexibility matrix method to analyse statically indeterminate structures.
- Apply stiffness matrix method to analyse statically indeterminate structures.
- Apply the basic principles of Dynamics to periodic and aperiodic motion- harmonic and non-harmonic motion

UNIT-I KANIS METHODS: Introduction- Basic Concept- Analysis of Continuous beams and Analysis of rigid jointed non-sway plane frames.

UNIT-II KANIS METHODS: Introduction- Basic Concept- Analysis of Continuous beams and Analysis of rigid jointed sway plane frames.

UNIT-III ANALYSIS OF ARCHES: Two hinged parabolic arch- Two hinged Circular Arch

UNIT-IV FLEXIBILITY MATRIX METHOD OF ANALYSIS

Introduction- Development of flexibility matrix for beam element- plane truss element and axially rigid plane framed structural elements and Analysis of beam- plane truss and axially rigid plane frames by flexibility method with static indeterminacy ≤ 2 .

UNIT-V STIFFNESS MATRIX METHOD OF ANALYSIS

Introduction- Development of stiffness matrix for beam element plane truss element and axially rigid plane framed structural elements. And Analysis of beam plane truss and axially rigid plane frames by stiffness method with kinematic indeterminacy ≤ 2 .

UNIT-VI BASIC PRINCIPLES OF DYNAMICS

Basic principles of Vibrations and causes- periodic and aperiodic motion- harmonic and non-harmonic motion. Period and frequency. Forced and Free Vibration- Damping and Equations of Single Degree of Freedom System with and without damping.

TEXT BOOKS:

1. R. Vaidyanathan and P. Perumal- Comprehensive Structural Analysis Volume I & II- Laxmi Publications (P) Ltd.
2. Reddy. C.S.- Basic Structural Analysis- Tata McGraw Hill.
3. BhavaiKatti- S.S- "Structural Analysis – Vol. 1 & Vol. 2"- Vikas Publishing Pvt Ltd.- New Delhi- 2008

REFERENCES:

1. Hibbeler- RC- Structural analysis- Pearson Education
2. Daniel L Schodak- Structures- Pearson Education
3. S.S. Bhavikatti- Structural Analysis II- Vikas Publication Houses (P) Ltd
- 4 Wang C. K.- Intermediate Structural Analysis- Tata McGraw Hill

III B.TECH II- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	3
ALTERNATIVE BUILDING MATERIALS & TECHNOLOGIES							

COURSE OBJECTIVES

- To study about the basic alternate building materials- properties and their applications.
- To know the smart building materials- external paints and their uses.
- To understand different types of masonry units and their applications

COURSE OUTCOMES

At the end of the course the student should have learnt

- To identify various building materials and select suitable type of building material for given situation.
- To be aware of various traditional building materials and also the emerging materials in the field of Civil Engineering construction.
- To select suitable type of Agro and industrial wastes- properties and its applications
- To Select Equipment for production of alternative materials as per their need of work.

UNIT-I

INTRODUCTION: Environmental friendly and cost effective building technologies- Requirements for building of different climatic regions- Traditional building methods and vernacular architecture- Green building ratings – IGBC and LEED manuals – mandatory requirements.

UNIT-II

ALTERNATIVE MASONRY UNITS: Characteristics of building blocks for walls- Stones and Laterite blocks- Bricks and hollow clay blocks- Concrete blocks- Stabilized blocks: mud blocks- steam cured blocks- Fal-G Blocks- stone masonry block .

UNIT-III

FIBRE REINFORCED CONCRETE: Properties and applications- Fibre reinforced plastics- Matrix materials- Fibers: organic and synthetic- Properties and applications building materials from

AGRO AND INDUSTRIAL WASTES: Types of agro wastes- Types of industrial and mine wastes- Properties and applications- Field quality control test methods.

UNIT-IV

FERROCEMENT AND FERROCONCRETE: Properties- Ferro cement and Ferro concrete building components- Materials and specifications- Properties- Construction methods- Applications .

UNIT-V

STRUCTURAL MASONRY UNITS: Compressive strength of masonry elements- Factors affecting compressive strength- Strength of units- prisms / wallet's and walls- Effect of brick work bond on strength- Bond strength of masonry: Flexure and shear- Elastic properties of masonry Materials and masonry.

UNIT-VI

EQUIPMENT FOR PRODUCTION OF ALTERNATIVE MATERIALS: Machines for manufacture of concrete- Equipments for production of stabilized blocks- Moulds and methods of production of precast elements.

TEXT BOOKS:

1. -Alternative Building Materials and Technologies||- KS Jagadish- BV Venkatarama Reddy and KS Nanjunda Rao- New Age International pub.
2. Sushil Kumar- -Building Construction||- Standard Publishers-1992.

REFERENCES:

1. -Structural Masonry||- Arnold W. Hendry
2. -Building materials in Developing Countries||- RJS Spence and DJ Cook- Wiley pub. 1983
3. LEED India- Green Building Rating System- IGBC pub.
4. IGBC Green Homes Rating System- CII pub.

E-LEARNING RESOURCES:

<http://nptel.ac.in/courses.php>

<http://jntuk-coeerd.in/>

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

COURSE LEARNING OBJECTIVES:

The objective of this course is:

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

COURSE OUTCOMES:

- The student should be able to possess the knowledge of various methods of ground Improvement and their suitability to different field situations
- The student should be in a position to design a reinforced earth embankment and check its stability.
- The student should know the various functions of Geosynthetics and their applications in Civil Engineering practice.
- The student should be able to understand the concepts and applications of grouting.

UNIT-I INTRODUCTION: Need for engineered ground improvement- classification of ground modification techniques; suitability- feasibility and desirability of ground improvement technique; objectives of improving soil.

UNIT-II: IN-SITU DENSIFICATION METHODS IN GRANULAR SOILS: Introduction- Vibration at the ground surface- impact at the ground surface- vibration at depth- impact at depth.

IN-SITU DENSIFICATION METHODS IN COHESIVE SOILS: Introduction- preloading- sand drains- sand wicks- band drains- stone and lime columns.

UNIT-III DEWATERING SYSTEMS: open sumps and ditches- well point system- deep well system- vacuum dewatering- Electro-Osmosis method.

UNIT-IV STABILIZATION OF SOILS: Methods of soil stabilization- mechanical- cement-lime- bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

UNIT-V REINFORCED EARTH: Principles- components of reinforced earth- governing design of reinforced earth walls- stability checks- soil nailing.

GEOSYNTHETICS: Introduction- types of geotextiles- functions and their applications- tests for geotextiles- geogrids and its functions.

UNIT- VI GROUTING: Objectives of grouting- grouts and their applications- methods of grouting- stage of grouting. Case studies indicating the efficiency and importance of ground improvement Technique.

TEXT BOOKS:

1. ‘Ground Improvement Techniques’ by Purushotham Raj- Laxmi Publications- New Delhi.
2. Hausmann M.R (1990) Engineering Principles of ground modification- McGraw-Hill International edition.
3. ‘Ground Improvement Techniques’ by Nihar Ranjan Patro- Vikas Publishing House (P) Limited- New Delhi.

REFERENCES:

1. Current Practices in Geotechnical Engineering Vol.-I- Alam Singh and Joshi- International Book Traders- New Delhi.
2. ‘An introduction to Soil Reinforcement and Geosynthetics’ by G.L.Siva Kumar Babu- Universities Press.
3. ‘Ground Improvement’ by MP Moseley- Blackie Academic and Professional- USA.

III B.TECH II- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	3
GROUND WATER HYDROLOGY							

COURSE OBJECTIVES

- Objective of this course is to introduce the students to the fundamentals of hydrology and its hydrological cycle
- Objective of this course is to introduce the students to the fundamentals of ground water flow.
- Distribution of ground water- concept of aquifers- flow in confined and unconfined aquifers-
- Interference among wells- well hydraulics- ground water development- ground water exploration by different techniques.
- To know about the conservation and management of the ground water.

COURSE OUTCOMES

At the end of the course- students must be in a position to

- Study types and classes of hydrologic simulation models and design procedures for safe and effective passage of flood flows for design of hydraulic structures
- Enable the students to understand the basic aquifer parameters and groundwater resources for different hydro-geological boundary conditions
- Study types and classes of hydrologic simulation models and design procedures for safe and effective passage of flood flows for design of hydraulic structures
- The student is exposed to the application of systems concept- advanced optimization techniques to cover the socio-technical aspects in the field of water resources.

UNIT-I HYDROLOGY- PRECIPITATION: Hydrological cycle- Meteorological measurements – Requirements- types and forms of precipitation-Rain gauges-Spatial analysis of rainfall data using Thiessen and Isohyetal methods Interception- Evaporation.

UNIT-II ABSTRACTIONS OF HYDROLOGY: Precipitations- Evaporation- Infiltration and minor losses and its measurement methods. Horton’s equation- pan evaporation measurements and evaporation suppression-Infiltration-Horton’s equation-double ring infiltrometer- infiltration indices.

UNIT-III HYDROGEOLOGICAL PARAMETERS: Introduction – Water bearing Properties of Rock – Type of aquifers - Aquifer properties – permeability- specific yield- transmissivity and storage coefficient – Methods of Estimation – Ground water table fluctuation and its interpretations – Groundwater development and Potential in India – GEC norms.

UNIT-IV WELL HYDRAULICS: Objectives of Groundwater hydraulics – Darcy’s Law - Groundwater equation – Flow net Theory – steady state flow - Dupuit Forchheimer assumption - Unsteady state flow – Theis method - Jacob method -Slug tests - Image well theory – Partial penetrations of wells.

UNIT-V GROUNDWATER CONSERVATION: Artificial recharge techniques – Remediation of Saline intrusion– Ground water management studies – Protection zone delineation- Contamination source inventory- remediation schemes: Physical- Chemical- Biological- Ground water Pollution and legislation.

UNIT-VI GROUNDWATER AND MANAGEMENT: Origin- Classification and types - properties of aquifers- governing equations – steady and unsteady flow - artificial recharge - RWH in rural and urban areas.

TEXTBOOKS

1. Subramanya .K. Engineering Hydrology- Tata McGraw Hill- 2013.
2. Jayarami Reddy .P. Hydrology- Tata McGraw Hill- 2008.
3. Raghunath H.M.- Ground Water Hydrology- New Age International (P) Limited- New Delhi- 2010.
4. Todd D.K.- Ground Water Hydrology- John Wiley and Sons- New York- 2000.

REFERENCES:

1. David Keith Todd. Groundwater Hydrology- John Wiley & Sons- Inc. 2007
2. Ven Te Chow- Maidment- D.R. and Mays- L.W. Applied Hydrology- McGraw Hill International Book Company- 2010.
3. Raghunath .H.M.- Hydrology- Wiley Eastern Ltd.- 2004 PTAI7002 INTEGRATED WATER RESOURCES MANAG.
4. Fitts R Charles. Ground water Science. Elsevier- Academic Press- 2002.
5. Ramakrishnan- S- Ground Water- K.J. Graph arts- Chennai- 1998.

E-LEARNING RESOURCES:

<http://nptel.ac.in/course>

III B.TECH II- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
RURAL WATER SUPPLY AND SANITATION							

COURSE OBJECTIVES

- To educate the students on the principles of rural water supply and sanitation and to develop understanding of factors governing the aspects in rural water supply and sanitation.
- Identify- formulate- analyze- and develop processes and technologies to meet desired environmental protection needs of society and formulate solutions that are technically sound- economically feasible- and socially acceptable.

COURSE OUTCOMES:

- At the end of the course the student will be able to:
- Identify the problems pertaining to rural water supply and sanitation.
- Design water supply and sanitation system for rural community.
- Design low cost waste management systems for rural areas.
- Plan and design an effluent disposal mechanism.

UNIT-I Concept of environment and scope of sanitation in rural areas. Magnitude of problems of rural water supply and sanitation. Population to be covered- difficulties. National policy.

UNIT-II WATER SUPPLY: Design population and demand loads. Various approaches of planning of water supply schemes in rural areas. Development of proffered sources of water springs. Wells- infiltration wells- radial wells and infiltration galleries- collection of raw water from surface source. Specific practices and problems encountered in rural water supply.

UNIT-III Improved methods and compact systems of treatment of surface and ground waters for rural water supply. Brief Details of multi-bottom settlers (MBS)- diatomaceous earth filter- cloth filter- slow sand filter- chlorine diffusion cartridges. Pumps- pipe materials- appurtenances and improved devices for use in rural water supply. Planning of distribution system in rural areas.

UNIT-IV Community and sanitary latrines. Various methods of collection and disposal of night soil. Planning of waste water collection system in rural areas.

UNIT-V

Treatment and Disposal of waste water. Compact and simple waste water treatment units and systems in rural areas such as stabilization ponds- septic tanks- Imhoff tank- soak pit etc. Disposal of waste water soakage pits and trenches.

UNIT-VI

Disposal of Solid Wastes. Composting- land filling- incineration- Biogas plants- Rural health. Other specific issues and problems encountered in rural sanitation.

TEXTBOOKS.

1. ‘Water Treatment and Sanitation – Simple Method for Rural Area’ by Mann H.T. and Williamson D.
2. ‘Water Supply for Rural Areas & Small Communities’ by Wanger E.G. and Lanoix J.N.- WHO
3. ‘Water Supply and Sewerage’ - by E.W.Steel & T.J.McGhee- McGraw Hill.

REFERENCES:

1. Manual on Water Supply and Treatment'- CPHEEO- Mini. Of Urban Development- Govt. of India.
2. Manual on Sewerage and Sewage Treatment'- CPHEEO- Mini. Of Urban Development- Govt. of India
6. _Environmental Engineering' by D. Srinivasan- PHI Learning Pvt. Ltd. 2009

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

COURSE OBJECTIVES:

- To know various components and characteristics of traffic.
- To know various traffic control devices and principles of highway safety.
- To understand the detrimental effects of traffic on environment
- To know highway capacity and level of service concepts.

COURSE OUTCOMES:

- At the end of the course- the student will be able to:
- Estimate basic characteristics of traffic stream
- Conduct traffic studies and analyze traffic data
- Design traffic signal systems
- Determine the capacity of highways

UNIT-I COMPONENTS OF TRAFFIC SYSTEM: Introduction- Human-vehicle-environment system- Characteristics of road users- highways and vehicles- Fundamental parameters of traffic and relationship. Traffic characteristics: Microscopic and macroscopic flow characteristics- Time headways- temporal- spatial and flow patterns- Interrupted and un-interrupted traffic- Microscopic and macroscopic speed characteristics.

UNIT-II TRAFFIC STREAM MODELS: Traffic flow modelling analogies- Macroscopic flow models- Microscopic flow models- Mesoscopic models- Shockwave analysis with examples Capacity and level of service analysis.

UNIT-III HIGHWAY CAPACITY AND LEVEL OF SERVICE- Factors affecting- capacity analysis and LOS criteria- case studies on capacity and level of service estimation.

UNIT-IV TRAFFIC SIGNAL DESIGN: Introduction about the signal and warrants- Signal phasing and development of phase plans; Cycle length- fixed and vehicle actuated signals- Webster method; Drew method; IRC method- Signal coordination- Area traffic control system- problems on signal design.

UNIT-V DESIGN OF AT-GRADE INTERSECTIONS: Types of intersections- Plain intersections- rotary and Mini Roundabout: Design aspects.

UNIT-VI PARKING SYSTEM ANALYSIS: Parking Inventory Studies- Parking Statistics- On-street and Off-street parking facilities- Worked out examples.

TEXTBOOKS

1. L.R. Kadiyali- Traffic Engineering and Transportation Planning- Khanna Publishers- 2011.
2. Roger P. Roess- Elena S. Prassas and William R. McShane- Traffic Engineering- Prentice Hall- 4th edition- 2010.

REFERENCES:

1. May- A.D. Traffic Flow Fundamentals- Prentice Hall- 1st Edition- 1989.
2. Fred L. Mannering- Scott S. Washburn- Kilareski Walter P.- Principles Of Highway Engineering And Traffic Analysis- Wiley India Pvt Ltd.- 4th edition- 2011.

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

COURSE LEARNING OBJECTIVES:

The objective of this course is:

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

COURSE OUTCOMES:

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

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

UNIT-I NATURAL HAZARDS AND DISASTER MANAGEMENT: Introduction of DM – Inter disciplinary -nature of the subject– Disaster Management cycle – Five priorities for action- Case study methods of the following: floods, draughts –Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

UNIT-II MAN MADE DISASTER AND THEIR MANAGEMENT ALONG WITH CASE STUDY METHODS OF THE FOLLOWING: Fire hazards – transport hazard dynamics – Civil Engineering solid waste management – post disaster – bio terrorism -threat in megacities, rail and air craft’s accidents, and Emerging infectious diseases & Aids and their management.

UNIT-III RISK AND VULNERABILITY: Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.

UNIT-IV ROLE OF TECHNOLOGY IN DISASTER MANAGERMENTS: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities- roads and bridges- mitigation programme for earth quakes -multimedia technology in disaster risk management and training transformable indigenous knowledge in disaster reduction.

UNIT-V EDUCATION AND COMMUNITY PREPAREDNESS: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -Community based disaster management and social capital-Designing resilience- building community capacity for action.

UNIT-VI MULTI-SECTIONAL ISSUES: Impact of disaster on poverty and deprivation- Climate change adaptation and human health -Exposure , health hazards and environmental risk- Forest management and disaster risk reduction.- Institutional capacity in disaster management.

TEXT BOOKS:

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

REFERENCES:

1. __Disaster Management‘ edited by H K Gupta (2003),Universities press.

III B.TECH II- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
BUILDING SERVICES							

COURSE OBJECTIVES:

- To introduce the concepts of basic services and its applications.
- To equip students with the required information and technologies of building services.
- Application of this knowledge in architectural design project.
- Evolving understanding in students to choose appropriate systems and integrate the same in their design projects.

LEARNING OUTCOMES:

Students will be able to

- Understand the measures to be taken while planning for sanitation and installation of varioussanitary units.
- Identify the minimizing and disposal techniques of waste and garbage.
- Evaluate the illumination strategies by consuming less energy resources.
- Acquaint with distribution of electricity to all units of the project.
- Provide fire protection units at service points.

UNIT - I: WATER SUPPLY:

Tapping of water- Storage and distribution of water in premises- Pipes- piping network- specials- materials- joinery- installation of network both open and concealed- all appurtenances required for installations e.g. taps- faucets- mixing units- valves- flushing cisterns- flushing valves and other fittings.

UNIT - II: DRAINAGE AND SANITATION:

Study of sanitary fittings with reference to use- materials and functions- traps and their uses- classification of traps as per use and shape- pipes and piping systems- specials- vent and anti-siphonage systems- jointing and installations- storm water and roof drainage systems and their installations- underground drainage systems with application of ventilation- self cleansing velocity- laying of drains to required gradients and testing of drains- disposal of sewage within the premises using septic tanks- effluent treatment plants- their function and layouts.

UNIT - III: ROOM ACOUSTICS:

Key terms & Concepts- Introduction- Acoustic principles- Sound power and pressure levels- Sound pressure level- absorption of sound- Reverberation time- Transmission of sound. Sound pressure level in a plant room- out door sound pressure level- Sound pressure level in intermediate space- noise rating- Data requirement- output data.

UNIT - IV: LIGHTING AND VENTILATION:

Indoor lighting- natural and artificial- systems of lighting such as direct- indirect- diffused- applications of lighting systems with reference to levels of illumination for various uses and lumen method calculations- light fittings/ luminaries-All types of energy efficient lamps- optic fiber- led etc. Ventilation - Introduction- Ventilation requirements- Natural and Mechanical systems- Removal of heat gains Psychrometric cycles- Ventilation rate measurement- Material for ventilation duct work.

UNIT - V: ELECTRIFICATION:

Introduction to generation and distribution of electric power in urban areas- substations for small schemes in industrial units- electrical system installations in a building from the supply mains to individual outlet points- including meter board- distribution board and layout of points with load calculations- electrical wiring systems for small and large installations including different material specification electrical control and safety devices- switches- fuse- circuit breakers- earthing- lightning conductors etc.

UNIT - VI: FIRE PROTECTION- PLANT AND SERVICE AREAS

Key terms and concepts- introduction- Fire classification- Portable existing gushers- Fixed – Fire fighting installation- fire detectors and alaruss- smoke ventilation. Key terms and conditions- Introduction- Mains and services- Plant room space requirements- service ducts- pipe- duct and cable supports- plant connections- Co-ordinated service drawings boiler room ventilation.

TEXT BOOKS:

1. S.C.Rangwala- Water supply and sanitary engineering- Charotar publishing house.
2. A. Kamala & DL Kanth Rao- Environmental Engineering- Tata McGraw – Hill publishing company Limited.

REFERENCE BOOKS:

1. Technical teachers Training Institute (Madras)- Environmental Engineering- Tata McGraw Hill publishing Company Limited.
2. M.David Egan- Concepts in Building Fire Safety.28
3. V.K.Jain- Fire Safety in Building.
4. E.G.Butcher- Smoke control in Fire-safety Design.
5. National Building Code 2016.

* *

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

COURSE LEARNING OBJECTIVES

The objective of this course is:

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

COURSE OUTCOMES

- Conduct traffic studies for estimating traffic flow characteristics
- Perform quality control tests on pavement materials
- Estimate earth work from longitudinal and cross-section details

I. EARTHWORK CALCULATIONS FOR ROAD WORKS

II. TRAFFIC SURVEYS:

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

III. ROAD AGGREGATES:

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

IV. BITUMINOUS MATERIALS:

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

IV. BITUMINOUS MIX:

1. Marshall Stability test

REFERENCES:

1. Mc Shane- WR and RP Roess- Traffic Engineering- Prentice Hall.
2. Pignataro LJ. Traffic Engineering: Theory and Practice; Prentice hall- Inc.
3. L.R. Kadiyali- Traffic Engineering and Transportation Planning- Khanna Publishers.
4. All laboratory tests are as per IS- ASTM- AASHTO- TRL- IRC- BS procedures / specifications and guidelines

III B.TECH II- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2
COMPUTER APPLICATIONS IN CIVIL ENGINEERING LABORATORY							

COURSE OBJECTIVES:

- To carry out Analysis of beams.
- To carry out Analysis of frames.
- To carryout Analysis of Trusses.

COURSE OUTCOMES:

At the end of course the student will be able to

- Analyse the beams
- Deisgn space frame.
- Deisgn of two-storied R.C.C frame building.

UNIT – I

1. Analysis of beams.
2. Analysis of Frames.
3. Analysis of Trusses.

UNIT - II

1. Design of Space frame subjected to gravity loads and lateral load (wind load)
2. Design of Isolated footing.
3. Design of one-way slab.
2. Design of two way slab
4. Design of Retaining wall.

UNIT -III

1. Analysis and design of two-storied R.C.C.Framed building.
2. Analysis and design of Industrial steel framed building.

SOFTWARE'S TO BE USED (ANY ONE)

STAAD PRO V8i

AUTO CAD

ROBOT STRUCTURAL ANALYSIS

E TABS

II MCA IIISEM, II MBA IIISEM, III B.TECH ISEM.	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	-	-	-	-	-	-
QUANTITATIVE APTITUDE AND REASONING - II							

COURSE OBJECTIVES:

- To train students in analysing real life scenarios considering all factors
- To educate the students on principles of mathematical problems and problem solving methods
- To train students for campus placements.

COURSE OUTCOMES:

After thorough learning of Quantitative Aptitude and Reasoning, a student:

- Will be able to prepare well for clearing Quantitative Aptitude and Reasoning tests for campus placements
- Will be able to critically evaluate various real life situations by resorting to Analysis of key issues and factors.
- Will be able to demonstrate various principles involved in solving mathematical 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

- | | |
|---|--|
| <ul style="list-style-type: none"> a) Classification of numbers b) Divisibility rules c) Finding the units digit | <ul style="list-style-type: none"> d) Finding remainders in divisions involving higher powers e) LCM and HCF Model |
|---|--|

2. Time and Distance

- | | |
|--|--|
| <ul style="list-style-type: none"> a) Relation between speed, distance and time b) Converting km/h into m/s and vice versa c) Problems on average speed | <ul style="list-style-type: none"> 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

- | | |
|--|--|
| <ul style="list-style-type: none"> a) Problems on Unitary method b) Relation between Men, Days, Hours and Work | <ul style="list-style-type: none"> c) Problems on Man-Day-Hours method d) Problems on alternate days e) Problems on Pipes and Cistern |
|--|--|

4 Averages, Mixtures and Allegations

- | | |
|--|--|
| <ul style="list-style-type: none"> a) Definition of Average b) Rules of Average c) Problems on Average d) Problems on Weighted Average | <ul style="list-style-type: none"> 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 Chart

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

2. Venn diagrams

- a) Representing the given data in the form of a Venn diagram
- b) Problems on Venn diagrams with two sets
- c) Problems on Venn diagrams with three sets
- d) Problems on Venn diagrams with four sets

3. Binary Logic

- a) Definition of a truth-teller
- b) Definition of a liar
- 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 letter

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

4. Lateral reasoning puzzle

- a) Problems on common balance
- b) Problems on digital balance
- c) Problems on coins
- d) Problems on lockers
- e) Problems on heights
- f) Digit puzzles using basic arithmetic operation
- 10. www.amazon.in/Quantitative-Aptitude-Competitive-Examinations.../8121924987
- 11. www.indiabix.com
- 12. www.practiceaptitudetests.com/numerical-reasoning-tests

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:

7. www.careerbless.com/aptitude/qa/home.php
8. www.affairsclooud.com/quantitative-aptitude-questions
9. www.careerafter.com/rs-aggarwal-quantitative-aptitude-pdf/

IV B.TECH- I SEMESTER

IV B.TECH- I SEMESTER COURSE STRUCTURE

S.No	Subject Name	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Estimation Costing & Valuation	PC	3	1	-	40	60	100	3
2	Environmental Engineering-II	PC	3	1	-	40	60	100	3
3	Construction Technology & Management	HS	4	-	-	40	60	100	3
4	Open Elective-III (See The List Of Open Electives)	OE	4	-	-	40	60	100	3
5	Professional Elective-II	PE							
	Matrix Methods Of Structural Analysis								
	Advanced Design Of R C Structures								
	Earth And Earth Retaining Structures		3	1	-	40	60	100	3
	Highway Geometric Design								
	Open Channel Hydraulics								
	Advanced Surveying								
6	Professional Elective-III	PE							
	Numerical Methods In Civil Engineering								
	Theory Of Elasticity								
	Pavement Materials And Construction								
	Air Pollution And Control		3	1	-	40	60	100	3
	Photogrammetry And Remote Sensing								
	Advanced Design Of Steel Structures								
	Bridge Engineering								
7	Environmental Engineering Lab	PC	-	-	3	25	50	75	2
8	Mini Project On Planning, Analysis & Design Of G+2building	PRC	-	-	3	25	50	75	2

IV B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
ESTIMATING COSTING & VALUATION							

COURSE OBJECTIVES:

- Quantity estimation for different civil engineering works like single storey residential building, BT road, canal etc.
- Cost estimation for different civil engineering works like single storey residential building, BT road, canal etc.
- Rate analysis for different items of work.
- Quantity estimation and preparing schedule of bars of different items of RC works using software like MS Excel.
- To prepare project management report for different civil engineering projects like residential building, BT road, canal etc using software packages like Primavera/MS Project e.t.c

COURSE OUTCOMES:

- Estimating quantities required for different civil engineering works like single storey residential building, BT road, canal etc.
- Cost estimation of different civil engineering works like single storey residential building, BT road, canal etc.
- Finding the unit rate of different items of work.
- Analysing a project and finding critical activities and hence allocate resources as per the schedule.

UNIT - I PROCEDURE OF ESTIMATING

Main items of work- Deduction for openings- Degree of accuracy- Units of measurement., types of estimates — detailed and abstract estimate of building.

UNIT – II METHODS OF BUILDING ESTIMATES

Individual wall method- Centre line method- Estimate of steps.

ESTIMATE OF BUILDINGS

Estimate of residential building- Estimate of a building from line plan.

UNIT – III ROAD ESTIMATING

Estimate of earthwork- Estimate of pitching of slopes- Estimate of earthwork of road from longitudinal sections- Estimate of earthwork in hill roads.

CANAL ESTIMATE

Earthwork in canals—different cases- Estimate of earthwork in irrigation channels.

UNIT — IV SPECIFICATIONS

Purpose and method of writing specifications- General specifications. Detailed Specifications for Brick work- R.C.C- Plastering- Mosaic Flooring- R.R.Stone Masonry.

VALUATION

Cost- Price & value- Methods of valuation- Out goings- Depreciation- Methods for Estimating cost depreciation- Valuation of building.

UNIT — V ANALYSIS OF RATES

Task or out — turn work- Labour and materials required for different works- Rates of materials and labour- Preparing analysis of rates for the following items of work: i) Concrete ii) RCC Works iii) Brick work in foundation and super structure iv) Plastering v) CC flooring vi) White washing.

UNIT — VI PWD ACCOUNTS AND PROCEDURE OF WORKS

Organization of Engineering department- Work charged establishment- Contract- Tender- Tender notice- Tender Schedule- Earnest money- Security money- Measurement book- Administrative approval- Technical sanction- Plinth area- Floor Area- Carpet area- Approximate Estimate- Plinth area estimate- Revised Estimate- Supplementary estimate.

TEXT BOOKS:

1. Estimating & Costing in Civil Engineering by B.N. Dutta- UBS Publishers & Distributors, 2010.
2. Valuation of Real properties by S. C. Rangwala, 8th Edition, Charotar Publishing House, 2011.

REFERENCES

1. Standard Scheduled Of Rates and Standard Data Book By Public Work Department.
2. IS 1200 (Part 1 to XXV-1974/ Methods Of Measurement Of Building And Civil Engineering Works-B.I.S
3. Estimation, Costing and Specifications By M. Chakraborti, Laxmi Publications
4. National Building Code.

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

COURSE OBJECTIVES

The objective of this course, the students will be able to:

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

COURSE OUTCOMES

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

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

UNIT-I INTRODUCTION TO SANITATION :systems of sanitation – relative merits & demerits – collection and conveyance of waste water – sewerage – classification of sewerage systems Estimation of sewage flow and storm water drainage – fluctuations – types of sewers – Hydraulics of sewers and storm drains– design of sewers – materials for sewers appurtenances in sewerage – cleaning and ventilation of sewers .

UNIT-II WASTE WATER COLLECTION AND CHARACTERSTICS: Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – storm water overflows combined flow – characteristics of sewage – cycles of decay – decomposition of sewage, examination of sewage – B.O.D. – C.O.D. equations.

UNIT-III WASTE WATER TREATMENT: Layout and general outline of various units in a waste water treatment plant – primary treatment: design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – biological treatment – trickling filters – standard and high rate – Construction and design of Oxidation ponds.

UNIT-IV SEWERAGE MAINTENANCE: man holes-drop manholes-ejectors-storm water relief works-Inverted siphon- gutters.

UNIT-V SOLID WASTE MANAGEMENT: Characteristics- generation- collection and transportation of solid wastes- engineered systems for solid waste management-ISWM-WTE-ULB- (reuse/ recycle energy recovery- treatment and disposal).

UNIT-VI PLUMBING: Introduction to plumbing—types of fixtures- fire protection system- Fuel and Gas piping system.

TRAPS: Types and sizes of traps-vent pipes and their types - hydraulic fittings- brazing-fasteners.

TEXT BOOKS:

1. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.
2. Wastewater Engineering Treatment and Reuse by Metcalf & Eddy, Tata McGraw-Hill edition.
3. Elements of Environmental Engineering by K.N. Duggal, S. Chand & Company Ltd. New Delhi, 2012.
4. Water supply and sanitary Engineering by S.K.Garg, Khanna Publishers.

REFERENCES:

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

IV B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	-	40	60	100	3
CONSTRUCTION TECHNOLOGY AND MANAGEMENT							

COURSE OBJECTIVE

- To introduce to the student the concept of project management including network drawing and monitoring.
- To introduce the concept of cost control and resource management.
- To introduce the importance of safety in construction projects.
- To introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, construction equipment and machinery.

COURSE OUTCOMES:

- Upon the successful completion of this course, the students will be able to:
- Appreciate the importance of construction planning and Project Management.
- Apply the gained knowledge to project Planning and Control.
- Understand and apply the concept of Quality control and Safety Management in construction.
- Understanding the function of various construction equipment's.

UNIT- I INTRODUCTION: Construction projects- Project management- Main causes of project failure, Origin of PERT and CPM, Planning, Scheduling and controlling, Bar charts, Milestone charts, weaknesses in Bar charts, PERT and CPM networks – Comparison, Event, Activity, Rules for drawing networks, Numbering the events (Fulkerson's law), Dummy activities.

UNIT –II PROJECT MANAGEMENT THROUGH NETWORKS: Time estimate-Expected time, Earliest allowable occurrence time, Latest allowable occurrence time, slack, project duration, probability of completion, Start and Finish time estimates, Floats, Project scheduling, Critical and sub-critical path. Updating – Process of updating.

UNIT- III COST CONTROL: Direct cost- indirect cost- total project cost- Optimization of cost through networks- Steps involved in optimization of cost.

UNIT- IV RESOURCE MANAGEMENT: Introduction- Resource smoothing- Resource levelling- Objectives of material management- Costs- Functions of material management department- ABC classification of materials-Introduction to Green Technologies-NBC code book-2016.

UNIT- V QUALITY CONTROL AND SAFETY MANAGEMENT: Importance of quality- Elements of quality- Organization for quality control- Quality assurance techniques- Total quality management- ISO – 9000. Accident prevention programme- immediate attention in case of accident- Approaches to improve safety in construction- Safety benefits, Prevention of fires in construction industries- Safety information system.

UNIT- VI CONSTRUCTION EQUIPMENT: Classification of construction equipment- Earth moving equipment- Excavation equipment- Hauling equipment, Earth compaction equipment- Hoisting equipment- Concreting plant and equipment- Time and motion study- Selection of equipment– Task consideration, Cost consideration- Factors affecting the selection- Factors affecting cost owning and operating the equipment- Equipment maintenance.

NOTE: NBC CODE BOOK 2016.

TEXT BOOKS:

1. Construction Engineering and Management by Dr. S. Seetharaman- Umesh Publications, Nai Sarak, Delhi.
2. Fundamentals of PERT/CPM and Project Management by S. K. Bhattacharjee- Khanna Publishers, Nai Sarak- Delhi.

REFERENCE BOOKS:

1. Construction Management & Planning by B. Sengupta & H. Guha- Tata Mc Graw – Hill Publishing Co. Ltd., New Delhi.
2. Construction Planning, Equipment & Methods by Peurifoy R. L.- Mc Graw – Hill International Book Company.
3. PERT and CPM – Punmia, Laxmi Publications, 3rd edition 1987.
4. PERT & CPM Principles and applications by L. S. Srinath- Affiliated East West Press.

E-LEARNING: NPTEL-<http://nptel.ac.in/courses/1051>

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

COURSE OBJECTIVES:

- To develop watershed management program making proper use of all available resources.
- To obtain optimum output from watershed with minimum hazards to natural resources.

COURSE OUTCOMES:

- Plan for developing watershed management in a needy area.
- Plan for integrating the conservation aspects such as water harvesting, land management, and ecosystem management.
- Plan for developing an integrated watershed with minimum disturbance to the natural resources.
- Distinguish the different components of watershed

UNIT - I INTRODUCTION: Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multidisciplinary approach for watershed management.

UNIT-II CHARACTERISTICS OF WATERSHED: size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socioeconomic characteristics, basic data on watersheds.

UNIT – III PRINCIPLES OF EROSION: Types of erosion, factors affecting erosion, effects of erosion on land fertility and land capability, estimation of soil loss due to erosion, Universal soil loss equation.

MEASURES TO CONTROL EROSION: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, rock fill dams, brushwood dam, Gabion.

UNIT - IV WATER HARVESTING: Rainwater harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks.

UNIT - V LAND MANAGEMENT: Land use and Land capability classification, management of forest, agricultural, grassland and wild land. Reclamation of saline and alkaline soils.

UNIT – VI GIS FOR WATERSHED MANAGEMENT

Applications of Remote Sensing and Geographical Information System - Role of Decision Support System – Conceptual Models and Case Studies.

TEXT BOOKS

1. JVS Murthy, Watershed Management - New Age International Publishers revised edition -1998
2. R.Awurbs and WP James, Water Resource Engineering - revised edition Prentice Hall Publishers2001.

REFERENCES

1. VVN Murthy, Land and Water Management, revised edition- Kalyani Publications- ss2015.
2. D.K.Majumdar, Irrigation and Water Management revised edition Prentice Hall of India2001.

III B.TECH II- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	4	-	0	40	60	100	3
SOLID AND HAZARDOUS WASTE MANAGEMENT							

COURSE OBJECTIVES:

- To know about Sources, types, Composition of MSW
- To learn how to handle, separate and store the solid waste at source of collection
- To know the method of transfer and transport the solid waste after the collection from the source.
- To learn how to separate, and transformation methods like Pyrolysis, compositing, Incineration, etc. Materials to be recycled from MSW

COURSE OUTCOMES:

After the exposure to the subject, student is able to:

- Comprehend Solid Waste Management program success in a city or town.
- Exposure the different techniques of SWM
- Assess different process techniques of solid waste
- Classify different types of waste.
- Analyze existing scenario of solid waste management in India

UNIT - I SOURCES, TYPES AND COMPOSITION OF MUNICIPAL SOLID WASTE

Sources- Types- Composition of Solid Waste- Effects of improper disposal of solid waste- public health effects-Types of materials recovered from MSW.

WASTE HANDLING AND STORAGE

On- site handling and separation at solid waste-on - site storage of solid waste-options under Indian conditions.

UNIT-II COLLECTION OF MUNICIPAL SOLID WASTE

Methods of collection-equipment- types of vehicles-man power requirement-collection routes.

TRANSFER AND TRANSPORT OF MUNICIPAL SOLID WASTE

Need for Transfer operations-Transfer Stations-Selection of Location of Transfer Station-Transport means and methods.

UNIT-III PROCESSING TECHNIQUES

Mechanical volume reduction-Thermal volume reduction- manual component separation.

DISPOSAL OF SOLID WASTE

Disposal of Solid Waste – Sanitary land Fills- Site selection- Planning-Design and operation of Sanitary landfills- Leachate collection & treatment-composition of land fill gases.

UNIT- IV SEPARATION AND TRANSFORMATION OF SOLID WASTE: unit operations used for separation and transformation: shredding - materials separation and recovery, source reduction and waste minimization.

UNIT-V RECOVERY OF THERMAL AND BIOLOGICAL CONVERSION

Combustion of waste materials-incineration with heat recovery-gasification-pyrolysis

RECOVERY OF BIOLOGICAL CONVERSION

Composting- Anaerobic digestion

UNIT-VI PLASTIC WASTE MANAGEMENT

Dangers of Plastics- Types- pyrolysis- Recycling of Plastic waste-Disposal of plastic waste

E-WASTE MANAGEMENT

Health Hazards of E- waste-sources-components-collection-segregation-E- waste management.

TEXT BOOKS:

1. Integrated Solid waste management by Goerge Tchobanolous, Hilary Theisen & Samuel A. Vigil. McGraw Hill International Editions
2. Design of Land Fills and Integrated Solid waste management by Amalendu Bagchi , John Wiley & Sons.

REFERENCE BOOKS:

1. CPCB Manual on solid waste Management
2. Solid waste management K.sasikumar, sanoop Gopi Krishna PHI Learning (P) Ltd.
3. Solid waste management in India by Urvashi Dhamija.

E-LEARNING RESOURCES:

NPTEL

IV B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
MATRIX METHODS OF STRUCTURAL ANALYSIS							

COURSE OBJECTIVES:

- To know the static and kinematic indeterminacy of structures.
- To understand the flexibility matrix concept
- To understand the stiffness matrix concept
- To solve the beams by flexibility and stiffness matrix
- To solve the frames by flexibility and stiffness matrix
- To solve the trusses by flexibility and stiffness matrix

COURSE OUT COMES:

At end of this course the student will able to

- Understand the static and kinematic indeterminacy of structures.
- Apply the flexibility matrix concept to beams and frames.
- Apply the stiffness matrix concept to beams and frames.
- Apply the flexibility and stiffness matrix to solve the trusses problems.
- student can apply the concept force and displacement transformation matrix to different structures

UNIT-I

Introduction to flexibility method, Element flexibility matrix, Principle of contragradience, and Force Transformation Matrix, Member Flexibility matrix, Construction of structure flexibility matrix. Matrix determination of the displacement vector, Determination of member forces.

UNIT-II

Analysis of axially rigid continuous beams by flexibility method using Force Transformation Matrix.

UNIT-III

Analysis of rigid plane frames with axially rigid members by flexibility method using Force Transformation Matrix.

UNIT-IV

Analysis of trusses by flexibility method Using Force Transformation Matrix.

UNIT-V

Fundamentals of the stiffness method, equivalent joint loads, Displacement Transformation matrix. Member stiffness matrix, Total or System stiffness matrix, Truss analysis by stiffness method using Displacement Transformation Matrix.

UNIT-VI

Continuous Beam and rigid frame analysis with axially rigid members by stiffness method using Displacement Transformation Matrix.

TEXT BOOKS:

1. Indeterminate structural analysis by C. K. Wang, McGraw-Hill Publications.
2. Mechanics of structures – II by Junnarkar & Shah, Charotar Publishing House.

REFERENCES

1. Structural analysis by R. C. Hibbeler, Pearson Education .
2. Basic Structural Analysis by C. S. Reddy, Tata McGraw-Hill

IV B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
ADVANCED DESIGN OF RC STRUCTURES							

COURSE OBJECTIVES:

This course will enable students:

- Familiarize Students with Raft Foundations and Retaining walls.
- Equip student with concepts of design of different types of RCC water tanks.
- Understand Concepts of flat slabs
- Familiarize different types of Bunkers, Silos and Chimneys.
- Understand different types of transmission towers.

COURSE OUTCOMES:

After studying this course, students will be able to:

- Design raft foundations and different types of RCC retaining walls, RCC water tanks
- Carryout analysis and design of flat slabs
- Design of RCC Bunkers, Silos and Chimneys
- Understand various types of transmission towers and loading on them.

UNIT – I

Analysis and Design of Raft Foundations – Design of RCC Retaining walls: Cantilever and Counter fort.

UNIT – II

Analysis and Design of RCC Water Tanks, Circular and Rectangular types- Intze tank.

UNIT – III

Analysis and Design of Flat Slabs- Direct Design and Equivalent Frame Methods- Check for Punching shear.

UNIT - IV

Analysis and Design of Bunkers and Silos- Concepts of Loading.

UNIT-V

Analysis and Design of Chimney, Concepts of loading.

UNIT-VI

Introduction to Transmission Towers- Principles and procedures.

TEXT BOOKS:

1. ‘Reinforced Concrete Structures’ Vol-2 by B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi.
2. ‘Reinforced Concrete Structures’ by N. Subrahmanian, Oxford Publishers.
3. ‘Design Drawing of Concrete and Steel Structures’ by N. Krishna Raju University Press 2005.

REFERENCES:

1. 'Essentials of Bridge Engineering' by D. Johnson Victor, Oxford and IBM publication Co., Pvt. Ltd.
2. 'Reinforced concrete design' by S. U, Pillai and D. Menon, Tata Mc.Grawhill Publishing Company, Codes: Relevant IS: codes.

IV B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
EARTH AND EARTH RETAINING STRUCTURES							

COURSE OBJECTIVES:

- To understand lateral earth pressure theories and pressure theories and design of retaining walls.
- To design anchored bulkheads by different methods.
- To understand pressure envelopes and design of various components in braced cuts and cofferdams.
- To understand stability of earth dams and its protection and construction.

COURSE OUTCOMES:

At the end of course the student will be able to

- Concepts of lateral pressure
- Design retaining walls,
- Classified anchored bulkheads,
- Excavation of braced cuts and coffer dams
- Stability of earth dams analysis.
- Construction of earth dams

UNIT-I LATERAL PRESSURE:

Basic concepts, Rankine and Coulomb earth pressure theories, graphical methods. Determining active and passive pressures: Culmann's, Rebhan's, logarithmic spiral methods, friction circle method. Consideration of surcharge, seepage, earth quake, wave effect, stratification, type of backfill, wall friction and adhesion.

UNIT-II RETAINING WALLS:

Uses, types, stability and design principles of retaining walls, backfill drainage, settlement and tilting.

UNIT-III ANCHORED BULKHEADS: Classification of anchored bulkheads, free and fixed earth support methods. Rowe's theory for free earth supports and equivalent beam methods for fixed earth supports. Design of anchored rods and dead man

UNIT-IV BRACED CUTS AND COFFERDAMS:

Braced excavations and stability of vertical cuts, lateral pressures in sand and clay, Braced and cellular cofferdams: uses, types, components, stability, piping and heaving. Stability of cellular cofferdams, cellular cofferdams in rock and in deep soils.

UNIT-V EARTH DAMS- STABILITY ANALYSIS: Classification, seepage control in embankments and foundations, seepage analysis, stability analysis: upstream and downstream for steady seepage, rapid draw down, end of construction, method of slices and Bishop's method.

UNIT-VI EARTH DAMS -PROTECTION & CONSTRUCTION: Slope protection, filters, embankment construction materials and construction, quality control, grouting techniques. Instrumentation and performance observations in earth dams.

TEXT BOOKS:

1. Basic & Applied soil mechanics – Gopal Ranjan & ASR Rao, New Age International Publishers, 2011.
2. Embankment Dams by Sharma Hd, Publisher: India Book House (IBH) Limited, 1991
3. Engineering for Embankment Dams By B. Singh & R. S. Varshney, A Balkema Publishers, 1995

REFERENCE BOOKS:

1. Foundation design by W. C. Teng, Prentice Hall, 1962
2. Analysis and design of foundations by Bowles. J. W McGraw Hill, 4th edition, 1955.
3. Earth and Rock-Fill Dams: General Design and Construction Considerations by United States Army Corps of Engineers, University Press of the Pacific, 2004
4. Soil mechanics in engineering and practice by Karl Terzaghi, Ralph B. Peck, Gholamreza Mesri, 3rd Edition. Wiley India Pvt Ltd, 2010.

E-LEARNING RESOURCES: NPTEL

IV B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
HIGHWAY GEOMETRIC DESIGN							

COURSE LEARNING OBJECTIVES

- Develop a good command of the concepts involved in geometric design of intersections, horizontal & vertical alignment of roads & pedestrian facilities.
- Recognize the history and evolution of transportation in cities.
- Describe the urban street hierarchy and functional classification system.
- Formulate a functional design process that accommodate the needs of all users and allows for street designs that are compatible with the surrounding area.

COURSE OUTCOMES:

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

- Design the longitudinal and cross sectional elements of a highway.
- Design the intersections, interchanges, and parking facilities.
- Design the facilities for bicyclists and pedestrians.
- Design parking facilities.
- Understand the facilities & standards design.

UNIT - I: FUNCTIONAL CLASSIFICATION OF HIGHWAY SYSTEM- Design Controls – Topography, Driver characteristics, Vehicle Characteristics, Traffic, Capacity and Level of Service, Design Speed. Objectives of Geometric Design, Cross Section Elements: Design specifications- Pavement Surface characteristics – Skid Resistance, Road Roughness- Camber, Objectives, design standards. Specifications for hill roads.

UNIT - II: HORIZONTAL ALIGNMENT OF ROADS: Sight Distances – Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance - Objectives of horizontal curves- Super elevation- Extra- widening on Curves- Transition Curves – Objectives and Design. Transition Curve setting methods, Introduction to MX Roads software.

UNIT - III: VERTICAL ALIGNMENT OF ROADS: Gradients – Types of Gradients, Design Standards- Vertical Curves – Summit Curves, Valley Curves and Design criteria for Vertical Curves- Importance of Sight Distances for Horizontal and Vertical Curves - Combination of Vertical and Horizontal Curves – Grade Compensation.

UNIT - IV:GEOMETRIC DESIGN OF INTERSECTIONS :Types of Intersections- Design Principles for Intersections- Design of At-grade Intersections – Channelization, Objectives-Traffic Islands and Design standards- Rotary Intersection – Concept, Advantages and Disadvantages- Grade separated Interchanges – Types, warrants and Design standards.

UNIT - V: MISCELLANEOUS ELEMENTS: Requirements of Pedestrians- Pedestrian facilities on Urban Roads- Cycle Tracks – Guidelines and Design standards- Bus bays –Types and Guide lines- Design of On-street and Off street Parking facilities – Guidelines for lay out Design, Traffic Signs and Markings.

UNIT-VI

Highway drainage importance – sub surface drainage –surface drainage– Design of road side drives – Hydrological – Hydraulic considerations and design of filter media, problems on above.

TEXTBOOKS:

1. Principles and Practice of Highway Engineering, L.R. Kadiyali and N.B. Lal, Khanna, 2007.
2. Traffic Engineering and Transportation Planning, L.R. Kadiyali, Khanna Publications, 2007.

REFERENCES:

1. Highway Engineering, C.E.G. Justo and S.K. Khanna, Nem Chand and Brothers.
2. IRC Codes for Signs, Markings and Mixed Traffic Control in Urban Areas

IV B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	3
OPEN CHANNEL HYDRAULICS							

COURSE OBJECTIVES

- To prepare the students for a successful career as hydrologist and water resources engineers.
- To develop the ability among students to synthesis data and technical concepts for application in open channel hydraulics and water resources engineering.
- To provide students an opportunity to work as a part of interdisciplinary team.
- To promote student awareness of the life-long learning and to introduce them professional ethics and codes of professional practice in water resource engineering.

COURSE OUTCOMES

- They will possess the skills to solve problems in uniform, gradually and rapidly varied flows Problems in open channels.
- They will possess the skills to solve problems in non- uniform flow.
- They will have knowledge in hydraulic machineries (pumps and turbines) in steady state conditions.
- They will have knowledge of Groundwater hydraulics and its applications.

UNIT I UNIFORM FLOW:- Definition and differences between pipe flow and open channel flow - Types of Flow - Properties of open channel - Fundamental equations - Velocity distribution in open channel - Steady uniform flow: Chezy's equation, Manning equation - Best hydraulic sections for uniform flow - Computation in Uniform Flow - Specific energy and specific force.

UNIT II VARIED FLOWS:-Dynamic equations of gradually varied and spatially varied flows - Water surface flow profile classifications: Hydraulic Slope, Hydraulic Curve - Profile determination by Numerical method: Direct step method and Standard step method - Applications.

UNIT III RAPIDLY VARIED FLOWS: Application of the energy equation for RVF - Critical depth and velocity - Critical, Sub-critical and Super-critical flow - Application of the momentum equation for RVF - Hydraulic jumps - Types - Energy dissipation - Surges.

UNIT IV TURBINES: Turbines- Classification - Reaction turbines - Francis turbine, Radial flow turbines, draft tube and cavitation - Propeller and Kaplan turbines - Impulse turbine - Performance of turbine - Specific speed - Runaway speed - Similarity laws.

UNIT V PUMPS: Centrifugal pumps - Minimum speed to start the pump - NPSH - Cavitations in pumps - Operating characteristics - Multistage pumps - Reciprocating pumps - Negative slip - Flow separation conditions - Air vessels, indicator diagrams and its variations - Savings in work done - Rotary pumps: Gear pump.

UNIT VI WELL HYDRAULICS :Objectives of Groundwater hydraulics – Darcy's Law - Groundwater equation – Flow net Theory – steady state flow - Dupuit Forchheimer assumption - Unsteady state flow – Theis method - Jacob method -Slug tests - Image well theory – Partial penetrations of wells.

TEXTBOOKS:

1. Jain. A.K., Fluid Mechanics, Khanna Publishers, Delhi, 2010.
2. Modi P.N. and Seth S.M., Hydraulics and Fluid Mechanics, Standard Book House, New Delhi, 19th edition, 2013.
3. Subramanya K., Flow in open channels, Tata McGraw Hill, New Delhi, 2000.

REFERENCES:

1. Ven Te Chow, Open Channel Hydraulics, McGraw Hill, New York, 2009.
2. Rajesh Srivastava, Flow through open channels, Oxford University Press, New Delhi, 2008.
3. Mays L. W., Water Resources Engineering, John Wiley and Sons (WSE), New York, 2005.

E-LEARNING RESOURCES:

<http://nptel.ac.in/courses.php>

<http://jntuk-coeerd.in/>

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

COURSE OBJECTIVES

- To know about the astronomy and astronomical terms.
- To develop the ability among students to synthesis data and for application in elements in photogrammetry survey.
- To provide students an opportunity to know about the remote sensing and digital processing.
- The main objective is to know the concept of GIS.
- To provide knowledge on GIS and applications in civil engineering.
- To know the type of maps and map projections.

COURSE OUTCOMES

- They will possess the skills to solve problems in uniform, gradually and rapidly varied flows Problems in open channels.
- They will have knowledge in photogrammetric survey.
- They are going to get good knowledge on remote sensing and digital image processing.
- Students are having good knowledge on concept of GPS surveying concepts.
- Students are going to know the concept of GIS applications in civil engineering.
- They are going to know the Types of Map Projections, Map projection to a plane.

UNIT – I ASTRONOMY: Definitions of astronomical terms, star at elongation, star at prime vertical star at horizon, star at culmination, celestial coordinate systems, sidereal, apparent, and solar and mean solar time.

UNIT – II ELEMENTS OF PHOTOGRAMMETRY : Introduction: types of photographs, types of aerial photographs, aerial camera and height displacements in vertical photographs, stereoscopic vision and stereoscopies, flight planning.

UNIT – III REMOTE SENSING : Introduction, Principles of energy interaction in atmosphere and earth surface features, Image interpretation techniques, visual interpretation, Digital image processing.

UNIT – IV

GPS Surveying Basic Concepts - Different segments - space, control and user segments - satellite configuration - signal structure. Geographical Information System Definition of GIS, Key Components of GIS, Functions of GIS, Spatial data.

UNIT – V

Geospatial analysis, Integration of Remote sensing and GIS and Applications in Civil Engineering. Map Projections Introduction- Scale Factor.

UNIT-VI

Geometry of the sphere and cone- Areas- Surface areas of solids- Types of Map Projections- Map projection to a plane- Gnomonic Projection- Stereographic Projection.

TEXT BOOKS

1. Surveying Vol.2 by B.C.Punmia
2. Surveying Vol.3 by B.C.Punmia

REFERENCE

1. Surveying Vol 2 by T.P.Kanitkar
2. Higher Surveying by A M Chandra

IV B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
NUMERICAL METHODS IN CIVIL ENGINEERING							

COURSE LEARNING OBJECTIVES:

The objective of this course is:

- Real life application of Numerical Methods for solving engineering problems.
- Developing computer codes for various Numerical Methods using open source/commercial programme.
- Application open source/commercial software tools for solving numerical problems.

COURSE OUTCOME:

After learning the course the students should be able to:

- Solve algebraic equations.
- Obtain numerical solution of ordinary and partial differential equations.
- Apply integration method/s for structural analysis.
- Carry out interpolations and curve fitting,
- Obtain solution of Eigen value problems and Fourier series for structural analysis.
- Apply iterative and transformation methods in structural engineering.

UNIT-I INTRODUCTION

Historical development of Numerical techniques, role in investigations, research and design in the field of civil engineering development of algorithms / flowcharts for following methods for solution of Linear Simultaneous Equation: a) Gaussian elimination method, b) Gauss-Jordan matrix inversion method, c) Gauss-Siedel method and d) Factorization method.

UNIT-II APPLICATION OF SOLUTION OF LINEAR SYSTEM OF EQUATIONS TO CIVIL ENGINEERING PROBLEMS

Construction planning, slope deflection method applied to beams, frames and truss analysis.

UNIT-III APPLICATION OF ROOT FINDING TO CIVIL ENGINEERING PROBLEMS

Development of algorithm for a) Bisection method and b) Newton-Raphson method and its applications for solution of non-linear algebraic and transcendental equations from problems in hydraulics, irrigation engineering, structural engineering and environmental engineering.

UNIT-IV APPLICATION OF NUMERICAL INTEGRATION FOR SOLVING SIMPLE BEAM PROBLEMS

Development of algorithm for a) Trapezoidal rule and b) Simpson's one third rule and its application for computation of area of BMD drawn for statically determinate beams.

UNIT-V

Newark's method for computation of slopes and deflections in statically determinate beams.

UNIT-VI**DEVELOPMENT OF ALGORITHM AND APPLICATION OF SOLUTION OF ORDINARY DIFFERENTIAL EQUATION TO CIVIL ENGINEERING PROBLEMS BY**

a) Euler's method b) Runge Kutta 4th order method

TEXT BOOKS:

1. C.Xavier: C Language and Numerical Methods.
2. Dutta & Jana: Introductory Numerical Analysis.
3. J.B.Scarborough: Numerical Mathematical Analysis.
4. Jain, Iyengar , & Jain: Numerical Methods (Problems and Solution).

REFERENCES:

1. Balagurusamy: Numerical Methods, Scitech.
2. Baburam: Numerical Methods, Pearson Education
3. N. Dutta: Computer Programming & Numerical Analysis, Universities Press.
4. Soumen Guha & Rajesh Srivastava: Numerical Methods, OUP.
5. Srimanta Pal: Numerical Methods, OUP.

MAJOR EQUIPMENTS: --

LIST OF OPEN SOURCE SOFTWARE/LEARNING WEBSITE:

- www.scilab.org/
- <http://nptel.ac.in/>

IV B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
THEORY OF ELASTICITY							

COURSE OBJECTIVES:

This course will enable students:

- Familiarize Students with concepts of Transformation of stress and strain in a 3D field.
- Equip student with Airy's stress function.
- Understand Concepts of stress concentration, Circular disc.
- Familiarize students with Torsion of non-circular sections.

COURSE OUTCOMES:

After studying this course, students will be able to:

- To understand the deformations and strains in a body when subjected to stresses. Plane stress and plane strain problems.
- To learn about stress and strain in a 2D field. Problems in 2D -Polar coordinate.
- To understand the concept of stress concentration, torsion.
- To understand about the membrane analogy theory.

UNIT-I

Basic concepts of deformation of bodies - Notations of stress and strain in 3D field- Transformation of stress and strain in a 3D field.- Equilibrium equations in 2D and 3D Cartesian coordinates.

UNIT-II

Plane stress and plane strain problems- 2D problems in Cartesian coordinates as applied to beam bending using Airy's stress function- Problems in 2D -Polar coordinate- Equations of equilibrium and compatibility.

UNIT-III

Curved beam bending- stress concentration in holes- Circular disc subjected to diametral compressive loading- Semi-infinite solid subjected to different types of loads.

UNIT-IV

Energy principle - Theorem of minimum potential energy and complementary energy.

UNIT-V

Torsion of non-circular sections- St. Venant's theory – Torsion of elliptical sections - Torsion of triangular sections.

UNIT-VI

Prandtl's membrane analogy - Torsion of rolled profiles- Stress concentration around reentrant corners - Torsion of thin walled tubes-Stress concentration.

TEXT BOOKS

1. Timoshenko and Goodier : Theory of Elasticity and Plasticity, McGraw-Hill, 2006
2. Mohammed Amin : Computation Elasticity, Narosa Publications,2005
3. K. Baskar, T.K. Varadan: Theory of Isotropic/Orthotropic Elasticity, An Introductory Primer, Anne books Pvt Ltd,2009.

REFERENCES

1. Advanced mechanics of solids by LS Srinath, TataMcGra-Hill
2. Introduction to Engineering plasticity by GK Lal and NV Reddy, Narosa Publishing House

IV B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
PAVEMENT MATERIALS AND CONSTRUCTION							

COURSE OBJECTIVES:

The main objective of this course is to provide students with a thorough understanding of the important factors in pavement design and analysis.

The focus will be on practices of pavement design and maintenance used by highway agencies.

COURSE OUTCOMES:

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

- Determine the proportions of ingredients required for the mix design of both asphalt mixtures and cement concrete.
- Characterize the pavement materials including soil, aggregate, asphalt, cement, asphalt mixtures, cement concrete.
 - Select appropriate asphalt binder for construction of a flexible pavement depending upon the traffic and climatic conditions.
- Choose appropriate stabilization technique for pavement.

UNIT-I AGGREGATES

Origin, classification, requirements, properties and tests on road aggregates, concepts of size and gradation – design gradation, maximum aggregate size, aggregate blending by different methods to meet specification.

UNIT-II BITUMEN AND TAR

Origin, preparation, properties and chemical constitution of bituminous road binders-requirements.

UNIT-III BITUMINOUS EMULSIONS AND CUTBACKS

Preparation, characteristics, uses and tests. Adhesion of Bituminous Binders to Road Aggregates: Adhesion failure, mechanism of stripping, tests and methods of improving adhesion.

UNIT-IV BITUMINOUS MIXES

Mechanical properties, dense and open textured mixes, flexibility and brittleness, (no Hveem Stabilometer & Hubbar – Field Tests) bituminous mix, design methods using Rothfuch's Method only and specification, Marshal mixed design criteria- voids in mineral aggregates, voids in total mix, density, flow, stability, percentage voids filled with bitumen.

UNIT-V EQUIPMENT IN HIGHWAY CONSTRUCTION:

Various types of equipment for excavation, grading and compaction – their working principle, advantages and limitations. Special equipment for bituminous and cement concrete pavement and stabilized soil road construction.

UNIT-VI SUBGRADE

Earthwork grading and construction of embankments and cuts for roads. Preparation of subgrade, quality control tests.

TEXT BOOKS:

1. Atkins, N. Harold, Highway Materials, Soils and Concretes, Fourth Edition, 2002, PrenticeHall.
2. Kerbs Robert D. and Richard D. Walker, Highway Materials, McGraw-Hill, 1971.
3. Relevant IRC and IS Codes of Practices (Separate List will be given).

REFERENCE BOOKS:

1. Read, J. And White oak, D., -The Shell Bitumen Handbook, Fifth edition, Shell Bitumen, Thomas Telford Publishing, London 2003
2. Relevant IRC and IS codes

IV B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
AIR POLLUTION AND CONTROL							

COURSE LEARNING OBJECTIVES:

- To learn the concept of air pollution, types, sources and effects.
- To know the Threshold Limit Values (TLV) of various air pollutants
- To know about Meteorology and plume Dispersion and study their effects.
- To understand the process of controlling gaseous emissions using various equipment.
-

COURSE LEARNING OUTCOMES:

Students will be able to

- Identify different sources of air pollution and its effects and suggest control measures.
- Judge the plume behavior in a prevailing environmental condition
- Explain control of gaseous pollution at sources.

UNIT – I INTRODUCTION: Air Pollution – Definitions, Scope, Significance, Air Pollutants - Classifications – Natural and Artificial, Primary and Secondary, point and Non Point, Line and Areal Sources of air pollution- stationary and mobile sources.

UNIT – II EFFECTS OF AIR POLLUTION: Effects of Air pollutants on man, material and vegetation, Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holes. Air Pollution Episodes in India and abroad.

UNIT – III REMOVAL AND CONTROL METHODS: Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like SO_x, NO_x, CO, and HC. Air-fuel ratio, computation and control of products of combustion.

UNIT – IV METEOROLOGY AND PLUME DISPERSION: Meteorology and plume Dispersion- properties of atmosphere- Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality wind rose diagrams. Lapse Rates, Pressure Systems, Winds and moisture plume behavior and plume Rise Models- Gaussian Model for Plume Dispersion.

UNIT – V CONTROL OF PARTICULATES: Control of particulates – Control at Sources, Removal of pollutants, Process Changes, Equipment modifications, Design and operation of control. Equipment's – Settling Chambers, Cyclones, Centrifugal separators, and filters Dry and Wet scrubbers, packed beds, Electrostatic precipitators.

UNIT – VI AIR POLLUTION CONTROL METHODS: General Methods of Control of NO₂ and SO₂ emissions, in plant Control Measures, process changes, dry and wet methods of removal and recycling. Air Quality Management – Monitoring of SPM, SO- NO and CO Emission Standards, Environmental criteria for setting industries and green belts.

TEXT BOOKS:

1. Air Pollution by M.N. Rao and H.V.N. Rao – Tata McGraw Hill Company.
2. Air Pollution and Control by K.V.S.G Murali Krishna, Laxmi Publications, New Delhi,2015.

REFERENCE BOOKS:

1. An Introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S. Publications.
2. T. Painter., Air Pollution Control Technology, Mc.Graw Hill.
3. Prof. T.Shivaji Rao, Elements of Air Pollution Control.

IV B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
PHOTOGRAMMETRY AND REMOTE SENSING							

COURSE OBJECTIVES:

- To introduce the physical principles of Remote Sensing and Photogrammetry as a tool for mapping
- To inform him of the data products, their properties and methods of preparing thematic information.

COURSE OUTCOMES:

- Understand the concepts of Photogrammetry and compute the heights of objects Gain skills in image analysis and interpretation in preparing thematic maps.
- Gain skills in image analysis and interpretation in preparing thematic maps.
- Acquire knowledge about concepts of Remote sensing, sensors and their characteristics.
- Understand the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies

UNIT-I INTRODUCTION TO PHOTOGRAMMETRY

Principles – aerial photo-aerial camera -Scale – overlaps – stereoscopy – concepts – viewing and measuring systems – image and object co-ordinates – transformation - floating mark – parallax equation – height information - Flight planning – computation for flight plan – photo control

UNIT-II PHOTOGRAMMETRY AND MAPPING

Concepts of interior, relative, absolute orientation – direct georeferencing – object, image relation - collinearity and coplanarity conditions – effect of orientation elements - Elements and principles of Aerotriangulation – ortho rectification - ortho mosaic - Introduction to digital photogrammetry- - comparison with analytical systems - DP workstations.

UNIT-III STEREOSCOPY AND PARALLAX: Recognize the basics of vision theory. Understand and operate stereoscopes. Theory of parallax, Use of parallax equations in solving simple photogrammetric problems- Geometry of Tilted Aerial Photographs

PROJECT PLANNING: Basic elements of overlap and sidelap- Effects of scale variation, crab, and drift. Compute flight planning parameters- Mosaic, contouring, specifications for topographic mapping.

UNIT IV INTRODUCTION TO REMOTE SENSING: Introduction of Remote Sensing ,Electro Magnetic Spectrum - Effects of Atmosphere- Scattering –Absorption-Atmospheric window- Energy interaction with surface features – Spectral reflectance of earth objects and land covers – Resolution concepts – types – Satellites, orbits and missions.

UNIT V DATA ACQUISITION IN DIFFERENT PLATFORMS: Historical development – Opto mechanical electro optical sensors – across track and Along track scanners – multi spectral scanners – characteristics of different types of platforms – medium and high resolution missions – Future Missions - Data products and characteristics – formats.

UNIT VI DATA ANALYSIS: Sources of Errors – scene, sensor and atmospheric causes - correction: geometric and Radiometric – visual and digital interpretation- elements of interpretation – interpretation keys - digital analysis and classification – image formation, visualization : Image enhancement, filters–Baye’s theorem - Image classification: unsupervised and supervised – thematic mapping - accuracy assessment.

TEXTBOOK(S):

- Elements Of Photogrammetry, 3rd edition, by P. Wolf and B. Dewitt, McGraw-Hill Book Co.
- Introduction to Modern Photogrammetry by Edward M. Mikhail, James S. Bethel, J. Chris McGlone, 2001, John Wiley & Sons Inc
- Textbook of Remote Sensing and Geographical Information systems by M. Anji Reddy, BS Publications, Hyderabad. 2011. ISBN: 81-7800-112-8

REFERENCES:

- Remote Sensing and GIS by A.M.Chandra and S.K. Gosh Narosa Publishing Home, New Delhi 2009.
- Remote sensing and image interpretation by Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman John Wiley & Sons, 2008

IV B.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
ADVANCED DESIGN OF STEEL STRUCTURES							

COURSE OBJECTIVES:

This course will enable students:

- Familiarize Students with industrial stacks.
- Equip student with concepts of design of industrial buildings.
- Understand Design Concepts of various towers.
- Familiarize students with beam connections, concepts of plastic analysis.

COURSE OUTCOMES:

After studying this course, students will be able to:

- To introduce the concept of industrial stacks, industrial buildings.
- To design Gantry girders and different types of towers.
- To study the types of beam connections and cold formed steel sections.
- Design of compression and tension members, concepts of Plastic analysis.

UNIT-I

Estimation of wind load - Design of industrial stacks - Self-supporting and guyed stacks lined and unlined – along wind and across wind vibration.

UNIT-II

Principles of analysis and design of Industrial buildings and bents - Gantry girders and crane columns.

UNIT-III

Lattice tower configurations and types – loads in tower – Analysis and design of steel towers – micro wave towers - Transmission line towers – analysis of tower foundation.

UNIT-IV

Types of connections, Design of framed beam connections, Seated beam connection, Un-stiffened, Stiffened Seat connections, Continuous beam – to - beam connections and continuous beam-to– column connection both welded and bolted.

UNIT-V

Cold formed Steel Sections - Types of cross sections - Local buckling and post buckling - Design of compression and Tension members - Beams - Deflection of beams - Combined stresses and connections.

UNIT-VI

Introduction to Plastic analysis - ductility - plastic bending of beams - stages of bending - shape factor - plastic hinge - load factor - failure mechanism - upper and lower bound theorems of plastic analysis - collapse load for beams and frames.

TEXT BOOKS

1. Subramanian N, Design of Steel Structures, Oxford University Press, New Delhi 2008.
2. Punmia B.C., Comprehensive design of steel structures, Lakshmi Publications, Newdelhi 2000.

REFERENCES

1. Bhavikatti, S.S., Design of Steel Structures, I.K. International Publishing House Pvt. Ltd., New Delhi, 2010.
2. IS 800-2007, Code of practice for general construction in steel, Bureau of Indian Standards, New Delhi.

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

COURSE OBJECTIVES:

The objective of this course is:

- Familiarize Students with different types of Bridges and IRC standards.
- Equip student with concepts and Importance of Proper Investigation.
- Understand concepts of I. R. C. Specifications for road bridges.
- Familiarize with Design of simply supported T – Beam Bridge, Design of pier- Design of abutment.

COURSE OUTCOMES:

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

- Explain different types of Bridges with diagrams and Loading standards.
- Carryout analysis and design of Slab bridges, with proper investigation. T Beam bridges, Box culvers and suggest structural detailing.
- Carryout analysis of Indian road congress specifications.
- Organize for attending inspections and maintenance of bridges and prepare reports.

UNIT – I

Introduction & Investigation For Bridges Components of a Bridge- Classification- Standard Specifications- Need for Investigation- Selection of Bridge Site- Preliminary Data to be Collected.

UNIT – II

Determination of Design Discharge- Economical Span- Location of Piers and Abutments- Vertical clearance above HFL- Scour depth- Traffic Projection- Choice of Bridge type- Importance of Proper Investigation.

UNIT – III

Concrete Bridges various types of bridges- I. R. C. Specifications for road bridges, Culverts Design of R. C. slab culvert.

UNIT – IV

Design of simply supported T – Beam Bridge.

UNIT – V

Design of pier- Design of abutment.

UNIT – VI

Bearings for Bridges Importance of bearings- Bearings for slab bridges- Expansion bearings- fixed bearings- Types of foundation.

TEXT BOOKS

1. Essentials of Bridge Engineering by Dr. Johnson Victor- Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Design of Bridge Engineering by Jagadeesh T . R, Jayaram .M PHI Learning Pvt. Ltd, New Delhi
3. Bridge Engineering by Rangwala Charotar Publishing House Pvt. Ltd.

REFERENCE: IRC CODE BOOK

IVB.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2
ENVIRONMENTAL ENGINEERING LAB							

COURSE OBJECTIVES:

- To identify the suitability of water for drinking considering physical and chemical parameters.
- To learn the properties of sewage.
- To identify the suitability of water for aquatic life.

COURSE OUTCOMES:

Students will be able to

- Test the quality of water as per IS standards.
- Decide whether the water body is polluted or not.
- Assess the quality of sewage.

LIST OF EXPERIMENTS

1. Determination of pH and Conductivity of water & soil.
2. Determination of Alkalinity / Acidity.
3. Determination of Physical parameters- Temperature, Colour, Odour, Taste, Turbidity.
4. Determination of Chlorides in water & soil.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of Dissolved Oxygen with D.O. Meter.
7. Determination of iron.
8. Determination of Optimum Coagulant Dose by Jar Test
9. Determination of Total hardness in water.
10. Determination of B.O.D.
11. Determination of C.O.D.
12. Determination of Nitrogen.
13. Determination of Chlorine Demand.

NOTE: AT LEAST 10 OF THE ABOVE EXPERIMENTS ARE TO BE CONDUCTED.

TEXT BOOKS:

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

REFERENCE:

1. Relevant IS Codes-10500.
2. Chemistry for Environmental Engineering by Sawyer and Mc.Carty.

IVB.TECH I- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	3	25	50	75	2
MINI PROJECT ON PLANNING ANALYSIS & DESIGN OF G+2 BUILDING							

The mini project should be done on planning, analysis & design of G+2 Building and report is to require to be submitted.

REQUIREMENTS:

1. Minimum pages of book should be 20 to 50 pages.
2. Main content in Times New Roman of size 12.
3. List of figures, list of tables should be included.
4. Tables, Appendix and others can be in Times New Roman of size 10.
5. References should be the following order.

EXAMPLE : Bhavikatti, S.S., Design of Steel Structures, I.K. International Publishing House Pvt. Ltd., New Delhi, 2010.

- C418.1 Planning of a G+2 Building
- C418.2 Analysis of a G+2 Building
- C418.3 Designing a G+2 Building

IV B.TECH - II SEMESTER

IV B.TECH- II SEMESTER COURSE STRUCTURE

S.No	Subject Name	Cat. Code	L	T	P	Internal Marks	External Marks	Total Marks	Credits
1	Business Management Concepts For Engineers	PC	4	-	-	40	60	100	3
2	Professional Elective-IV	PE	3	1	-	40	60	100	3
	Pre-Stressed Concrete Structures								
	Advanced Foundation Engineering.								
	Pavement Design								
	Earthquake Resistant Design Of Structures								
	Industrial Waste Water Treatment								
	Pre-Fabricated Structures								
Design And Drawing Of Hydraulic Structures									
3	Professional Elective-V	PE	3	1	-	40	60	100	3
	Finite Element Analysis								
	Reinforced Earth Structures								
	Urban Transport Planning								
	Geographic Information System								
	Water Resources Engineering								
Environmental Impact Assessment									
4	Project Work	PRC	-	-	-	80	120	200	10
5	Practical Training/Intern Ship	PRC	-	-	-	40	60	100	03
	TOTAL		10	2	-	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
BUSINESS MANAGEMENT CONCEPTS FOR ENGINEERS							

COURSE OBJECTIVE:

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

COURSE OUTCOMES:

- After completion of this course, the students would be able to
- Learns necessary skills relating to the economics, management and accountancy which are useful for decision making.
- To equip themselves with the basic principles of accounting which will be of help to them to know the fundamentals of accounting.
- The student will also acquire necessary skills relating to various functional aspects of management viz., Human Resource Management, Marketing Management etc.
- This course will also help the student to acquaint with the latest management concepts and practices which are used in the industry.

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.Taylor's Scientific Management- Douglas Mc Gregor's 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-Invenory 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 theory & applications, DM Mithani, Himalaya Publishing House, 2013.(UNITS - 1, 2)
2. Accounting For Managers, G. Prasad, Jaibharath Publishers, 2016. (UNIT-3)
3. Dr. P. Vijaya Kumar & Dr. N. Appa Rao, Management Science cengage. Delhi, 2012.(UNITS – 4, 5)
4. Project Planning & Control with PERT & CPM, BC Punmia & KK Khandelwal, Lakshmi Publications, New Delhi, 4th Edition – 2016. (UNIT-6)

REFERENCES:

1. Dr. N. APPARAO Dr. P. Vijay Kumar: -Managerial economics and financial analysis Cengage publication's, New Delhi-2011.
2. Dr. A. R. Aryasri- Managerial Economics and Financial Analysis, TMH2011.
3. V. Maheswari: Managerial Economies, Sultan Chand.
4. Suma Damodaran: Managerial Economics, Oxford 2011.
5. Koontz & Weihrich: Essentials of Management TMH 2011.

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

COURSE LEARNING OBJECTIVES:

The objective of this course is:

- Familiarize Students with concepts of prestressing.
- Equip student with different systems and devices used in prestressing.
- Understand the different losses of pre-stress including short and long term losses.
- Familiarize students with the analysis and design of prestressed concrete members under flexure- shear and torsion.

COURSE OUTCOMES:

- At the end of this course the student will be able to
- Understand the different methods of prestressing.
- Estimate the effective prestress including the short and long term losses.
- Analyze and design prestressed concrete beams under flexure and shear.
- Understand the relevant IS Codal provisions for prestressed concrete

UNIT-I INTRODUCTION: Historic development – General principles of prestressing pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

UNIT-II IS.CODE PROVISIONS- METHODS AND SYSTEMS OF PRESTRESSING- Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System- Magnel System Freyssinet system and Gifford – Udall System.

UNIT-III LOSSES OF PRESTRESS: Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortage of concrete- shrinkage of concrete- creep of concrete- Relaxation of steel- slip in anchorage bending of member and frictional losses.

UNIT-IV ANALYSIS OF SECTIONS FOR FLEXURE: Elastic analysis of concrete beams prestressed with straight- concentric- eccentric- bent and parabolic tendons.

UNIT-V DESIGN OF SECTIONS FOR FLEXURE AND SHEAR: Allowable stress- Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure- shear- and principal stresses – design for shear in beams – Kern lines- cable profile.

UNIT-VI ANALYSIS OF END BLOCKS: by Guyon's method and Magnel method- Anchorage zone strusses – Approximate method of design – Anchorage zone reinforcement – Transfer of prestress pre-tensioned members.

TEXT BOOKS:

1. Prestressed Concrete by Krishna Raju- - Tata Mc.Graw Hill Publications.
2. Prestressed Concrete by N.Rajasekharan- - Narosa publications.
3. prestressed concrete by N Raj Gopal.

REFERENCE:

1. Prestressed Concrete by Ramamrutham- Dhanpatrai Publications.
2. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H. Burns- John Wiley & Sons.

Codes: BIS code on prestressed concrete- IS 1343

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

LEARNING OBJECTIVES:

- Understanding of problem soils and their bearing capacity limitations
- Imparting knowledge on settlement and consolidation of soils.
- Gaining capabilities on the design of foundations including for problem soils

COURSE OUTCOMES:

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

- Understand safe bearing capacity of soil
- Determine settlement analysis of cohesive and cohesion less soil and consolidation
- Understand soil related problems sheet piles and anchored & coffer dams
- Design of different types of machine foundation
- Find out different shapes well foundation
- Design deep foundation for expansive soil

UNIT-I BEARING CAPACITY ON FOUNDATIONS

Effect of eccentric loading- inclined load- inclination of base of foundation- sloping ground- Bearing Capacity of stratified soils- Meyerhof analysis- Vesic's analysis and Hansen's analysis.

UNIT-II SETTLEMENT ANALYSIS

Contact pressure- sources of settlement- uniform settlement- differential settlement- construction practices to avoid differential settlement- immediate settlement in sands and clays-Terzaghi's and Janbu's methods for clays- Schmertmann and Hartman method for cohesion less soils- consolidation settlement

THREE DIMENSIONAL CONSOLIDATIONS

Consolidation equation- Solution- Vertical sand drain analysis and design.

UNIT-III ANCHORED BULKHEADS

Earth pressure diagram- determination of depth of embedment in sands and clays- Types of bracing system- types of coffer dams.

UNIT-IV MACHINE FOUNDATIONS

Introduction- Terminology- Design criteria for machine foundation- single degree freedom system- free and forced vibration- Methods of analysis of block foundation- Dynamic subsoil investigation- Damping- Design and construction of foundation for reciprocating and impact type machines- Active and Passive isolation.

UNIT-V CAISSONS AND WELL FOUNDATIONS

Types of caissons- different shapes of well- components of well- functions of wells- sinking of wells- lateral stability by Terzaghi's analysis.

UNIT-VI FOUNDATIONS IN EXPANSIVE SOILS: Problems associated with expansive soils- Swelling potential- percent swell- swell pressure factors affecting- methods of measurement of swell pressure - Prediction of heave- factors affecting heave- methods of prediction of heave- IS Classification of expansive soils- Under- reamed pile foundations- Sand cushion method- CNS layer method- granular pile-anchor technique- lime stabilization of expansive soils- Moisture

control in expansive clays- Horizontal and vertical moisture barriers- sub-surface drainage and surface drainage- pre-wetting and ponding.

TEXT BOOKS:

1. Soil dynamics and machine foundations – Swami Saran
2. Principles of Foundation Engineering(1999)- B.M. Das.- PWS Publishing Company- 4th edition- Singapore
3. Soil Mechanics and Foundation Engg (7th edition) by Dr. Arora- K.R.- Standard Publisher and distributors- Delhi- 2010.
4. Hand book of Machine foundations – Srnivasulu and Vaidyanathan.

REFERENCE :

1. Foundation Analysis & Design by Bowles- J.E.- McGraw- Hill Book Company.
2. Basic and Applied Soil Mechanics by Gopal Ranjan and ASR Rao- Wiley Eastern Limited- New Delhi.
3. Foundations of Expansive Soils- F.H. Chen. Elsevier Publications.
4. Geotechnical Engineering by SK Gulati & Manoj Datta- Tata McGraw- Hill Publishing Company Limited.

E-LEARNING RESOURCES: NPTEL

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

COURSE OBJECTIVES:

- To know various factors affecting pavement design
- To know various concepts for the stresses in pavements.
- To understand material characterization and mix design concepts.
- To acquire design principles of flexible and rigid pavements.
- To acquire design principles of shoulders- overlays and drainage.

COURSE OUTCOMES:

- Characterize the response characteristics of soil- aggregate- asphalt- and asphalt mixes
- Analyze flexible pavements
- Analyze rigid pavements
- Design a flexible pavement using IRC- Asphalt Institute- and AASHTO methods
- Design a rigid pavement using IRC- and AASHTO methods

UNIT I PAVEMENT MATERIALS:

Types and component parts of pavements- highway and airport pavements- Materials used in pavements- basic soil properties relevant to pavement applications- resilient modulus- and modulus of sub-grade reaction- Physical properties of aggregates and blending- Basic properties of bitumen- polymer and rubber modified bitumen- Dynamic modulus- flow time and flow number of bituminous mixes. Cement: chemical composition- types- physical properties. Distresses in flexible and rigid pavements. Use of geosynthetics in pavements.

UNIT II STRESSES IN FLEXIBLE PAVEMENTS: layered system concepts- stress solution for one- two and three layered systems- fundamental design concepts.

UNIT III STRESSES IN RIGID PAVEMENTS: Westergaard's theory and assumptions- stresses due to curling- stresses and deflections due to loading- frictional stresses- stresses in dowel bars and tie bars.

UNIT IV FACTORS AFFECTING PAVEMENT DESIGN: Variables considered in pavement design- Classification of axle types- articulated commercial vehicles- legal axle and gross weights on single and multiple units- tyre pressure- contact pressure- ESWL- EWLF and EAL concepts- Traffic analysis: ADT- AADT- growth factor- lane distribution- directional distribution and vehicle damage factors.

UNIT V DESIGN OF FLEXIBLE PAVEMENTS: IRC method of flexible pavement design- Design of flexible pavements for low volume roads using IRC method.

UNIT VI DESIGN OF RIGID PAVEMENTS

IRC methods of rigid pavement design- Design of rigid pavements for low volume roads using IRC method.

TEXTBOOKS

1. Huang- Y.H. Pavement Analysis and Design- Second Edition- Dorling Kindersley (India) Pvt. Ltd.- New Delhi- India- 2008.

REFERENCES:

1. IRC: 37-2012 Guidelines for the Design of Flexible Pavements- The Indian Roads Congress- New Delhi- India- 2012.
2. IRC: 58-2011 Guidelines for the Design of Plain Jointed Rigid Pavements for Highways- The Indian Roads Congress- New Delhi- India- 2011.

IV B.TECH II- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
EARTHQUAKE RESISTANT DESIGN OF STRUCTURES							

COURSE LEARNING OBJECTIVES:

- Familiarize Students with Engineering Seismology
- Equip student with concepts of Structural Dynamics
- Understand Concepts of Seismic Design
- Familiarize with Design philosophies for Seismic loading
- Familiarize students with various IS codal provisions for ductile design and detailing.

COURSE OUTCOMES:

- Explain fundamentals of Engineering Seismology
- Able to understand the seismic design concepts
- Compute equivalent lateral seismic loads and carry out a seismic design as per IS codal provisions
- Able to Design multi-Storey building using Equivalent static method.

UNIT-I Engineering seismology – rebound theory – plate tectonics – seismic waves - Earthquake size and various scales – local site effects – Indian seismicity – seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects.

UNIT-II Seismic design concepts – EQ load on simple building – load path – floor and roof diaphragms – seismic resistant building architecture – plan configuration – vertical configuration – pounding effects – mass and stiffness irregularities. As per code (IS 1893-2000)

UNIT-III Seismic design concepts – EQ load on simple building – load path – floor and roof diaphragms – plan configuration – pounding effects – mass and stiffness irregularities - Provision of seismic code (IS 1893 & 13920) – Building system – frames – shear wall – braced frames – Infill wall – Non- structural elements.

UNIT-IV Calculation of equivalent lateral force- Design Base Shear- Storey Shear- Estimation of Natural period of Structure- Computation of Response acceleration Coefficient- Zone factor- Seismic weight- Response reduction factors- Seismic Coefficient Method.

UNIT-V Concept of strong column weak beams- Ductility criteria for earthquake resistant design- Ductile detailing of flexural members as per IS 13920- Longitudinal reinforcement- Shear reinforcement- Anchorage of reinforcement- Development length- Lap Splices.

UNIT-VI Seismic Analysis and design of simple 2-storied RC Building frame – Equivalent static lateral force method.

TEXT BOOKS 1. ‘Earthquake Resistant Design of Structures’ -Pankaj Agarwal and Manish ShriKhande- Prentice – Hall of India- 2007- New Delhi.
2. ‘Earthquake Resistant Design of Building Structures’ by Vinod Hosur- Wiley India Ltd.
3. ‘Reinforced Concrete Design’ by A. K. Jain

REFERENCES 1. ‘Introduction to the Theory of Seismology’ by Bullen K.E.- Great Britain at the University Printing houses- Cambridge University Press 1996. 2. Relevant code of practices.

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

COURSE LEARNING OBJECTIVES:

The course will address the following:

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

COURSE OUTCOMES:

- Upon the successful completion of this course- the students will be able to:
- Suggest treatment methods for any industrial wastewater.
- Learn the manufacturing process of various industries.
- Student will be in a position to decide the need of common effluent treatment plant for the industrial area in their vicinity.

UNIT-I INDUSTRIAL WATER QUANTITY AND QUALITY REQUIREMENTS : Quality and quantity requirement of Boiler and cooling waters–Process water for Textiles- Food processing- Brewery Industries- power plants- fertilizers- sugar mills.

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

UNIT – III BASIC THEORIES OF INDUSTRIAL WASTEWATER MANAGEMENT: Industrial waste survey - Measurement of industrial wastewater Flow-generation rates –Industrial wastewater sampling and preservation of samples for analysis - Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction – Neutralization – Equalization and proportioning- recycling- reuse and resources recovery.

UNIT – IV INDUSTRIAL WASTEWATER DISPOSAL MANAGEMENT: discharges into Streams- Lakes and oceans and associated problems- Land treatment – Common Effluent Treatment Plants: advantages and suitability- Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method-ZLD(Zero liquid Discharge).

UNIT – V PROCESS AND TREATMENT OF SPECIFIC INDUSTRIES-1: Manufacturing Process and origin- characteristics- effects and treatment methods of liquid waste from Steel plants- Fertilizers- Textiles- Paper and Pulp industries- Oil Refineries- Brewery Industries- Coal and Gas based Power Plants.

UNIT – VI PROCESS AND TREATMENT OF SPECIFIC INDUSTRIES-2: Manufacturing Process and origin- characteristics- effects and treatment methods of liquid waste from Tanneries- Sugar Mills- Distillers- Dairy and Food Processing industries- Pharmaceutical Plants.

TEXT BOOKS:

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

REFERENCES:

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

IV B.TECH II- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	3
PRE-FABRICATED STRUCTURES							

COURSE OBJECTIVES

- After completing the course- student will get the knowledge about the main processes of building constructions using prefabricated technology.
- In particular- will have knowledge regarding the types of prefabricated buildings (flat houses) construction- and will know the classification of these type of buildings.
- Furthermore- student will also know the basic types of construction of prefabricated reinforced concrete- timber and steel structures (skeleton systems).
- He will have a basic knowledge of building technology applied in bridge structures using prefabricated technology (cantilever- methods of prestressing reinforcement)- and construction of underground structures using prefabrication (secondary segmental lining).
- The knowledge of types and technology of construction of wood-frame buildings will be the expected results also.

COURSE OUTCOMES

- The student shall be able to design the prefabricated elements and also have the knowledge of the construction methods in using these elements.
- The student shall be able to know about the applications of prefabricated elements for the civil engineering structures
- To successfully complete the exercising part of course- each student has to develop their own reports describing real-time usage of prefabricated structure according to their own choice.

UNIT I INTRODUCTION- Need for prefabrication - Principles - Materials - Modular co-ordination – Standardization – Systems Production – Transportation – Erection Disuniting of Structures.

UNIT II PREFABRICATED COMPONENTS- Behaviour of structural components – Large panel constructions – Construction of roof- floor slabs and Wall panels – Columns – Shear walls.

UNIT III DESIGN PRINCIPLES- Design of Structural components – Beam- Column and Corbel - Stress limitations – Handling without cracking- handling with controlled cracking – Design for stripping forces.

UNIT IV JOINTS IN STRUCTURAL MEMBERS- Joints for different structural connections – Beam to Column- Beam to Beam- Column to Column- Column to Foundation- Connections between wall panels- Connections between floor panels - Dimensions and detailing – Design of expansion joints- Jointing Materials.

UNIT V TOTAL PREFABRICATED BUILDINGS- Prefabricated units for Industrial structures- Multi-storied buildings and Water tanks etc.--Application of pre stressed concrete in prefabrication.

UNIT VI DESIGN FOR EARTHQUAKES AND CYCLONES- Progressive collapse – Codal provisions – Equivalent design loads for considering abnormal effects such as earthquakes-cyclones etc. - Importance of avoidance of progressive collapse.

TEXTBOOKS:

1. Koncz T.- Manual of Precast Concrete Construction- Vols. I- II and III- Bauverlag- GMBH- 1971.
2. Structural Design Manual- Precast Concrete Connection Details- Society for the Studies in the Use of Precast Concrete- Netherland Betor Verlag- 1978.
3. Haas. A.M.- Precast Concrete Design and Applications-CRC Press-1983.
4. PCI Manual for Structural Design of Architectural Precast Concrete- PCI Publication number MNL-121-77-1977.
5. M.Levitt- -Precast Concrete Material- Manufacture- Properties and Usagell Applied Science Publishers Ltd.- 1982.
6. A.S.G. Bruggeling and G.F.Huyghe- Prefabrication with concrete- Netherlands: A.A. Balkema Publishers- 1991.
7. Lasslo Mokka- -Prefabricated Concrete for Industrial and Public Structures Budapest Budapest-Akadémiai Kiadó-publishers- 1964

REFERENCES:

1. Building Materials and Components- CBRI- India- 1990.
2. Glover C.W- Structural Precast Concrete- Asia Publishing House- 1965
3. PCI Design Hand Book- 6th Edition- 2004.
3. Promyslov- V. (1998)- Design and Erection of Reinforced concrete structures- MIR Publishers- Moscow.
4. Levit- M.- (2000)- Precast concrete materials- Manufacture properties and usage- Applied Science Publishers- London.

E-LEARNING RESOURCES:

<http://nptel.ac.in/courses.php>

<http://jntuk-coeerd.in/>

IV B.TECH II- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	0	40	60	100	3
DESIGN AND DRAWING OF HYDRAULIC STRUCTURES							

COURSE OBJECTIVES:

This course will enable students:

- Familiarize Students with different types of design philosophies.
- Equip student with concepts of design of hydraulic structures.
- Understand Concepts of design discharge- silt velocity- and structural stability.
- Familiarize students with different types of aqueducts and weir.
- Understand different components of the hydraulic structures and their design.

COURSE OUTCOMES:

- Work on different types of design philosophies.
- Carryout analysis and design of tank sluice and glacis weir.
- Design different types of aqueducts and surplus weir.
- Design of fall and canal regulator.

Design and drawing of the following hydraulic structures:-

- Sloping glacis weir.
- Tank sluice with tower head
- Type III Syphon aqueduct.
- Surplus weir.
- Trapezoidal notch fall.
- Canal regulator.

FINAL EXAMINATION PATTERN: Any two questions of the above six designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

TEXT BOOKS:

1. Design of minor irrigation and canal structures by C.Satyanarayana Murthy- Wiley eastern Ltd.

REFERENCE:

1. Irrigation engineering and Hydraulic structures by S.K.Garg- Standard B k H use.

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

COURSE LEARNING OBJECTIVES:

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

COURSE OUTCOMES:

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

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

UNIT-I

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

UNIT-II

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

UNIT-III

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

UNIT-IV

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

UNIT-V

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

UNIT-VI

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

TEXT BOOKS

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

REFERENCES:

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

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

COURSE OBJECTIVES:

- To understand components of reinforced soil
- To design reinforced earth structure.
- To understand design of reinforcement.
- To understand soil nailing and geosynthetics.

COURSE OUTCOMES:

At the end of course the student will be able to

- understand components of reinforced soil
- Find reinforced earth structure-
- Design the reinforced earth structure-
- Use the soil nailing techniques-
- Apply geo-synthetics.
- Use the fiber reinforced soil

UNIT-I BASIC COMPONENTS OF REINFORCED SOIL:

Introduction- General- basic mechanism of reinforced earth. Soil or fill-metric- reinforcement bars- Metallic strips- Metallic grids- Facing Elements- concrete panel facing etc.

UNIT-II REINFORCED EARTH CONSTRUCTIONS:

Introduction- Historical background- Principles of reinforced earth- Effect of reinforcement of soil. Mechanism of reinforced earth- Anchors- Tiebacks- Economic advantage of reinforced earth structure over similar structures.

UNIT-III DESIGN OF REINFORCED EARTH STRUCTURE:

Introduction- Internal and overall stability- Reinforced earth dams- slopes- Reinforced Earth foundation- typical design of retaining walls and embankments.

UNIT-IV SOIL NAILING TECHNIQUES:

Introduction- Advantages & limitations of soil nailing techniques- comparison of soil nailing with reinforced soil- methods of soil nailing- -construction sequence components of system- design aspects.

UNIT-V GEOSYNTHETICS:

Introduction and overview. Historical developments- recent developments. Classification based on materials. Geosynthetics – geotextiles- geogrids- geo membranes- geo composites- geonets and other products- geomats- geomeshes- geowebbs etc.

UNIT-VI FIBER REINFORCED SOIL:

General- soil stabilization- reinforced soil- soil nailing- texsol- ply soil- comparison of ply soil with reinforced soil and soil nailing- types of fibers – synthetic fibers- natural fibers- plant roots- direction of placements.

TEXT BOOKS:

1. Basic & Applied soil mechanics – Gopal Ranjan & ASR Rao- New Age International Publishers- 2011.
2. Embankment Dams by Sharma Hd- Publisher: India Book House(IBH) Limited-1991
3. Engineering for Embankment Dams By B. Singh & R. S. Varshney- A Balkema Publishers- 1995

REFERENCE BOOKS:

1. Foundation design by W. C. Teng- Prentice Hall-1962
2. Analysis and design of foundations by Bowles. J. W McGraw Hill- 4th edition- 1955.
3. Earth and Rock-Fill Dams: General Design and Construction Considerations by United States Army Corps of Engineers- University Press of the Pacific-2004
4. Soil mechanics in engineering and practice by Karl Terzaghi- Ralph B. Peck- Gholamreza Mesri-3rd Edition. Wiley India Pvt Ltd-2010.

E-LEARNING RESOURCES: NPTEL

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

COURSE LEARNING OBJECTIVES

- To learn various procedures for travel demand estimation .
- To various data collection techniques for OD data.
- To know various models and techniques for trip generation- trip distribution- mode choice and traffic assignment.
- To develop alternative urban transport network plans.

COURSE OUTCOMES:

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

- Identify urban transportation problems.
- Estimate urban travel demand.
- Plan urban transport networks.
- Identify urban transport corridors.
- Prepare urban transportation plans

UNIT I: URBAN TRANSPORTATION PROBLEM:

Urban Issues- Travel Characteristics- Evolution of Planning Process- Supply and Demand – Systems approach

UNIT II: TRAVEL DEMAND:

Trends- Overall Planning process- Long term Vs Short term planning- Demand Function- Independent Variables- Travel Attributes- Assumptions in Demand Estimation- Sequential- and Simultaneous Approaches- Aggregate and Disaggregate Techniques.

UNIT III: DATA COLLECTION & INVENTORIES:

Collection of data – Organisation of surveys and Analysis- Study Area- Zoning- Types and Sources of Data- Road Side Interviews- Home Interview Surveys- Commercial Vehicle Surveys- Sampling Techniques- Expansion Factors- Accuracy Checks- Use of Secondary Sources- Economic data –Income – Population – Employment – Vehicle ownership

UNIT IV: FOUR STAGE DEMAND FORECASTINGTRIP GENERATION ANALYSIS:

Zonal Models- Category Analysis- Household Models- Trip Attraction models- Commercial Trip Rates. Trip Distribution: Growth Factor Methods- Gravity Models- Opportunity Models- Time Function Iteration Models. Mode Choice **Analysis:** Mode Choice Behavior- Competing Modes- Mode Split Curves- Models and Probabilistic Approaches. Mode Choice Analysis: Mode Choice Behavior- Competing Modes- Traffic Assignment

UNIT V: TRAFFIC CORRIDORS AND FRIGHT TRAVEL DEMAND:

Master plans- Selection of Corridor- Corridor Identification- Corridor deficiency Analysis- Freight Characteristics- and Factors influencing Freight Travel- Freight Demand Estimation- and Fright flow on the network

UNIT VI: PLAN PREPARATION & EVALUATION:

Travel Forecasts to Evaluate Alternative Improvements- Impacts of New Development on Transportation Facilities. Pivot Point Analysis- Environmental and Energy Analysis.

TEXTBOOKS:

1. Bruton- M. J.- An Introduction to Transportation Planning (The Living Environment)- UCL Press- London- UK- 2000.

REFERENCES:

- 1.C.J. Khisty and B. Kent Lall- Transportation Engineering- Prentice Hall of India Pvt. Ltd.- 2002.C.S. Papacostas and P.D. Prevedouros-
2. C.S. Papacostas and P.D. Prevedouros- Transportation Engineering and Planning- Prentice Hall of India Pvt. Ltd.- 2001.

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

COURSE OBJECTIVES

- Introduce the fundamentals of GIS
- Introduce the types and clearing techniques of the errors in Spatial data
- Understand the methods to analyse the data from different sources
- Learn how to identify and solve the problems with the GIS

COURSE OUTCOMES

- To Know the fundamentals of GIS
- Should be able to identify and clear the errors in Spatial data
- Should be able to analyse the data from different sources
- Individual should be able to identify and solve the problems with the GIS

UNIT-I: FUNDAMENTALS OF GIS: a) Introduction to GIS- GIS components and function of GIS: hardware software requirement of GIS- data types and spatial data models- idea of conceptual- logical and physical models

- c) Definition of a map Geographic data in the computer. File and data processing- data base structures: Raster data structure and Vector data structures for geographical entities

UNIT-II DATA INPUT AND QUALITY VERIFICATION: a) Data input- data verification- and correction and storage data output- data user interfaces.

b) **DATA QUALITY- ERRORS AND NATURAL VARIATION:** Sources of error- Errors resulting from natural variation of from original measurements. Errors arising through processing- problem- and errors arising from overlay and boundary intersections. Combining attributes from overlaid maps.

UNIT-III DEM & MAP PROJECTIONS A) DIGITAL ELEVATION MODELS: The need of DEMs- methods of representing DEMs. Image methods- data sources and sampling methods for DEMs. Products that can be derived from a DEM. Automated landform delineation from DEMs.

- c) **MAP PROJECTIONS IN GIS:** Types and Utilities.

UNIT-IV DATA ANALYSIS A) VECTOR & RASTER BASED ANALYSIS: Attribute data analysis- Integrated spatial and attribute data analysis: Single and multi-layer raster and vector analysis- map overlay- spatial join- buffering analysis- network analysis

RASTER DATA ANALYSIS: Local- Neighbourhood and regional operations. b) Methods of Data Analysis and Spatial Modeling: Introduction- definition of the database. Simple data retrieval.

UNIT-V

Cartographic modeling using natural language commands. advantages and disadvantages of cartographic modeling in land evaluation and planning- Methods of Spatial interpolation: global methods of interpolation- location interpolators. Comparing krigging with other interpolation techniques. Choosing a Geographic Information System. Designing the needs for GIS.

UNIT-VI TECHNOLOGICAL TRENDS IN GIS A) TOOLS FOR MAP ANALYSIS: SINGLE maps- Map reclassification- operations and attribute tables- spatial topological and geometric modeling and operations on spatial Neighborhood. Tools for map Analysis: Map pairs- map overlay and map modeling correlation between two maps. Tools for map analysis: Multiple

maps- types of models- Boolean logic models- Index overlay models- Fuzzy logic methods. GIS and decision support system- over view of Internet GIS- Location based services.

TEXT BOOKS:

1. Principles of Geographical Information System for Land Resource Assessment- P.A. Burrough- Clarendon Press- Oxford- 1986.
2. Geographic Information Systems- T.R. Smith & Piqent- London Press- 1985.

REFERENCES:

1. Principles of data base systems- J.D. Ullman- Computer Science Press.
2. Longly- Paul A.- Goodchild- Michael F.- Maguire- David J.- and David W. Rhind.(2005) Geographic Information System and Science- @nd ed.- John Wiley and sons- Toronto.
- 5.Marguerite- Maddm- (2009). Manual of Geographic Information system- ASPRS- 2009

IV B.TECH II- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	3	1	-	40	60	100	3
WATER RESOURCES ENGINEERING							

COURSE OBJECTIVES

- Understand the basic concepts of the water resources structures.
- Realize and evaluate the problems and potential methods of solution for the regional water shortages- determining water storage capacities of the reservoirs of any scale.
- Know the details and the aim of construction of different type of the dams and be able to follow the basic design calculations.
- Recognize safety valves of the dams- spillways- their types- aim of construction- design and understand the energy dissipation systems at the downstream end

COURSE OUTCOMES

- students to know various components of hydrologic cycle that affect the movement of water in the earth
- students to know various sources of the water
- the concepts of movement of ground water beneath the earth
- distribution of water through the canal& head works- dams and reservoirs head works and the basics of design of unlined and lined irrigation canals design
- basic components of diversion and impounding structures
- Apply math- science- and technology in the field of water resource Engineering

UNIT I SOURCES OF WATER: Public water supply system – Planning- Objectives- Design period- Population forecasting- Water demand – Sources of water and their characteristics- Surface and Groundwater – Impounding Reservoir – Development and selection of source – Source Water quality – Characterization – Significance – Drinking Water quality standards

UNIT II RUNOFF: Watershed- catchment and basin - Catchment characteristics - factors affecting runoff - Runoff estimation using empirical - Strange's table and SCS methods – Stage discharge relationships flow measurements- Hydrograph

UNIT III FLOOD AND DROUGHT: Natural Disasters-Flood Estimation- Frequency analysis-Flood control- Definitions of droughts- Meteorological- hydrological and agricultural droughts- IMD method-NDVI analysis- Drought Prone Area Programme (DPAP)

UNIT IV CANALS : Distribution systems for canal irrigation- canal capacity- canal losses- alignment of main and distributary canals- most efficient section- lined canals- their design- regime theory- critical shear stress- bed load- local and suspended load transport- cost analysis of lined and unlined canals- drainage behind lining.

UNIT V RESERVOIRS - Classification of reservoirs- General principles of design- site selection- spillways- elevation – area - capacity - storage estimation- sedimentation - life of reservoirs – rule curve

UNIT VI DIVERSION AND IMPOUNDING STRUCTURES: Head works –Weirs and Barrages –Types of impounding structures - Factors affecting- location of dams -Forces on a dam -Design of Gravity dams- Earth dams- Arch dams – Spillways -Energy dissipaters.

TEXT BOOKS

1. Subramanya .K. Engineering Hydrology- Tata McGraw Hill- 2013.
2. Raghunath H.M.- Ground Water Hydrology- New Age International (P) Limited- New Delhi- 2010.
3. Todd D.K.- Ground Water Hydrology- John Wiley and Sons- New York- 2000.

REFERENCES:

1. David Keith Todd. Groundwater Hydrology- John Wiley & Sons- Inc. 2007
2. Ven Te Chow- Maidment- D.R. and Mays- L.W. Applied Hydrology- McGraw Hill International Book Company- 2010.
3. Raghunath .H.M.- Hydrology- Wiley Eastern Ltd.- 2004 PTAI7002 INTEGRATED WATER RESOURCES MANAG
4. Fitts R Charles. Ground water Science. Elsevier- Academic Press- 2002.
5. Ramakrishnan- S- Ground Water- K.J. Graph arts- Chennai- 1998.

E-LEARNING RESOURCES:

<http://nptel.ac.in/courses.php>

<http://jntuk-coeerd.in/>

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

COURSE OBJECTIVES:

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

COURSE LEARNING OUTCOMES

- Prepare EMP- EIS- and EIA report
- Identify the risks and impacts of a project
- Selection of an appropriate EIA methodology
- Evaluation the EIA report
- Estimate the cost benefit ratio of a project
- Know the role of stakeholder and public hearing in the preparation of EIA

UNIT – I BASIC CONCEPTS OF EIA: Initial Environmental Examination- Elements of EIA- Factors affecting EIA- Impact evaluation and analysis- Preparation of Environmental Base map- Classification of Environmental parameters.

UNIT – II EIA METHODOLOGIES: Introduction- criteria for the selection of EIA Methodology- EIA Methods: Ad-hoc methods- Matrix methods- Network method- Environmental media quality index method- Overlay methods- Cost/benefit Analysis.

UNIT-III IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE: Introduction and Methodology for the Assessment of soil and ground water- Delineation of study area- Identification of activities.

PROCUREMENT OF RELEVANT SOIL QUALITY- Impact prediction- Assessment of Impact significance-Identification and Incorporation of mitigation measures.

UNIT – IV EIA IN SURFACE WATER- AIR AND BIOLOGICAL ENVIRONMENT: Methodology for the assessment of Impacts on surface water environment- Air pollution sources- generalized approach for assessment of Air pollution Impact.

UNIT – V ASSESSMENT OF IMPACT OF DEVELOPMENT ACTIVITIES ON VEGETATION AND WILDLIFE- Environmental Impact of Deforestation- Causes and effects of deforestation.

ENVIRONMENTAL AUDIT AND ENVIRONMENTAL LEGISLATION: Objectives of Environmental Audit- Types of Environmental Audit- audit protocol- stages of Environmental Audit- On-site activities- Evaluation of Audit data and preparation of Audit report.

UNIT-VI

POST AUDIT ACTIVITIES: The Environmental Pollution Act- The Water Act- The Air (Prevention and Control of Pollution) Act- Mota Act- Wild life Act Case Studies and preparation of Environmental Impact Assessment statement for various Industries.

TEXT BOOKS:

1. Environmental Science and Engineering by Suresh K. Dhameja- S.K. Kataria & Sons Publications- New Delhi.
2. Environmental Pollution and Control by Dr. H.S. Bhatia- Galgotia Publications Pvt. Ltd. Delhi
3. Environmental Impact Assessment- Canter Larry W.-McGraw-Hill education Edi (1996)
4. Environmental Impact Assessment Methodologies- by Y. Anjaneyulu- B.S. Publication- Sultan Bazar- Hyderabad.

REFERENCES:

1. Environmental Science and Engineering- by J. Glynn and Gary W.Hein Ke – Prentice Hall Publishers.
 2. Environmental Science and Engineering- by Suresh K. Dhaneja – S.K. Katania & Sons Publication- New Delhi.
 3. Environmental Pollution and Control- by Dr H.S. Bhatia – Galgotia Publication (P) Ltd.- Delhi.
- *

IV B.TECH II- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	-	80	120	200	10
PROJECT WORK							

THE MAIN OBJECTIVE OF THE PROJECT WORK IS

- To enable the student apply engineering knowledge that has been taught all through the Programme for solving practical engineering problem.
- To enable the student capable for problem solving/problem shooting.
- To instill and inculcate team spirit/team work in to the minds of the students.
- To enable /train the students report making/documentation.
- To provide students an opportunity to use any Civil Engineering software for their project work.

OUTCOMES OF THE PROJECT WORK.

- Up on completion of the project work, the student will be able to
- Apply all levels of engineering knowledge in solving the engineering problems
- Work together with team spirit.
- Use civil engineering software at least one.
- Document the projects.

IV B.TECH II- SEMESTER	L	T	P	INTERNAL MARKS	EXTERNAL MARKS	TOTAL MARKS	CREDITS
	-	-	-	40	60	100	3
PRACTICAL TRAINING /INTERNSHIP							

- CO .1 To learn the application of knowledge in real world problems.
 CO .2 To get exposure to team work and leadership quality.
 CO .3 To deal with industry-professionals and ethical issues in the work environment.
 CO .4 Ability to integrate existing and new technical knowledge for industrial application.

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.