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ACADEMIC REGULATIONS
COURSE STRUCTURE
AND DETAILED SYLLABUS

CIVIL ENGINEERING

B.TECH. FOUR YEAR DEGREE COURSE
(Applicable for the batches admitted from 2012-13)

LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING
L.B.Reddy Nagar :: MYLAVARAM – 521 230 :: Krishna District
Andhra Pradesh State

ACADEMIC REGULATIONS FOR AUTONOMOUS STREAM
(2012-2013 Batch)

(Common to all branches)
INDEX

1. INTRODUCTION

Academic Programmes of the institute are governed by rules and regulations approved by the Academic Council, which is the highest Academic body of the Institute. These academic rules and regulations are applicable to the students admitted during academic year 2010-11 into first year of four year undergraduate programme offered by the college leading to Bachelor of Technology (B.Tech) degree in the disciplines viz., Computer Science and Engineering, Electronics and Communication Engineering, Electrical and Electronics Engineering, Electronics and Instrumentation Engineering, Information Technology, Mechanical Engineering .

1.1 Lakireddy Balireddy College of Engineering, Mylavaram, an autonomous institution, follows Semester pattern for all four years of its undergraduate B.Tech programmes with internal and external evaluation.

1.2 **Semester Pattern** :Each academic year shall be divided into two semesters, each of 20 week duration, including instruction, evaluation, etc. Each semester consists of a minimum of 90 instruction days with at least 35 to 40 contact periods per week.

2. PROGRAMMES OFFERED (UNDER GRADUATE)

Presently, the college is offering Under Graduate Programmes in the following disciplines:

- Aero Space Engineering (AE)
- Civil Engineering(CE)
- Computer Science and Engineering (CS)
- Electronics and communication Engineering (EC)
- Electrical and Electronics Engineering (EE)
- Electronics and instrumentation Engineering (EI)
- Information Technology (IT)
- Mechanical Engineering (ME)

3. ELIGIBILITY CRITERIA FOR ADMISSION

* The eligibility criteria for admission into 1st year B.Tech programme shall be as mentioned below:
* Admissions in each programme in the Institution are classified into **CATEGORY - A** (70% of intake) and **CATEGORY- B** (30% of intake).

3.1 CATEGORY – A SEATS:

* The candidate shall be of Indian National

* The candidate should have completed 16 years of age as on 31st December of the Academic year for which the admissions are being conducted.

* The candidate should have passed the qualifying examination (10+2) or equivalent on the date of his/her counseling for admission and secured the rank at the Common Entrance Test conducted by the State and also satisfy other conditions laid down in the G.O.s.

* The candidate should satisfy Local/Non-Local status requirement as laid down in the Andhra Pradesh Educational Institutions (Regulation of Admissions) Order, 1974 as subsequently amended.

3.2.1 CATEGORY - B SEATS:

* The candidate shall be of Indian National or a Non-Resident Indian.

* The candidate should have completed 16 years of age as on 31st December of the Academic year for which the admissions are being conducted.

* Category B Seats shall be thrown open for admission to all the eligible candidates on the basis of merit from within the state, other states, Union territories and NRI/NRI sponsored candidates

* Out of the 30% quota of Category B Seats, seats not exceeding 15% of the sanctioned intake in each course shall be filled on merit basis with NRI/NRI sponsored candidates (vide G.O.Ms.140 HE Dept Dt:31.07.08), who have passed qualifying examination with not less than 50% of aggregate marks or Cumulative Grade Point Average (CGPA) equivalent to 5 on a scale of 10.

* The remaining 15% of seats and the leftover seats after filling NRI/NRI sponsored candidates shall be filled with candidates from within state as per the merit order (EAMCET/AIEEE) interpreted by a Division Bench of Hon'ble High Court of AP in W.P. No.17385/2009 dt.:18-09-2009, which is put on website. Only thereafter if any still remain unfilled the colleges can fall back upon the option of filling up such vacant seats with candidates who have qualified at the qualifying examination.

3.3 CATEGORY: LATERAL ENTRY

* The candidates should have passed the qualifying exam.(B.Sc. graduation & Diploma holders) shall be admitted into the II nd year Ist semester directly, based on the rank secured by the candidate at Engineering Common Entrance Test (ECET (FDH)) in accordance with the instructions received from the Convener, ECET and Government of Andhra Pradesh.
  The candidate shall also satisfy any other eligibility requirements stipulated by the JNT University and / or the Government of Andhra Pradesh from time to time.

4. AWARD OF B.TECH DEGREE

A student will be declared eligible for the award of the B.Tech. by JNTUK Degree if he/she fulfills the following academic regulations:

(i) Pursued a course of study for not less than four academic years and not more than eight academic years.

(ii) Registered for 220 credits and secured 212 credits with specified compulsory subjects

COMPULSORY SUBJECTS

S.No.	Specified Particulars
1.	All the first year subjects
2.	All Practical Subjects
3.	Internship
4.	Comprehensive viva-voce
5.	Seminar
6.	Project Work
7.	Mini Project

5. DURATION OF THE PROGRAMME

Students, who fail to fulfil all the academic requirements for the award of the degree within minimum of eight academic years shall forfeit their seat in B.Tech course**.**

6. SEMESTER –WISE DISTRIBUTION OF CREDITS

TABLE .1 SEMESTER-WISE CREDITS DISTRIBUTION

SEMESTER	CSE	IT	ECE	EIE	EEE	ME	AE	CE
I	25	25	25	24	25	25	25	24
II	27	27	27	28	27	27	27	27
III	28	28	29	29	29	28	28	29
IV	30	30	29	29	29	30	30	29
V	30	28	31	31	31	27	27	29
VI	28	30	28	28	28	31	31	29
VII	32	32	31	31	31	32	32	31
VII	20	20	20	20	20	20	20	22
TOTAL	**220**	**220**	**220**	**220**	**220**	**220**	**220**	**220**

(i) There shall be an internship of four weeks duration (summer vacation) in an industry/ top academic institutes or R & D centers of excellence at the end of the VI semester.

(ii) The internships shall be supervised by a competent faculty member of the institute who in turn shall be in touch with the respective division head of the industry. The internships are compulsory and are credit based.

(iii) All the seminars, Term Paper and mini projects are credit based

7. DISTRIBUTION AND WEIGHTAGE OF MARKS:

(i) In each semester the course of study consists of 5 theory subjects + 3 laboratories or 6 theory subjects + 2 laboratories. However, in the **VIIIsemester** there shall be only 3 theory subjects in addition to the project work and comprehensive viva-voce.

(ii) The performance of a student in each semester shall be evaluated subject wise with a maximum of 100 marks for theory and 100 marks for practical subject. In addition, internship, seminar, Term Paper, Project work and Comprehensive Viva-Voce shall be evaluated for 50, 50,50, 200 and 100 marks respectively.

(iii) For each theory subject the distribution shall be 25 (20+5 marks for attendance) marks for Internal Evaluation and 75 marks for the end semester examination.

(iv) For each theory subject, during each semester there shall be 2 tests, for duration of 90 minutes. One descriptive test to be conducted in 1 – 2 units and the second test are conducted in 3 – 5 units thereby. However,75% weightage for the **best** and 25% for the other first test shall be considered for awarding sessional marks

(v) The question paper for internal examinations shall contain 3 questions and each question consists of internal choice.

(vi) For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks (10 marks for day-to-day work,10 marks for Internal test and 5 marks for attendance) and 75 end examination marks. The end examination shall be conducted by the teacher concerned and another external member.

(vii) For the subject having design and / or drawing (such as Engineering Graphics, machine Drawing), and estimation, the distribution shall be 25 marks for internal evaluation (10 marks for day-to-day work,10 marks for Internal tests and 5 marks for attendance) and 75 marks for end examination. There shall be one internal test in a Semester.

(viii) All project works / internships / mini projects shall be evaluated by the committee. The committee consists of, head of the department, the supervisor of mini project and a senior faculty member of the department along with duly approved / recognized external examiner.

(ix) There shall be seminars in the III semester and V semester and Term Paper in VII semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department, which shall be evaluated by the Department committee consisting of Head of the department, seminar supervisor and a senior faculty member. The Term Paper / Seminar report shall be evaluated for 50 marks.

(x) Out of a total 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination. The internal Evaluation shall be on the basis of two seminars given by each student on the topic of his project. The End Semester Evaluation (viva-voce) shall be conducted by the same committee appointed for internship evaluation. The topics for mini project, seminar and project work shall be different from each other. The topic for Term Paper and Project work can be same. The evaluation of project work shall be conducted at the end of the VIII Semester.

(xi) The comprehensive viva shall be conducted for 100 marks both in VI semester and VIII Semesters. The comprehensive viva shall be evaluated in the topics covering the core aspects of the subject in which the candidate is likely to graduate.

8. ATTENDANCE REGULATIONS AND CONDONATION:

(i) A student shall be eligible to appear for end semester examinations, if acquired a minimum of 75% of attendance in aggregate of all the subjects.

(ii) Condonation of shortage of attendance in aggregate up to 10% on medical grounds (65% and above and below 75%) in each semester may be granted by the College Academic Committee. However, the subject of granting is purely at the discretion of the College Academic Committee or competent authority.

(iii) A Student will not be promoted to the next semester unless he satisfies the attendance requirement of the present semester as applicable. They may seek re-admission for that semester as and when offered next.

(iv) Due weightage in each of the subjects shall be given to the attendance. Marks not exceeding 5 shall be given to all such candidates who satisfies the following criteria

% of attendance	Marks
>= 90	5
85 to <90	4
80 to < 85	3
>75 to < 80	2
=75	1

(v) Shortage of Attendance below 65% in aggregate shall in no case be condoned.

(vi) Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examination of that particular semester and their registration for examination shall stands cancelled.

(vii) A stipulated fee shall be payable towards condonation of shortage of attendance.

(viii) Attendance may also be condoned for those who participate in prestigious sports, co- and extracurricular activities provided their attendance is in the minimum prescribed range for the purpose and recommended by the concerned authority.

9. MINIMUM ACADEMIC REQUIREMENTS:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.8.

(i) A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory or practical design or drawing subject or project if he/she secures not less than a minimum of 40% of marks exclusively at the end semester examinations in each of the subjects in which candidate had appeared. However, the candidate should have secured minimum of 40% marks in both external and internal components put together to be eligible for passing in the subject.

(ii) A student will be promoted to next semester, if he satisfies the minimum attendance requirement.

(iii) Only such candidates who had completed their II Semester to III Semester of study and had obtained at least 40 credits (50% of the total credits up to III Semester) are eligible to study V Semester.

(iv) To be eligible to study VII Semester, the candidate should have secured a minimum of 68 credits (50% of the total credits up to V Semester).

(v) There shall be supplementary examinations along with the regular even semester examinations enabling the students to give a fair chance to appear in the subject if failed any.

(vi) However, an advanced supplementary examination shall be conducted for all such students who had failed in only one subject at the VII Semester of their study. Such an examination is applicable only for those students pursuing VIII semester.

(vii) Students who fail to earn 212 credits as indicated in the course structure including compulsory subjects as indicated in table – I within eight academic years from the year of their admission shall forfeit their seat in B.Tech course and their admission shall stand cancelled.

(viii) The examination Committee shall approve application of promotion rules as specified above under clauses (iii) and (iv) for each academic batch.

10. COURSE PATTERN:

(i) The entire course of study is of four academic years. Each academic year shall have two semesters

(ii) A Student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject as and when conducted.

(iii) All admitted students' are to study 4 electives during their course of four year study at the institute. The following shall be the programme of study of electives.

Year	Semester	No. of electives
3	2	1
4	1	1
4	2	2

(iv) During the VIII semester, it is mandatory that departments offer 3 theory subjects and a comprehensive viva (covering all core subjects of engg) along with project work

(v) When a student is detained due to lack of credits / shortage of attendance, he may be re-admitted when the semester is offered after fulfillment of academic regulations. Whereas the academic regulations hold good with the regulations he/she first admitted.

11. AWARD OF GRADE:

After a student has satisfied the requirement prescribed for the award of B.Tech. Degree, he/she shall be placed in one of the following four grades. The award of the degree is based on CGPA on a grade point of scale 4. The grade points are awarded as follows:

CGPA	Award Division
>=3	First Class with Distinction
>=2.4 and <3	First division
>2 and <2.4	Second division
>=1.6 and < 2	Pass division
< 1.6	Fail

Based on the performance of the candidate, the following shall be the criteria for the award of letter grades at the end of each semester in the subjects in which the candidate appeared for the examination

Percentage of Marks Scored	Letter Grades	Grade points
>=90	S	4.00
>=85 to<90	A^+	3.67
>=80 and <85	A	3.33
>=75 and <80	B^+	3.00
>=70 and <75	B	2.67
>=65 and <70	C^+	2.33
>=60 and <65	C	2.00
>=55 and <60	D^+	1.67
>=50 and <55	D	1.33
>=40 and <50	E	1.00
<40	F	0

11.1 Calculation of Grade Points Average (GPA)* for semester

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

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

Where **CR**= Credits of a course
GP = Grade points awarded for a course
* **GPA** is calculated for the candidates who passed all the courses in that year/semester.

11.2 Calculation of Cumulative Grade Point Average (CGPA) for Entire Programme.

The CGPA is calculated as below:

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

(for entire programme)

Where **CR**= Credits of a course
GP = Grade points awarded for a course

12. MINIMUM INSTRUCTION DAYS:

The minimum instruction for each semester shall be 90 instruction days excluding examination days.

13. GENERAL:

(a) Where the words ''he'' ''him'' ''his'', occur in the regulations, they include ''she'', ''her''.

(b) The academic regulation should be read as a whole for the purpose of any interpretation.

(c) In the case of any douCS or ambiguity in the interpretation of the above rules, the decision of the Director is final.

(d) The Institute may change or amend the academic regulations or syllabi at any time duly approved by Academic council and the changes or amendments made shall be applicable to all the students with effect from the dates notified by the Institute.

14. CHANGE OF BRANCH

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

15. TRANSITORY REGULATIONS

A candidate, who is detained or discontinued in the semester, on readmission shall be required to do all the courses in the curriculum prescribed for such batch of students in which the student joins subsequently. However, exemption will be given to those candidates who have already passed in such courses, which he/she had passed in the earlier semester(s) he/she was originally admitted into.

15.1 A student who is following the JNTU, Kakinada curriculum, detained due to lack of academics/attendance at the end of the first semester of second year, shall join the autonomous batch of III Semester. Such students will study all the courses prescribed for that batch, in which the student joins. The first year marks shall not be converted in to course credits. However, the student has to clear all his first year backlog subjects by appearing the supplementary examinations, conducted by JNTU, Kakinada and courses prescribed in Autonomous stream for the award of Degree. The class will be awarded based on the academic performance of a student. Such candidates will be considered on par with lateral entry candidates of autonomous stream and will be governed by the regulations applicable to lateral entry candidates category.

15.2 A student who is following the JNTU, Kakinada curriculum, detained due to lack of academics/attendance at the end of the second semester of second year and also at the subsequent semesters, shall join with the autonomous batch at the appropriate semester. Such candidates shall be required to pass in all the courses in the programme prescribed by concerned BOS for such batch of students, to be eligible for the award of degree. However, exemption will be given in all those courses of the semester(s) of the batch, which the candidate joins now, which he/she had passed earlier. The student has to clear all his backlog subjects by appearing the supplementary examinations, conducted by JNTU, Kakinada and College(Autonomous stream) for the award of Degree. The class will be awarded based on the academic performance of a student in the autonomous Pattern.

16. COURSE CODE AND COURSE NUMBERING SCHEME

All the subjects of all the branches are grouped as one pool of subjects. Each theory (o)r Laboratory Course was assigned an unique Number. Theory Subject Code will start with letter 'T' and other than theory subject will start with Letter ' P'.

17. MEDIUM OF INSTRUCTION

The medium of instruction and evaluation is English.

18. AMENDMENTS TO REGULATIONS

The Academic council from time to time may revise, amend, or change the regulations, schemes of examinations, and/or syllabi.

19. ACADEMIC REGULATIONS FOR B.TECH (LATERAL ENTRY SCHEME)

(i) The students have to acquire 168 credits from III Semester to VIII Semester of B.Tech Programme (Regular) for the award of the degree

(ii) Students, who fail to fulfill the requirement for the award of the degree in 7 consecutive academic years from the year of admission, shall forfeit their seat.

(iii) The same attendance regulations are to be adopted as that of B.Tech (Regular)

19.1 Rules For Promotion into Next Higher Class: (VI Semester to VII Semester)
A student shall be promoted from VI Semester to VII Semester only if he fulfills the academic requirements of 42 credits up to V semester.

19.2. Award of Grade in each semester:

After a student has satisfied the requirement prescribed for the completion of the programme and is eligible for the award of B.Tech. Degree he shall be placed in one of the following four classes:

Based on the performance of every candidate, the following shall be the criteria for the award of grades at the end of each semester.

Percentage of Marks Scored	Letter Grades	Grade points
>=90	S	4.00
>=85 to<90	A^+	3.67
>=80 and <85	A	3.33
>=75 and <80	B^+	3.00
>=70 and <75	B	2.67
>=65 and <70	C^+	2.33
>=60 and <65	C	2.00
>=55 and <60	D^+	1.67
>=50 and <55	D	1.33
>=40 and <50	E	1.00
<40	F	0

Passed on the aggregate marks secured for the best 161Credits (Lateral Entry).
The aggregate marks secured for 168 Credits. (i.e. III Semester to VIII Semester)

20. GRADE CARD

The grade card issued shall contain the following:
a) The credits for each course offered for that semester
b) The letter grade oCSained in each course
c) The SGPA/CGPA
d) Total number of credits earned by the student up to the end of that semester

21. CONDUCT AND DISCIPLINE

(a) Students shall conduct themselves within and outside the premises of the Institute in a manner befitting the students of our Institution.

(b) As per the order of Honorable Supreme Court of India, ragging in any form is considered as a criminal offence and is banned. Any form of ragging will be severely dealt with.

(c) The following acts of omission and/or commission shall constitute gross violation of the code of conduct and are liable to invoke disciplinary measures with regard to ragging.

(i) Lack of courtesy and decorum; indecent behavior anywhere within or outside the campus.

(ii) Willful damage or distribution of alcoholic drinks or any kind of narcotics or of fellow students/citizens.

(d) Possession, consumption or distribution of alcoholic drinks or any kind of narcotics or hallucinogenic drugs.

(e) Mutilation or unauthorized possession of library books.

(f) Noisy and unseemly behavior, disturbing studies of fellow students.

(g) Hacking in computer systems (such as entering into other person's areas without prior permission, manipulation and/or damage of computer hardware and software or any other cybercrime etc.

(h) Usage of camera cell phones in the campus.

(i) Plagiarism of any nature.

(j) Any other act of gross indiscipline as decided by the academic council from time to time.

(k) Commensurate with the gravity of offense, the punishment may be reprimand, fine, expulsion from the institute / hostel, debarment from a examination, disallowing the use of certain facilities of the Institute, rustication for a specified period or even outright expulsion from the Institute, or even handing over the case to appropriate law enforcement authorities or the judiciary, as required by the circumstances.

(l) For an offence committed in (i) a hostel (ii) a department or in a class room and (iii) elsewhere, the chief Warden, the Head of the Department and the principal respectively, shall have the authority to reprimand or impose fine.

(m) Cases of adoption of unfair means and/or any malpractice in an examination shall be reported to the principal for taking appropriate action.

(n) All cases of serious offence, possibly requiring punishment other than reprimand, shall be reported to the Academic council.

(o) The Institute Level Standing Disciplinary Action Committee constituted by the academic council, shall be the authority to investigate the details of the offence, and recommend disciplinary action based on the nature and extent of the offence committed.

(p) The Principal shall deal with any academic problem, which is not covered under these rules and regulations, in consultation with the Programmes Committee in an appropriate manner, and subsequently such actions shall be placed before the academic council for ratification. Any emergency modification of regulation, approved by the academic council earlier, shall be reported to the academic council for ratification.

(q) **"Grievance and Redressal Committee" (General)** constituted by the principal shall deal with all grievances pertaining to the academic / administrative /disciplinary matters.

(r) All the students must abide by the code and conduct rules of the college.

22. **MALPRACTICES**

(a) The Principal shall refer the cases of malpractices in internal assessment tests and Semester-End Examinations, to a Malpractice Enquiry Committee, constituted by him/her for the purpose. Such committee shall follow the approved scales of punishment. The Principal shall take necessary action, against the erring students basing on the recommendations of the committee.

(b) Any action on the part of candidate at an examination trying to get undue advantage in the performance at examinations or trying to help another, or derive the same through unfair means is punishable according to the provisions contained hereunder. The involvement of the Staff, who are in charge of conducting examinations, valuing examination papers and preparing/keeping records of documents relating to the examinations in such acts (inclusive of providing incorrect or misleading information) that infringe upon the course of natural justice to one and all concerned at the examination shall be viewed seriously and recommended for award of appropriate punishment after thorough enquiry.

23. AWARD OF RANK

The rank shall be awarded based on the following:

1.1 Only such candidates who pass the Final Semester examination at the end of the eigth semester (Final Semester) after admission as regular final year students along with the others in their batch and become eligible for the award of the Degree shall be eligible for the award of rank. Candidates, who lose one or more Semesters of study for any reason whatsoever are not eligible for the award of rank.

1.2 Ranks shall be awarded in each branch of study for the top five students appearing for the Regular Examinations.

1.3 Award of prizes, scholarships, or any other Honours shall be based on the rank secured by a candidate, consistent with the guidelines of the Donor, wherever applicable.

COURSE STRUCTURE(2012-2013 Admitted Batch)

I-SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab	Internal	External		
T118	Applied Mathematics-I	4	1	--	25	75	100	4
T131	C Programming	4	1	--	25	75	100	4
T197	English-I	4	--	--	25	75	100	3
T191	Engineering Chemistry	4	-	--	25	75	100	3
T192	Engineering Graphics	2	--	5	25	75	100	4
P806	C Programming Lab	--	--	3	25	75	100	2
P812	Computer Aided Engineering Graphics	-	-	3	25	75	100	2
P831	Engineering Workshop	--	--	3	25	75	100	2
TOTAL		**18**	**3**	**14**	**200**	**600**	**800**	**24**

II-SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab	Internal	External		
T119	Applied Mathematics- II	4	1	-	25	75	100	4
T198	English – II	4	-	-	25	75	100	3
T199	Environmental Studies	4	-	-	25	75	100	3
T383	Engineering Mechanics	4	1	-	25	75	100	5
T195	Engineering Physics	4	1	-	25	75	100	4
T376	Construction Materials	4	-	-	25	75	100	3
P832	English Language Communication Skills Lab	-	-	3	25	75	100	2
P830	Engineering Physics and Chemistry Lab	-	-	3	25	75	100	2
P856	Mini Project – I	--	--	3	25	25	50	2
	TOTAL	**24**	**3**	**12**	**225**	**625**	**850**	**28**

III - SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab.	Internal	External		
T367	Applied Mathematics - III	4	1	-	25	75	100	4
T377	Construction techniques, equipment And practices	4	-	-	25	75	100	3
T177	Electrical and Electronics Engineering	4	-	-	25	75	100	3
T395	Mechanics of Fluids	4	1	-	25	75	100	4
T396	Mechanics of Solids	4	1	-	25	75	100	4
T409	Surveying	4	-	-	25	75	100	4
P888	Computer Aided Building Drawing	-	-	3	25	75	100	2
P893	Strength of Materials lab	-	-	3	25	75	100	2
P896	Survey Field Work	-	-	3	25	75	100	2
P870	Seminar - I	-	-	-	50	-	50	1
TOTAL		**24**	**03**	**09**	**275**	**675**	**950**	**29**

IV – SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab.	Internal	External		
T365	Advanced Surveying	4	-	-	25	75	100	4
T366	Applied Hydraulic Engineering	4	1	-	25	75	100	4
T374	Concrete Technology	4	-	-	25	75	100	4
T383	Engineering Geology	4	-	-	25	75	100	3
T391	Hydrology	4	-	-	25	75	100	4
T397	Mechanics of structures	4	1	-	25	75	100	4
P834	Fluid Mechanics and Hydraulics Machines Lab	-	-	3	25	75	100	2
P891	Engineering Geology Lab	-	-	3	25	75	100	2
P857	Mini Project - II	-	-	2	25	25	50	2
	TOTAL	**24**	**03**	**11**	**225**	**625**	**850**	**29**

V - SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab.	Internal	External		
T369	Basic Structural Analysis	4	1	-	25	75	100	4
T378	Design of RCC Elements	4	1	-	25	75	100	4
T380	Design of Steel structures	4	1	-	25	75	100	4
T393	Irrigation and Water Resources Engineering	4	-	-	25	75	100	4
T407	Soil Mechanics	4	-	-	25	75	100	4
T412	Water Supply Engineering	4		-	25	75	100	4
P889	Concrete Laboratory	-	-	3	25	75	100	2
P886	Advanced Survey Field Work	-	-	3	25	75	100	2
P871	Seminar - II	-	-	-	50	-	50	1
TOTAL		**24**	**03**	**06**	**250**	**600**	**850**	**29**

VI - SEMESTER

Code No.	Name of the Course	Scheme of Instruction Periods per Week			Scheme of Examination Maximum Marks		Total	Credits
		Lectures	Tutorial	Lab.	Internal	External		
T371	Classical Structural Mechanics	4	1	-	25	75	100	4
T379	Design of RCC structures	4	1	-	25	75	100	4
T388	Foundation Engineering	4	1	-	25	75	100	4
T390	Highways and Air Port Planning	4	1	-	25	75	100	4
T405	Sanitary Engineering	4	-	--	25	75	100	4
T385 T387 T389 T400 T372	**ELECTIVE – I** Environmental Impact Assessment Finite Element Method in Civil Engineering Ground Improvement Techniques Prestressed Concrete Coastal Engineering	3	--	--	25	75	100	3
P890	Computer Applications in Civil Engineering Lab	-	-	3	25	75	100	2
P895	Soil Mechanics Laboratory	-	-	3	25	75	100	2
P810	Comprehensive Viva-Voce - I	-	-	-	100	-	100	2
	TOTAL	**23**	**03**	**06**	**300**	**600**	**900**	**29**

VII - SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab.	Internal	External		
T373	Computational Methods of Structural Analysis	4	1	-	25	75	100	4
T386	Estimation and Quantity Surveying	4	1	-	25	75	100	4
T402	Railways, Docks and Harbour Engineering	4	-	-	25	75	100	4
T401	Principles of Management and Professional Ethics	4	-	-	25	75	100	3
T382	Engineering Economics and Accountancy	4	-	-	25	75	100	3
T370 T408 T381 T411 T403	**ELECTIVE –II** Bridge Engineering Solid Waste Management Earthquake Resistant Design of Structures Traffic Engineering Remote sensing and GIS	4	-	-	25	75	100	3
P887	Computer Aided Analysis and Design Laboratory	-	-	3	25	75	100	2
P897	Transportation Engineering Lab	-	-	3	25	75	100	2
P892	Environmental Engineering Lab	-	-	3	25	75	100	2
P843	Internship	-	-	-	50	-	50	2
P878	Term Paper	-	-	3	25	25	50	2
	TOTAL	**24**	**03**	**09**	**275**	**625**	**900**	**31**

VIII - SEMESTER

Code No.	Name of the Course	Scheme of Instruction			Scheme of Examination		Total	Credits
		Periods per Week			Maximum Marks			
		Lectures	Tutorial	Lab.	Internal	External		
T375	Construction Management	4	1		25	75	100	3
	ELECTIVE – III							
T404	Repair and Rehabilitation of Structures							
T398	Modern Construction Systems and Techniques	4	-	-	25	75	100	3
T406	Shoring, Scaffolding and Form Work							
T394	Machine Foundations							
	ELECTIVE – IV							
T368	Architecture and Town Planning							
T392	Industrial structures	4	-	-	25	75	100	3
T399	Pavement Analysis and Design							
T410	Total Quality Management							
P894	Quantity Estimation and Project management	-	-	3	25	75	100	2
P867	Project Work	-	-	8	60	140	200	8
P811	Comprehensive Viva-Voce - II	-	-	-	100	-	100	2
	TOTAL	**12**	-	**8**	**310**	**590**	**900**	**21**

TOTAL CREDITS : 220

I Semester : 24	V Semester : 29
II Semester : 27	VI Semester : 29
III Semester : 29	VII Semester : 31
IV Semester : 29	VIII Semester : 22

I -SEMESTER

T118 APPLIED MATHEMATICS – I	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

UNIT - I

Differential equations of first order and first degree – exact, linear and Bernoulli. Applications to Newton's Law of cooling, Law of natural growth and decay, orthogonal trajectories.

UNIT - II

Linear differential equations of second and higher order with constant coefficients and with variable coefficients, method of variation of parameters and their simple applications to Simple Harmonic Motion and Electrical Circuits.

UNIT - III

Generalized Mean Value theorems (without proof), Functions of several variables, Maxima and Minima of functions of two variables with constraints and without constraints. Lagrangian Multiplier method.

UNIT - IV

Curve tracing – Cartesian curves. Applications of Integration to Lengths, Volumes and Surface areas of revolution in Cartesian Coordinates. Multiple integrals - double and triple integrals (Cartesian Coordinates only) – Changing of order of Integration. (Cartesian Coordinates only)

UNIT - V

Vector Differentiation: Gradient- Divergence - Curl and their related properties of sums-products - Laplacian and second order operators. Vector Integration - Line integral – work done – Potential function – area - surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence Theorems (Without proof) and related problems.

TEXT BOOKS

1. Higher Engineering Mathematics by Dr. B.S. Grewal
2. Higher Engineering Mathematics by Dr. B. V. Ramana – TMGH

REFERENCES

1. Advanced Engineering Mathematics by M. D. Greenberg – TMGH
2. Advanced Engineering Mathematics by Erwin Krezig - John Wiley & sons
3. Elementary Differential equations by W. E. Boyce and R. C. Diprima - John Wiley & sons
4. Advanced Engineering Mathematics by Peter V. O. Neil - Thomson

T131 C - PROGRAMMING	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

UNIT - I

Algorithm / pseudo code, flowchart, program development steps, structure of C program, A Simple C program, identifiers, basic data types and sizes, Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, bit-wise operators, assignment operators, expressions, type conversions, conditional expressions, precedence and order of evaluation.

Input-output statements, statements and blocks, if and switch statements, loops- while, do-while and for statements, break, continue, goto and labels, programming examples.

UNIT - II

Designing structured programs, Functions, basics, parameter passing, storage classes- extern, auto, register, static, scope rules, block structure, user defined functions, standard library functions, recursive functions, header files, C preprocessor, example c programs.

UNIT - III

Arrays- concepts, declaration, definition, accessing elements, storing elements, arrays and functions, two dimensional and multi-dimensional arrays, applications of arrays. pointers-concepts, initialization of pointer variables, pointers and function arguments, address arithmetic, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays, dynamic memory managements functions, command line arguments, c program examples.

UNIT - IV

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, bitfields, C program examples.

UNIT - V

Input and output – concept of a file, text files and binary files, streams, standard I/o, Formatted I/o, file I/o operations, error handling, C program examples.

TEXT BOOKS

1. Computer science, A structured programming approach using C, B.A. Forouzan and R.F. Gilberg, Third edition, Thomson.
2. The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education

REFERENCES

1. C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press
2. Programming in C – Stephen G. Kochan, III Edition, Pearson Eductaion
3. C and Data Structures:A Snap Shot Oriented Treatise Using Live Engineering Examples by Prof. N.B.Venkateswarlu and, Prof.E.V.Prasad, S Chand & Co, New Delhi
4. C/C++ for Engineers and Scientists, Harry H.Cheng ,McGrawHill,

T197 ENGLISH - I	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

English Language continues to be regarded as an important tool for global communication and employability. Hence, it is imperative that students need to acquire communicative competence besides their core skills. The syllabus has been designed to develop linguistic and communicative competence of Engineering students with special emphasis on professional and functional aspects of English language i.e., on Listening, Speaking, Reading and Writing (LSRW Skills).

OBJECTIVES

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To develop the study skills and Communication skills of the students in both formal and informal situations.
- To enable the students to face the academic and professional challenges of the present day scenario.
- To help students acquire the ability to speak effectively in English in the real life situations.
- To inculcate reading as a habit and to develop reading skills among students.
- To train students to improve their active and passive vocabulary.
- To familiarize the students with different rhetorical functions of Technical English.
- To enable the students write letters and reports effectively in formal and professional situations.

UNIT - I

Chapter – 1: "Read & Proceed" from Step by Step (*Pearson*)
Extensive Reading - Masterminds– The Trailblazers – **Jagadis Chandra Bose***(Orient Longman)*

UNIT - II

Chapter – 2: "Travel" from Step by Step (*Pearson*)
Extensive Reading - Masterminds– The World of Figures and Physics – **Chandra SekharaVenkata Raman** *(Orient Longman)*

UNIT - III

Chapter – 3: "Gender" from Step by Step (*Pearson*)
Extensive Reading - Masterminds–The Institution Builders– **Shanti SwarupBhatnagar** (*Orient Longman*)

UNIT - IV

Vocabulary – Synonyms, Antonyms, Words often Confused, Gerunds & Infinitives, Prefixes & Suffixes, Word plurals, Analogy Grammar – Parts of Speech, Sentence Completion, Question Tags, Tense and Aspect

UNIT - V

Analytical Writing – Sentence Construction – Types of sentences, Exercises with scrambled words & Jumbled sentences, Paragraph writing, Dialogue writing (Formal & Informal), Letter Writing (Formal & Informal), Resume writing, Expansion (of a given topic), Abstract Writing (Summarizing / Synopsis), Decision-making, Drafting E-Mails & Memo writing, Essay writing.

TEXT BOOKS

- Step by Step (*Pearson*)
- Masterminds by EnakshiChatterjee (*Orient Longman*)

REFERENCES

1. Andrea J Rutherford. *Basic Communication Skills for Technology*: Pearson Education, New Delhi, 2009.
2. Murphy. *English Grammar with CD*: Cambridge University Press, New Delhi, 2004.
3. Rizvi, M Ashraf. *Effective Technical Communication*: Tata McGraw Hill, New Delhi, 2008.
4. Blum Rosen. *Word Power*: Cambridge University Press, New Delhi, 2009.

T191 ENGINEERING CHEMISTRY	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

UNIT - I

WATER TECHNOLOGY: Introduction, Hardness of Water - Temporary and Permanent hardness. Units and inter conversions of Units. Problems on Temporary and Permanent hardness. Boiler troubles – scale & sludge formation, Caustic embrittlement, Corrosion, priming & foaming, softening of water Methods of Treatment of Water for Domestic Purposes - Sedimentation, Coagulation, Filtration, Disinfection – Sterilization, Chlorination, Break point chlorination, Ozonization.
Water Treatment: Internal Treatment - Colloidal, Phosphate, Calgon, Carbonate, Sodium aluminates Conditioning of Water.External Treatment - Lime-Soda Process, Zeolite Process, Ion- Exchange Process.

UNIT - II

FUELS AND COMBUSTION: Definition and classification of Fuels- conventional fuels (solid, liquid, gaseous), Solid fuels- coal - analysis, Proximate and ultimate analyses of coal – significances, Liquid Fuels – primary- petroleum- refining of petroleum- cracking, knocking, synthetic petrol – Bergius and Fischer Tropsech's process; Gaseous fuels- octane number – cetane number,– water gas, producer gas CNG, and biogas - gross and net calorific values – (definition only) – flue gas analysis – Orsat's apparatus.

UNIT - III

CORROSION: Definition, Examples, Types of Corrosion: Theories of Corrosion and Mechanism - Dry Corrosion (Direct Chemical corrosion), Wet Corrosion (Electro Chemical corrosion) Principles of Corrosion, Galvanic Series, Galvanic Corrosion, Concentration Cell Corrosion, Mechanism of Wet and Chemical Corrosion - Hydrogen evolution type, Oxygen absorption type. Factors Influencing Corrosion.Control of Corrosion - Proper Design, Use of pure metal and metal alloys, Passivity, Cathodic Protection - Sacrificial anode and Impressed Current, Modifying the Environment and use of Inhibitors.

UNIT - IV

Polymer Science and Technology: Types of polymerization, Mechanism (Chain growth & step growth), Plastics –Thermosetting and Thermoplastic resins – preparation, properties and engineering applications of Polyethylene, PVC, Polystyrene, Teflon, Bakelite, Nylon, Conducting polymers: polyacetylene, polyaniline, conduction, doping, application. Characteristics and uses Rubber - Natural Rubber, Vulcanization and significance, Elastomers – Buna S, Buna N, Thiokol, Fibers- Polyester, fiber reinforced plastics (FRP), applications.

UNIT - V

1. REFRACTORIES & INSULATORS: Definition, Classification with Examples, Criteria of a Good Refractory Material, Causes for the failure of a Refractory Material, Insulators – Definition and Classification with Examples. Characteristics of Insulating Materials, Thermal Insulators, Electrical Insulators - Their Characteristics and Engineering Applications.

2. LUBRICANTS: Introduction to Lubricants, Principles and function of lubricants - Types of Lubrication and Mechanism - Thick Film or Hydrodynamic Lubrication, Thin Film or Boundary Lubrication, Extreme Pressure Lubrication. Classification and properties of lubricants-Viscosity, flash and fire point, cloud and pour point, aniline point, Neutralization Number and mechanical strength, Selection of lubricants.

TEXT BOOKS

1. A text book of Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Company, New Delhi (15^{th} Edition) (2006).
2. A Text book of Engineering Chemistry by Dr. Y. Bharathi Kumari and Dr. Jyotsna Cherukuri, VGS Publications, First Edition, 2009.

REFERENCES

1. A Text book of Engineering Chemistry by Shashi Chawla, Dhanpat Rai Publishing Company, First Edition, 2002.
2. Advanced Engineering Chemistry by Dr. M. R. Senapati, University Science Press (Impart from Laxmi Publications), 3^{rd} Edition 2009.
3. N. Krishnamurthy, P. Vallinayagam and D. Madhavan, Engineering Chemistry, 2nd Edition. PHI Learning PVT., LTD, New Delhi, 2008.
4. A Text book of Engineering Chemistry by S. S. Dara, S CHAND Publications.

T264 NUMERICAL METHODS	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

UNIT - I

Linear systems of equations: Rank-Echelon form, Normal form – Solution of Linear Systems – Direct Methods- Gauss Elimination - Gauss Jordon and Gauss Seidal Methods. Eigen values – Eigen Vectors – Properties – Cayley Hamilton Theorem – Inverse and Powers of a matrix by using Cayley Hamilton Theorem.

UNIT - II

Quadratic forms – Reduction to Canonical form – Rank and Nature of Quadratic form. Solution of Algebraic and Transcendental Equations: Introduction – The Method of False Position – Newton-Raphson Method.

UNIT - III

Interpolation: Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences- Backward differences –Central differences – Symbolic relations and separation of symbols-Differences of a polynomial- Newton's formulae for interpolation – Lagrange's Interpolation formula.

UNIT - IV

Numerical Differentiation and Integration – Differentiation using finite differences – Trapezoidal rule – Simpson's 1/3 Rule –Simpson's 3/8 Rule.

UNIT - V

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge- Kutta Methods –Predictor-Corrector Methods- Milne's Method. Curve fitting: Fitting a straight line –Second degree curve-exponential curve by method of least squares.

TEXT BOOKS

1. Higher Engineering Mathematics by Dr. B.S. Grewal
2. Higher Engineering Mathematics by Dr. B. V. Ramana – TMGH

REFERENCES

1. Introductory Methods of Numerical Analysis by S. S. Sastry – PHI
2. Numerical Methods for Engineers with programming and software application by Steven .C. Chopra and Ra. P. Canale – TMGH
3. Numerical Methods for scientific and engineering by M. K. Jain, S. R. K. Iyengar – New Age International ltd.

T192 ENGINEERING GRAPHICS	L	T	P	Credits	Internal	External	TOTAL
	2	0	5	4	25	75	100

UNIT - I

INTRODUCTION TO ENGINEERING DRAWING:
Principles of Engineering Graphics and their significance - Drawing Instruments and their use-Conventions in Drawing- Lettering and Dimensioning – BIS conventions –Geometrical Constructions.
Curves used in engineering practice:

a) Conic Sections- Ellipse, Parabola, Hyperbola and rectangular hyperbola- General method and other methods.
b) Cycloid, Epi-Cycloid and Hypo-Cycloid.
c) Involutes.

UNIT - II

ORTHOGRAPHIC PROJECTIONS:(First angle projection only)
Principle of orthographic projection-Method of Projection – First and third angle projection methods- Projections of Points –Projection of straight lines-True lengths and traces.

UNIT – III

PROJECTIONS OF PLANES
Planes parallel to one of the reference planes-Inclined to one reference plane and perpendicular to other-Oblique planes.

UNIT – IV

PROJECTIONS OF SOLIDS
Projection of solids in simple position - Axis inclined to one of the reference planes and parallel to the other-Axis inclined to both H.P and V.P.

UNIT - V

SECTIONS OF SOLIDS:
Introduction-Sections of Prisms,Pyramids,Cylinders,Cones and Spheres

TEXT BOOK

Engineering Drawing, N.D. Bhat / Charitor publishers

REFERENCES

1. Engineering Drawing, Narayana and Kannaiah / Scitech publishers.
2. Engineering Drawing, R.K.Dhawan / S.Chand Company LTD.
3. Engineering Drawing and Graphics – Venugopal –New Age publishers
4. Engineering Drawing by Dhananjay A. Jolhe, Tata McGraw Hill Publishers.

P806 C - PROGRAMMING LAB	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

1. Write a programme in 'C' language to cover the following problems.
   a) Roots of Quadratic Equation.
   b) Example program which shows the usage of various Operators available in C Language.
   c) Example program which shows the usage of various preliminary Data types available in C Language.
   d) Example programs to illustrate the *order of* evaluation.

II) WRITE EXAMPLE PROGRAMS

a) To check whether the given year is leap year (or) not

b) Converting given two digit number into words using switch statement

c) To illustrate the usage of 'goto' statement.

d) Finding smallest& biggest number from the given set of 4 numbers using 'if' statement.

e) Calculate the student grade in the examination – assume suitable constraints.

f) Prepare electricity bill for the consumed units – assume suitable constraints.

III) EXAMPLE PROGRAMS

a) To Display first N natural numbers
b) To find whether the given number is Armstrong (or) not
c) To find reverse of the given number and to check whether it is palindrome (or) not.
d) To find whether given number is strong number (or) not.
e) To check whether given number is Prime (or) not
f) To display prime numbers with in the given range(Nesting of Loops).
g) To display the following structure(Nesting of Loops)

i)
```
1
1 2
1 2 3
1 2 3 4
1 2 3 4 5
```

ii)
```
5 4 3 2
4 3 2 1
3 2 1
2 1
1
```

IV) Write example programs in C Language:
   a) To find factorial of a given number using functions.
   b) Swap two numbers using functions.
   c) To find GCD of two numbers using recursion
   d) Write a recursive function to solve Towers of Honai problem.

e) Write an example program to illustrate use of external &static storage classes.

V) Write example programs in C Language to perform following operations:
a) Finding the sum and average of given numbers using Arrays.
b) To display elements of array in reverse order
c) To search whether the given element is in the array (or) not using linear search & binary search.
d) Write a C program to perform the following operations
i) Addition, subtraction and multiplication of Matrices
ii) Transpose of given matrix (The above operations are to be exercised using functions also by passing arguments)
e) Write a C program to find whether the given string is palindrome (or) not.
f) To accept line of text and find the number of characters, number of vowels and number of blank spaces in it.
g) Write an example program to illustrate the use of any 5 string handling functions.

VI) a) Example program to bring clarity on pointer declaration & initialization and Pointer arithmetic.
b) Write an example program to describe the usage of call by reference.
c) Write a program to find sum of the elements of the array using functions.
d) Write an example program to illustrate the usage of command line arguments.
e) Program to illustrate the usage of dynamic memory management functions.

VII) a) Write an example program using structures to process the student record. Assume suitable fields for student structures (Different kinds of initialization of structure variables are to be exercised)
b) Write a program to read records of 10 employees and find their average salary (exercise array of structures & Nested structures concepts through this program).
c) Write a program to handle a structure variable using pointers and implement self referential structure(i.e. A structure variable having a pointer to itself)

VIII) Write an example program on file to perform following operations:
a) Accessing content from files and writing content in to it. (Exercise different file operation modes)
b) Copy the contents of one file into another (Exercise different file operation modes)

P812 COMPUTER AIDED ENGINEERING GRAPHICS	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

UNIT - I

COMPUTER AIDED DRAFTING

Introduction - Computer Aided drafting system – Advantages, Applications of AUTOCAD. Drafting software – AUTOCAD – Advantages, Initial setup commands, utility commands, Drawing Aids, Entity Draw commands, Display commands, Edit Commands.

Introduction Lettering – Basic types of Dimensioning, Linear, Angular and Radial Dimensioning.

UNIT - II

ORTHOGRAPHIC PROJECTIONS:

Introduction to orthographic Projections

Projections of Solids: Types of Solids, Prisms, pyramids , solids of revolution-simple positions Sections of Solids : Introduction – section & section planes – Types of section planes – True shape of a section.

UNIT - III

ISOMETRIC DRAWING :

Introduction - Theory of Isometric projection, Isometric view and Isometric drawing. Non – Isometric Lines – Methods to generate an Isometric Drawing.

UNIT - IV

DEVELOPMENT OF SURFACES OF SOLIDS:

Introduction – Theory of development - Methods of developments – Developments of lateral surfaces along with base.

UNIT - V

INTERSECTION OF SURFACES:

Introduction – Rules for visibility – Line of intersection – Intersection of Lines & Solids – Intersection of plane Vs plane - Intersection of surfaces of two solids, Interpenetration of two solids.

TEXT BOOKS

1. Engineering Graphics with AutoCAD by Bethune PHI Learning Private Limited, New Delhi, 2009.
2. Engineering Graphics with AutoCAD by M. Kulkarni, A.P Rastogi, and A.K. Sarkar; PHI Learning Private Limited, New Delhi, 2009.
3. Engineering Drawing, N.D. Bhat / Charitor

P831 ENGINEERING WORKSHOP	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

TRADES FOR EXERCISES: (Common to EEE, ECE, CSE, EIE & IT)

At least three exercise from each trade :

1. Carpentry
2. Fitting
3. House – Wiring
4. Plumbing

TRADES FOR EXERCISES : (MECHCHANICAL ENGINEERING)

At least two exercise from each trade :

1. Carpentry
2. Fitting
3. Tin - Smithy
4. Black - Smithy
5. House - Wiring
6. Plumbing

TEXT BOOK

Workshop manual / P. Kannaiah / K.L. Narayana Scitech Publications, India Pvt Ltd, Chennai.

II-SEMESTER

T119 APPLIED MATHEMATICS – II	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

UNIT – I

Laplace transforms of standard functions –Shifting Theorems, Transforms of derivatives and integrals – Unit step function –Dirac's delta function. Inverse Laplace transforms– Convolution theorem - Applications of Laplace transforms to ordinary differential equations

UNIT – II

Fourier Series: Determination of Fourier coefficients – Fourier series – even and odd functions – Fourier series in an arbitrary interval– Half-range sine and cosine series.

UNIT – III

Fourier integral theorem (only statement) – Fourier sine and cosine integrals – Fourier transform – sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

UNIT – IV

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation. Method of Separation of Variables - Applications to wave equation, heat equation and Laplace Equation.

UNIT – V

Z-transform – properties – Damping rule – Shifting rule – Initial and final value theorems - Inverse z-transform -Convolution theorem – Solution of difference equation by z-transforms.

TEXT BOOKS

1. Higher Engineering Mathematics by Dr. B.S. Grewal
2. Higher Engineering Mathematics by Dr. B. V. Ramana – TMGH

REFERNCES

1. Advanced Engineering Mathematics by Michael D. Greenberg – TMGH
2. Advanced Engineering Mathematics by Erwin Krezig - John Wiley & sons

T198 ENGLISH - II	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

English Language continues to be regarded as an important tool for global communication and employability. Hence, it is imperative that students need to acquire communicative competence besides their core skills. The syllabus has been designed to develop linguistic and communicative competence of Engineering students with special emphasis on professional and functional aspects of English language i.e., on Listening, Speaking, Reading and Writing (LSRW Skills).

OBJECTIVES

- To improve the language proficiency of the students in English with emphasis on LSRW skills.
- To develop the study skills and Communication skills of the students in both formal and informal situations.
- To enable the students to face the academic and professional challenges of the present day scenario.
- To help students acquire the ability to speak effectively in English in the real life situations.
- To inculcate reading as a habit and to develop reading skills among students.
- To train students to improve their active and passive vocabulary.
- To familiarize the students with different rhetorical functions of Technical English.
- To enable the students write letters and reports effectively in formal and professional situations.

UNIT - I

Chapter 4: "Disaster Management" from *Step by Step* (Pearson)
Extensive reading – *Masterminds* - The institution builders - **MeghanadSaha** *(*Orient Longman*)*

UNIT - II
Chapter 5: "Health" from *Step by Step* (Pearson)
Extensive reading – *Masterminds*- The New Age – **HomiJehangirBhabha** *(*Orient Longman*)*

UNIT - III
Chapter 6: "Sports" from *Step by Step* (Pearson)
Extensive reading – *Masterminds* - The New Age – **Vikram Sarabhai** *(*Orient Longman*)*

UNIT - IV
Grammar – Articles, Prepositions, Voice, Speech, Concord, Correction of Sentences
Vocabulary – Phrasal verbs, Gerunds, Infinitives, One word Substitutes.

UNIT - V
Analytical writing – Comprehension, Technical dialogue writing,
Presentation skills - Note making, Information transfer / Data interpretation (Tables, Pie-charts, Bar graphs, Tree diagrams, Pictograms, etc.), Report writing

TEXTBOOK

Step by Step, Pearson Education, New Delhi 2010.
Master Minds, (Orient Longman*).*

REFERENCES

1. KoneruAruna. *Professional Communication:* Tata McGraw-Hill, New Delhi, 2007.
2. Effective Technical Communication, Rizvi, Tata McGraw-Hills, New Delhi, 2009.
3. Basic Communication Skills for Technology, Andrea J. Rutherford, Pearson Education.
4. GRE and TOEFL, Kaplan and Baron's, Latest editions.

T199 ENVIRONMENTAL STUDIES	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

UNIT - I

Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems -Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources. Case studies.Role of an individual in conservation of natural resources.Equitable use of resources for sustainable lifestyles.

UNIT – II

Ecosystems : Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem – Ecological succession. - Food chains, food webs and ecological pyramids.

Biodiversity and its conservation: Introduction - Definition: genetic, species And ecosystem diversity. - Bio-geographical classification of India - Value of Biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. - India as a mega diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. - Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

Environmental Pollution: Definition, Types, Cause, effects and control measures of:

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV

Social Issues and the Environment: From Unsustainable to Sustainable development -Urban problems related to energy -Water conservation, rain water harvesting, watershed management -Resettlement and rehabilitation of people; its problems and concerns. Case Studies -Environmental ethics: Issues and possible solutions. -Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies. -Wasteland reclamation. – Consumerism and waste products.

UNIT – V

Human Population and the Environment: Population growth, variation among nations. Population explosion – Family Welfare Programme -Environment and human health. -Human Rights. -Value Education. HIV/AIDS. -Women and Child Welfare. -Role of information Technology in Environment and human health. –Case Studies. Environment Protection Act. -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act -Issues involved in enforcement of environmental legislation. -Public awareness.

TEXT BOOKS

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE

Textbook of Environmental Sciences and Technology by M. Anji Reddy BS Publication.

T383 ENGINEERING MECHANICS	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	5	25	75	100

UNIT - I

BASICS & STATICS OF PARTICLES

Introduction - Units and Dimensions - Laws of Mechanics - Vectors - Vectorial representation of forces and moments - Vector operations, Coplanar forces resolution and composition of forces - equilibrium of force systems – forces in space - equilibrium of a particle in space - equivalent systems of forces - principle of transmissibility – Single equivalent force.

UNIT - II

EQUILIBRIUM OF RIGID BODIES

Free body diagram - Types of supports and their reactions - requirements of stable equilibrium - Moments and Couples - Varignon's theorem - Equilibrium of Rigid bodies in two dimensions - Equilibrium of Rigid bodies in three dimensions

UNIT - III

PROPERTIES OF SURFACES AND SOLIDS

Determination of Areas - First moment of Area and the centroid - simple problems involving composite figures. Second moment of plane area - Parallel axis theorems and perpendicular axis theorems- Radius of gyration - Polar moment of Inertia - Principal moments of Inertia of plane areas - Second moment of plane area of sections like C,I,T,Z etc. - Basic Concept of Mass moment of Inertia

UNIT - IV

FRICTION

Introduction- Classification of friction-Laws of friction-Co-efficient of friction-Angle of repose-Frictional forces on motion of bodies –Ladder friction-Wedge friction.

UNIT - V

DYNAMICS OF PARTICLES

Displacement- Velocity and acceleration and their relationship - Relative motion - Curvilinear motion - Newton's Laws -D'Alembert's Principle, Work Energy Equation .

TEXT BOOK

1. Engineering Mechanics by Ferdinand . L. Singer / Harper – Collins
2. Engineering Mechanics by S.S. Bhavikatti and K.G.Rajashekarappa – New Age International Publishers, New Delhi.
3. Engineering Mechanics by AK Tayal. Umesh Publications, New Delhi

REFERENCES

1. Engineering. Mechanics by RK Rajput – DhanpatRai and Sons, New Delhi
2. Engineering Mechanics by S.Timoshenko, D.H.Young and J.V.Rao – TATA McGraw Hill, New Delhi, Revised Fourth Edition.
3. Engineering. Mechanics by RK Bansal – Lakshmi Publishers, New Delhi.

T195 ENGINEERING PHYSICS	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

UNIT - I

INTERFERENCE: Superposition of waves-double slit interference- Young's double slit experiment- Coherence – Interference from thin films- Newton's rings.

DIFFRACTION: Diffraction and wave theory of light (Fresnel and Fraunhofer diffractions) -single slit Diffraction, Intensity in single- slit diffraction, Calculating the intensity– Double slit interference and diffraction combined.

GRATINGS AND SPECTRA - Multiple slits-width of the maxima, Diffraction gratings, Grating spectrum – Dispersion and Resolving power.

POLARIZATION: Polarization by reflection Brewster's law - Double refraction - Polarization by scattering - Retarders -Optical Activity.

UNIT - II

CRYSTAL STRUCTURES: Introduction –periodic arrays of atoms-Lattice translation vectors, Basis and crystal structure, Primitive cell, fundamental types of lattices-three dimension lattice types, Crystal systems- Structure and packing fractions of Simple cubic-Body centered cubic- Face centered cubic crystals.

X-RAY DIFFRACTION: Directions and planes in crystals – Miller indices – separation between successive (h k l) planes- Diffraction of X- rays by crystal planes – Braggs law-Laue method- powder method.

UNIT - III

LASERS: Introduction – Characteristics of Lasers- Principle of laser (Absorption, Spontaneous and stimulated emission of Radiation), Einstein Coefficients- Population Inversion - Helium Neon Laser, Semiconductor laser, Applications of Lasers.

FIBER OPTICS: Introduction- Principle of optical Fiber- Acceptance angle and Acceptance cone- Numerical aperture - refractive index profile-Application of optical fibers.

UNIT - IV

SUPER CONDUCTIVITY: Phenomenon, Meissner effect, critical parameters, Type I, Type II Super conductors, BCS theory of super conductivity, Applications of Super conductors.

UNIT - V

NON-DESTRUCTIVE TESTING USING ULTRASONICS: Characteristics Production and detection of ultrasonics-Piezoelectric and magnetostiriction methods,Ultrasonic Testing - Basic Principle –Transducer – Couplant and inspection Standards – Inspection Methods – Pulse echo Testing Technique – Flaw detector- Different Types of Scans – Applications.

TEXT BOOKS

1. Fundamentals of physics Resinic, Halliday and Krane, John Wiley 2003
2. Engineering Physics by V RAJENDRAN Tata McGrahill

REFERENCES

1. Introduction to solid state physics, C. Kittel, John wiley, 1999.
2. Engineering physics by H K MALIK AK SINGH TATA McGRAHILL.

T376 CONSTRUCTION MATERIALS	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	4	25	75	100

OBJECTIVE

At the end of this course the student should have learnt about the various materials, both conventional and modern, that are commonly used in civil engineering construction. Further he should be able to appreciate the criteria for choice of the appropriate material and the various tests for quality control in the use of these materials.

UNIT - I

STONES – BRICKS – CONCRETE BLOCKS

Stone as building material – Criteria for selection – Tests on stones – Deterioration and Preservation of stone work – Bricks – Classifi cation – Manufacture of clay bricks – Tests on bricks – Compressive Strength – Water Absorption – Effl orescence – Bricks for special use – Refractory bricks – Cement and Concrete hollow blocks – Light weight concrete blocks – Code Practices.

UNIT - II

LIME – CEMENT – AGGREGATES – MORTAR

Lime – Preparation of lime mortar – Cement, Ingredients – Manufacturing process – Types andGrades – Properties of cement and Cement mortar – Hydration – Compressive strength – Tensile strength – Soundness and consistency – Setting time – Aggregates – Natural stone aggregates – Industrial by products – Crushing strength – Impact strength – Flakiness – Abrasion Resistance – Grading – Sand – Bulking – Code of Practices-Types of mortars-Functions.

UNIT - III

CONCRETE

Concrete – Ingredients – Manufacture – Batching plants – Ready Mix Concrete – Properties of fresh concrete – Slump – Flow and compaction – Principles of hardened concrete – Compressive, Tensile and shear strength – Modulus of rupture – Tests – Mix specifi cation – Mix proportioning – IS method – High Strength Concrete and High Performance Concrete – Other types of Concrete – Code Practices.

UNIT - IV

TIMBER AND OTHER MATERIALS

Timber - Industrial timber – Plywood – Veneer – Thermocole –Bitumen –Market forms Panels of laminates – Steel – Aluminium and Other Metallic Materials – Composition – Uses – Market forms – Mechanical treatment – Paints – Varnishes – Distempers – Code Practices.

UNIT - V

MODERN MATERIALS

Glass – Ceramics – Sealants for joints – Fibre glass reinforced plastic – Clay products – Refractories – Composite materials – Types – Applications of laminar composites – Fibre textile – Geosynthetics for Civil Engineering applications.

TEXT BOOKS

1. R.K. Rajput, Engineering Materials, S. Chand & Company Ltd., 2000.
2. M.S. Shetty, Concrete Technology (Theory and Practice), S. Chand & Company Ltd., 2003

REFERENCES

1. P. C Varghese, Building Materials, Prentice Hall of India ca-print-prentice_hall,2005

P832	L	T	P	Credits	Internal	External	TOTAL
ENGLISH LANGUAGE COMMUNICATION SKILLS LAB	**0**	**0**	**3**	**2**	**25**	**75**	**100**

The English Language Communications Skills Lab focuses on practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts. It aims at improving the communicative competence of students and to enrich their power of expression, articulation and persuasiveness. The thrust is on developing competences, both linguistic as well as communicative, in order to improve employability potential.

OBJECTIVES

1. To expose the students to a variety of self-instructional, learner-friendly modes of English language learning and stimulate intellectual and attitudinal exercise.
2. To provide students with the required facility and practice to face computer-based competitive exams such GRE, TOEFL, IELTS etc.
3. To enable them to learn better pronunciation through emphasis on word accent, intonation, and rhythm.
4. To train them to use language effectively to face interviews, group discussions, public speaking.
5. To develop necessary attitudes and behaviors so as to improve their employability quotient.

SYLLABUS

The following course content is prescribed for the English Language Communication Skills Laboratory sessions:

1. Dimensions of Phonetics: Phonetic Transcription, Sounds, Stress, Intonation, Rhythm, Varieties of Spoken English: Indian, British and American
2. Oral Presentations -- Prepared and Extempore -- JAM
3. Role Play
4. Describing Objects / Situations / People
5. Information Transfer
6. Debates
7. Group Discussions

SUGGESTED SOFTWARE/BOOKS

* *Digital Mentor,* Globarena, Hyderabad, 2005
* *Sky Pronunciation Suite: Young India Films, Chennai, 2009*
* Mastering English in Vocabulary, Grammar, Spelling, Composition, Dorling Kindersley, USA, 2001
* Dorling Kindersley Series of Grammar, Punctuation, Composition, Dorling Kindersley, USA, 2001
* *Oxford Talking Dictionary,*The Learning Company, USA, 2002
* *Cambridge Advanced Learners English Dictionary* (with CD). Cambridge University Press, New Delhi, 2008.
* Learning to Speak English - 4 CDs. The Learning Company,USA,2002
* Herbert Puchta and Jeff Stranks with Meredith Levy: *English in Mind*: Cambridge University Press, New Delhi, 2009.
* Krishna Mohan, Effective English Communication, Tata McGraw Hills, New Delhi,2007

P830 ENGINEERING PHYSICS AND CHEMISTRY LAB	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

ENGINEERING PHYSICS LABORATORY
(Any 5 experiments)

LIST OF EXPERIMENTS

1. LCR Resonance circuit
2. Newton's Rings – Determination of Radius of curvature of plano convex lens
3. Verification of laws by using sonometer
4. Meldy's experiment
5. Wedge shaped film
6. Volume Resonator
7. Refractive index of light
8. Diffraction Grating – Normal incidence method
9. Rigidity modulus of a given wire
10. Frequency of AC supply – Sonometer

ENGINEERING CHEMISTRY LABORATORY
(Any 5 experiments)

1. Estimation of total Hardness of water by EDTA method
2. Determination of Temporary and permanent hardness of water.
3. Iodometric Titration of $K_2Cr_2O_7$ v/s $Na_2S_2O_3$ to determine the percentage purity of $K_2Cr_2O_7$ sample.
4. Preparation of Standard Potassium Dichromate and Estimation of Copper by Iodometry.
5. Determine the amount of Oxalic acid and Sulphuric acid in 1 liter solution by using given standard Sodium Hydroxide and Potassium Permanganate solution
6. Determination of alkalinity of water sample.
7. Determination of Dissolved Oxygen (DO) content by Winkler's method.
8. Preparation of Urea formaldehyde resin.

III -SEMESTER

T367 APPLIED MATHEMATICS - III	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

UNIT – I

Solution of Algebraic and Transcendental Equations: Introduction – The Method of False Position – Newton –Raphson Method. Interpolation: Introduction – Errors in Polynomial Interpolation – Finite difference- Forward Differences – Backward differences- Central differences

UNIT – II

Symbolic representation of forward, backward, central and shifting operators. Relations between them. Differences of a polynomial –Newton's formulae for interpolation (both forward and backward)- Lagrange's Interpolation formula. Numerical Differentiation and Integration – Differentiation using finite differences –Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT – III

Numerical solution of Ordinary Differential equations: Solution by Taylor's series- Picard's Method of successive Approximations – Euler's Method -Runge - Kutta Methods. Curve fitting: Fitting a straight line- Second degree curve-exponential curve by method of least squares.

UNIT – IV

Probability: Sample space and events – Probability - The axioms of probability.

Random variables – Discrete and continuous distributions – Distribution function. Binomial, Poisson, normal distribution – related properties

UNIT –V

Statistical Hypothesis – Errors of Type I and Type II errors. One tail and two – tailed tests. Testing of hypothesis concerning means, proportions and their differences using Z-test. Tests of hypothesis using Student's t-test, F-test and (Chi - square) $\chi 2$ test. Applications of decision making use the above tests.

TEXT BOOKS

1. Higher Engineering Mathematics by Dr.B.S.Grewal
2. Higher Engineering Mathematics by Dr.B.V. Ramana-TMGH
3. Probability and Statistics, Guupta & Kapoor

REFERENCE

1. Introductory Methods of Numerical Analysis by S.S. Sastry – PHI
2. Numerical Methods for Engineers with programming and software application by Steven.C.Chopra and Ra.P.Canale-TMGH
3. Numerical Methods for scientific and engineering by M.K.Jain, S.R.K.lyengar-New Age International Itd.
4. Probability and Statistics for Engineers, Miller, John E. Freund, PHI.
5. Probability , Statistics and Queuing theory applications for Comp. Sciences,2/e ,Trivedi,John Wiley

T377 CONSTRUCTION TECHNIQUES, EQUIPMENT AND PRACTICES	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	4	25	75	100

OBJECTIVE

The main objective of this course is to make the student aware of the various construction techniques, practices and the equipment needed for different types of construction activities. At the end of this course the student shall have a reasonable knowledge about the various construction procedures for sub to super structure and also the equipment needed for construction of various types of structures from foundation to super structure.

UNIT - I

Functional planning of building: Introduction-man made environment-general principles of site selections-site plan-planning regulations and by laws-principles of planning. Masonry construction: General Discussion-masonry classifications-deifications of terms-stone masonry-brick masonry-hollow concrete masonry-reinforced masonry-composite masonry.

UNIT-II : Supporting structures and concrete constructions
General-foam work-scaffolding-shoring-underpinning –reinforced concrete constructions-precast concrete constructions prestressed concrete constructions- joints in concrete works

UNIT-III

A) Damp preventions and fire protections-Source of Dampness- effect of dampness-techniques and methods of damp preventions-material used for damping(d.p.c)-treatment in building-treatment of dampness-
B) Fire protection: important considerations in fire protections- properties of fire resisting materials –fire resistant constructions- general measurement of fire safety in buildings
C) Arches& lintels: arches and their stability considerations- technical terms in arch work-types of arches- methods of constructions of arches..

UNIT-IV

Acoustics of building –characteristics of audible sound, Behaviour of sound and its effects acoustical defects and acoustic buildings air conditions of buildings-classifications –system of air conditions-essetials of an air conditioned system & anti –terminate in building essential –types of proofing methods.

UNIT-V

Construction Equipment: selection of Equipment-excavation equipment-compaction equipment-hauling equipment-hoisting equipment-conveying equipment-pumping equipment-pile driving equipment-

TEXT BOOKS

1. Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., “Construction Planning, Equipment and Methods”, 5th Edition, McGraw Hill, Singapore, 1995.
2. Arora S.P. and Bindra S.P., Building Construction, Planning Techniques and Method of Construction, Dhanpat Rai and Sons, 1997

REFERENCES

1. Jha J and Sinha S.K., Construction and Foundation Engineering, Khanna Publishers, 1993.
2. Sharma S.C. "Construction Equipment and Management", Khanna Publishers New Delhi, 1988.
3. Deodhar, S.V. "Construction Equipment and Job Planning", Khanna Publishers, New Delhi, 1988.
4. Dr. Mahesh Varma, "Construction Equipment and its Planning and Application", Metropolitan Book Company, New Delhi-, 1983.

T177 ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

UNIT - I

Electrical Circuits: Basic definitions, Types of elements, Ohm's Law, Resistive networks, Kirchhoff's Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations

UNIT - II

AC Machines: Principle of operation of alternators – regulation by synchronous impedance method – MMF and zero power factor methods. Principle of operation of induction Principle of operation of three-phase induction motors –Slip ring and Squirrel cage motors – Slip-Torque characteristics

UNIT - III

Transformers: Principle of operation of single phase transformers, Ideal transformer, Practical transformer, phasor diagram.– emf equation – losses –efficiency and regulation..

UNIT - I V

Diode and Transistors: P-n junction diode, symbol, V-I Chacracteristics, DiodeApplications, Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems)**.**PNP and NPN Junction transistor, Transistor as an amplifier, SCR characteristicsand applications.

UNIT - V

Electrical and Electronics Measuring Instruments.
Electrical Instruments: Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments. **Electronic Instruments:** Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.

TEXT BOOK

Essentials of Electrical and Computer Engineering by David V. Kerns, JR. J. David Irwin/Pearson.

REFERENCES

1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
2. Basic Electrical Engineering by Kothari and Nagarath, TMH Publications, 2nd Edition.

Electrical Technology by JB GUPTA

T395 MECHANICS OF FLUIDS	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

UNIT – I

FLUID PROPERTIES

Density, specific weight, specific volume, specific gravity, compressibility, viscosity, surface tension, capillarity, vapour pressure. Fluid Statics: Pressure in a fluid, pressure head, Measurement of pressure, Hydrostatic forces on submerged plane and curved surfaces, Buoyancy, Metacentre, stability of floating and submerged bodies.

UNIT- II

FLUID KINEMATICS

Stream line, streak line, Path line and stream tube. Types of flow, steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows. Equation of continuity for one, two, three dimensional flows, Stream function and velocity potential function, flow net analysis,.Dynamics of Flow: Euler's equation of motion, Bernoulli's equation, simple applications of Bernoulli's equation, Momentum equation. Kinetic energy and Momentum correction factors.

UNIT – III

BOUNDARY LAYER THEORY

Boundary Layer thickness, Displacement thickness, Momentum thickness, Energy thickness, Boundary layer growth and separation. Laminar flow: Laminar flow through pipes, Hagen - poissuille flow, energy loss. Turbulent flow: Turbulent flow through pipes, Darcy's equation, Minor losses, Energy and hydraulic gradients, pipes in series and parallel.

UNIT- IV

FLOW MEASUREMENT

Pitot tube, Venturimeter, orificemeter, Flow nozzle, and mouthpieces, flow over notches and weirs, Venturiflume and Standing wave flume, Velocity measurement in open channel.

UNIT – V

DIMENSIONAL ANALYSIS AND SIMILITUDE

Dimensional analysis - Rayleigh's method, Buckingham's fi theorem, Dimensionless numbers, Laws of similitude, Model Analysis, Distorted models, Principles of analogy.

TEXT BOOKS

1. Modi, P.N., and Seth, S.M., Hydraulics, Fluid Mechanics and Hydraulic Machines, Standard Book Home, New Delhi, 2005.
2. Rajput,R.K., Text Book of Fluid Mechanics and Hydraulic Machinery, S.Chand & Company, Ltd., New Delhi, 2005.

REFERENCES

1. Douglas, J.F., Gasiorek, J.M and Swaffield, J.A., Fluid Mechanics 4th Edn. Pearson Education India, 2002.
2. Das M.M Fluid Mechanics and Turbimachines , Prentice Hall of India (P) Ltd New Delhi, 2008.
3. Arora, K.R Fluid Mechanics, Hydraulic and Hydraulic Machines , Standard Publishersand Distributors , New Delhi , 2005.

T396 MECHANICS OF SOLIDS	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

UNIT – I

Simple stresses and strains

Introduction – Stress – Strain – Tensile, compressive and shear stress – Elastic limit – Hooke's law – stress strain diagram – Stresses in composite sections – Thermal stresses – Young's modulus – Rigidity modulus – Bulk modulus – Poisson's ratio – Volumetric strain – Relationship between elastic constants. Analysis of trusses by methods of joints and sections.

UNIT – II

Shear Force and Bending Moment

Introduction – Types of beams – Cantilever – Simply supported – Over handing – fixed and continuous beams – types of loads – concentrated load – Uniformly distribute load – Uniformly varying load – Couples – Shear force and bending moment diagram for statically determinate beams (Cantilever, simply supported and over handing) Relationship between load, shear force and bending moment.

UNIT – III

Bending and shear stresses

Theory of simple bending – Assumption – Derivation of Flexure Formula - bending stresses in simply supported, cantilever beams. Shear stress in beams – Shear stress distribution like Rectangular, Circular, Triangular, I and T Sections.

UNIT – IV

Torsion of circular shafts and springs

Introduction – Derivation of torsion equation – Assumptions – Power transmitted by shafts – Design of shafts – Combined bending and torsion Closed coiled and open coiled helical springs subjected to axial load.

UNIT – V

Thin and Thick cylinders

Thin cylinders – Circumferential stress – Longitudinal stress – Volumetric strain - Stresses in thick cylindrical shell – Lame's equation – Stresses in compound cylinders – Shrink fit.

TEXT BOOKS

1. Bhavikatti. S. S., Strength of Materials, Vikas Publishing House (P) Ltd., New Delhi, Second Edition, 2002.

2. Punmia. B. C., Jain, A. K., and Jain, A. K., Strength of Materials and Theory of Structures, Vols. I & II, XI Edition, Laxmi Publications (P) Ltd, New Delhi, 2002.

3. Hearn, E. J., Strength of Materials, Pergamon Press, Oxford, 1997.

T409 SURVEYING	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	4	25	75	100

UNIT – I

Linear Measurements
Principles - Ranging and Chaining - Errors in chaining-overcoming obstacles in ranging and chaining - uses of cross staff and optical squares - Traversing - Plotting.

UNIT – II

Compass Survey
Prismatic compass - Surveyor's compass - Bearings - Whole circle and Reduced Bearing - traversing - Local attraction - Magnetic declination.

UNIT- III

Plane Table Survey
Plane table survey-accessories - Methods - Intersection - Radiation - Resection - Traversing – Two point and three point problems - Bowditch's Correction.
Study of Minor Instrucments
Planimeter - Sextant - Pentograph - Ceylon Ghat Tracer.

UNIT- IV
Leveling
Principles - Levels and Staves - Bench Marks - Temporary and permanent adjustments – Booking - Reduction - Arithmetic checks - Fly leveling – Reciprocal leveling – check leveling - longitudinal and cross sectioning - Plotting.

UNIT- V

Contouring, Areas and Volumes
Contouring - Characteristics and uses - Interpolation - Calculation of areas and volumes field notes and plan - Earth work - Capacity of reservoirs - alignment of hill roads.

TEXT BOOKS

1. Kanetkar T.P and Kulkarni S.V., "**Surveying and leveling part I and II**", Vidyarthi Prakasam,Pune - 411 030, 1997.
2. Punmia B.C., "**Surveying Vol I and II**", Laxmi Publications 9th / 10th Edition, 1987.
3. Basak N.N., "**Surveying and Leveling**", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1994.
4. Agor R "**Text Book of Surveying and Leveling**", Khanna Publishers, 2BNath Market, Nai Sarak, Delhi - 110 006, 1998.

P888 COMPUTER AIDED BUILDING DRAWING	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

1. Fully Panelled Window
2. Fully Panelled Door with wooden panel
3. Fully Panelled Door with RCC frame
4. Panelled and glazed door with wooden panel
5. Steel roof truss
6. King post and Queen post trusses
7. Single floor residential building - Plan, Elevation and Cross section
8. Storied residential building- Plan, Elevation and Cross section
9. Framed office building- Plan, Elevation and Cross section
10. Institution building- Plan, Elevation and Cross section
11. 3D view of a single floor residential building
12. 3D view of a dog legged stair case
13. 3D view of a spiral stair case

REFERENCES

1. Sikka V.B., "**A Course in Civil Engineering Drawing**", 4th edition, S.K.Kataria & Sons, New Delhi – 1998.
2. Shah M.G. Kale C.M. & Patki S.Y., "**Building Drawing with an Integrated Approach to Built Environment**", 4th edition, Tata McGraw Hill Publishing Co. Ltd. New Delhi – 2002.

IS Codes

1. IS: 962 – 1967 Code of Practical for Architectural and Building Drawing
2. IS: 4021 – 1983 Specification for Timber Door, Window and Ventilator Frames
3. IS: 6523 – 1983 Specification for Precast Reinforced Concrete Door and Window Frames
4. IS: 1003 – 1977 Part I, II Specification for Timber Panelled and Glazed Shutters
5. IS: 2191 – 1983 Part I, II Specification for Wooden Flush Door Shutters
6. IS: 6198 – 1983 Specification for Ledged, Braced and Battened Door and Window Frame.

P893 MECHANICS OF SOLIDS LAB	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

Note: A minimum of 8 experiments from the following

1. Study of stress-strain characteristics of mild steel bars by UTM.
2. Study of stress-strain characteristics of HYSD bars by UTM.
3. Determination of modulus of elasticity of the material of the beam by conducting bending test on simply supported beam.
4. Determination of modulus of rigidity by conducting torsion test on solid circular shaft.
5. Determination of hardness of the given material by Brinnel's/Vicker's/ Rockwell hardness test.
6. Determination of impact strength of the given material by conducting Charpy/Izod test
7. Determination of ultimate shear strength of steel by conducting direct shear test.
8. Determination of modulus of rigidity of the material of closely coiled helical spring.
9. Determination of compressive strength of wood with grain parallel / perpendicular to loading.

P896 SURVEY FIELD WORK	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

CHAIN SURVEYING

1. (a) Pacing
   (b) Ranging
   (c) Spreading and Folding of Chain
   (d) Chaining of a line

2. (a) Determination of Area by taking Perpendicular Offsets
   (b) Determination of Area by taking Oblique Offsets

3. Determination of Obstacle Length

4. Chain and Cross Staff Survey – Running a closed traverse around an existing building

COMPASS SURVEYING

5. Compass traverse – Plotting and Adjustments of Traverse 6. Compass Surveying – Distance between Two Inaccessible Points

PLANE TABLE SURVEYING

7. (a) Radiation method of plane table survey
   (b) Intersection method of plane table survey

8. Plane Table traverse

9. Two Point Problem

10. Three Points Problem – Trial and error method

LEVELING

11. Simple Leveling (Including an inverted staff reading)
12. Fly LEVELING
13. Check LEVELING
14. Longitudinal sectioning and Cross Sectioning

IV -SEMESTER

T365 ADVANCED SURVEYING	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

UNIT- I

Theodolite.

Parts - Temporary and permanent adjustments of vernier theodolite - optical and micro optic theodolites – Total station – advantages Distomat - Trilateration – Traversing- Omitted measurements.

Setting out works Setting out of buildings and marking for foundation.

UNIT- II

Tacheometry

Principle of stadia and tangential tacheometry - Field procedure and different system - Heights and distances - Subtense bar.

UNIT- III

Curves

Simple, Compound, Transition, Reverse and Vertical Curves.

Trignometrical levelling

Single and Reciprocal observations - Eye and Object Corrections

UNIT –IV

Triangulation survey

Principle of Triangulation - Types of Signals - Intervisibility of stations - Base line measurements and corrections - Extension of base line - Satellite stations - Problems - Adjustment of Triangulation by the method of equal shifts.

UNIT- V

Hydrographic Surveying

Control - Shore line - River surveys - Soundings gauges - Signals - Sextant - Methods of locating soundings.

Photographic surveying

Terrestrial and Aerial Photographs - Stereoscopy - Flight planning - Satellite - Image Characteristics – Concepts of Remote sensing

TEXT BOOKS

1. Kanetkar,T.P, "**Surveying and Leveling Vol. I & II**", United Book Corporation, Pune, 23rd Edition. 1997
2. Punmia B.C., "**Surveying Vol. I, II & III**" Laxmi Publications 9th Edition, 1987
3. Bannister and Raymond, S, "**Surveying**", Pitman Publishing Ltd., 5ThEdition. 1987.

REFERENCES

1. Clark ,D,"**Plane & Geodetic Surveying Vol. I & II**" , CBS Publishers and Distributors, Delhi 6th Edition.1971
2. Shahani,P.B,"**Advanced surveying**", Oxford and IBH Publishing Company. 1971
3. Agor, R, "**Text Book of Advanced Surveying**", Khanna Publishers, 1981
4. Natarajan,V, "**Advanced Surveying**" , BI Publications, 54, Janpath, New Delhi. 1976
5. Arora, K.R," **Surveying Vol II & III**", Standard Book House & SBH Publishers & Distributors,1705, A Nai Sarak, New Delhi - 110 006,2nd Edition. 1993.

T366 APPLIED HYDRAULIC ENGINEERING	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

UNIT – I

OPEN CHANNEL FLOW

Types of flow, Types of Channel, Velocity distribution, Chezy, Manning and Basin formulae, for uniform flow, Most economical section , critical flow ,Specific energy, specific force. Computation of uniform flow and critical flow.

UNIT-II

OPEN CHANNEL FLOW

Non-Uniform flow, Dynamic equation for Gradually varied flow, computation for length of backwater curve, Rapidly Varied flow - hydraulic jump, types, uses. Surges in open channels.

UNIT-III

BASICS OF TURBO MACHINERY

Impulse momentum equation, Hydrodynamic forces of jets on vanes, velocity Triangles, Angular momentum principle, application to radial flow turbines.

UNIT-IV

TURBINES

Classification, impulse and reaction turbines, characteristic curves, draft tubes, governing of turbines, specific speed, unit quantities concept, similarity, cavitation.

UNIT-V

PUMPS:

Centrifugal pumps - classification, work done, minimum starting speed, losses and efficiencies, specific speed, multistage pumps, specific speed, characteristic curves, NPSH, Cavitation in pumps.

Reciprocating pumps - types, effects of acceleration and frictional resistance, separation, Air vessels, work saved by fitting air vessels.

TEXT BOOKS

1. Modi, P.N., and Seth, S.M., Hydraulics, Fluid Mechanics and Hydraulic Machines, Standard Book Home, New Delhi, 2005.
2. Rajput,R.K., Text Book of Fluid Mechanics and Hydraulic Machinery, S.Chand & Company, Ltd., New Delhi, 2005.

REFERENCES

1. Douglas, J.F., Gasiorek, J.M and Swaffield, J.A., Fluid Mechanics 4th Edn. Pearson Education India, 2002.
2. Das M.M Fluid Mechanics and Turbimachines , Prentice Hall of India (P) Ltd New Delhi, 2008.
3. Arore, K.R Fluid Mechanics, Hydraulic and Hydraulic Machines , Standard Publishers and Distributors , New Delhi , 2005

T374 CONCRETE TECHNOLOGY	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	4	25	75	100

UNIT –I

Concrete Making Materials

Cement –raw materials –manufacture- compound –composition- hydration of cement – types of cement-tests and specifications. Aggregates –size and shape –gradation of aggregate – fineness modulus – bulking of sand-tests and specifications – alkali aggregate reaction-quality of water for concreting and curing .

UNIT – II

Properties of Concrete

Properties of fresh concrete –workability –slump test –compaction factor test –flow test – segregation – bleeding Properties of hardened concrete –strength development –elastic properties of concrete-durability – impermeability - shrinkage and creep- thermal properties – fire resistance-resistance to abrasion.

UNIT- III

Quality Control and Admixtures in Concrete

Control techniques –storing –batching –mixing – transporting –placing –compacting – finishingcuring– tests and specifications for fresh and hardened concrete –acceptance and rejection criteria – introduction to nondestructive testing. Accelerators – retarders –water proofing compounds - air entraining agents–workability agents –bonding admixtures – pozzolanic admixtures – silica fume –fly ash –blast furnace slag-hyper plasticizer.

UNIT – IV

Special Concrete

Light weight concrete – light weight aggregate concrete –no fines concrete –high density concrete –sulphur infiltrated concrete –fibre reinforced concrete –polymer concrete –ready mixed concrete –high strength concrete –High performance concrete- Self compacting concrete-Bacterial concrete –gunite – shotcrete –vacuum concrete – pre packed concrete-ferro cement.

UNIT- V

Concreting Plant and Mix Design

Batching plant –mixer –distributing plant –vibrators – repairs in concrete –control of cracks in

mass concrete – surface treatment of concrete Concept of mix design –ACI method, Road note method (concepts only)- Indian Standard method.

TEXT BOOKS

1. Shetty. M.S, "**Concrete Technology**" S.Chand & Co., Ltd., New Delhi, 2003
2. Gambhir. M.L, "**Concrete Technology**", Tata McGraw Hill Publishing Co.,New Delhi 1998.

REFERENCES

1. Orchard .D.F "**Concrete Technology**", Vol & II, Applied Science Publishers Ltd,London, 1979
2. Neville , A. M, "**Properties of Concrete**",4th Edition Pitman Publishing Ltd,London, 1995.
3. Rofat Siddique "**Special structural Concrete**" Galgotiya Publishing Pvt. Ltd.,New Delhi, 1996

T383 ENGINEERING GEOLOGY	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

UNIT - I

GENERAL GEOLOGY

Geology in Civil Engineering – Branches of geology – Earth structure and composition – Continental drift – Weathering – types and products – Geological work of Rivers, Wind and Sea – Seismic zones of India – Geophysical Methods – Seismic and Electrical Methods for Subsurface Investigation

UNIT - II

MINEROLOGY

Physical properties of Minerals – Crystallographic system – Study of following rock forming minerals- Quartz, Felspar, Piroxene, Amphibole, Mica, Calcite, Gypsum and Clay

UNIT - III

PETROLOGY

Classification of Rocks – Igneous, Sedimentary and Metamorphic Rocks – Origin, Structure and Classification – Metamorphism – Engineering Properties – Distribution of Dolerite, Syenite, Gabbro, Basalt, Sandstone, Limestone, Conglomerate, Breccia, Quartzite, Marble, Gneiss, and Schist.

UNIT - IV

STRUCTURAL GEOLOGY

Civil Engineering Importance of Folds, Faults, Unconformity and Joints relevance to civil engineering –Prospect of ground water

UNIT - V

ENGINEERING APPLICATIONS IN GEOLOGY

Geological consideration in construction of Dam, Tunnel, Secured Landfill -Earthquake, causes and Distribution in India – Tsunami – Remote Sensing for Civil Engineering Applications.

TEXT BOOKS

1. Parbin Singh., "Engineering and General Geology", Katson Publication House, 2009.
2. Chenna Kesavulu N., "Text book of Engineering Geology", Macmillan India Ltd, 2003.

REFERENCES

1. Legget., "Geology and Engineering", 2nd Edition, McGraw Hill Book Company, 2006.
2. Blyth. "Geology for Engineers", 7th Edition, ELBS, 1995.

T391 HYDROLOGY	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	4	25	75	100

UNIT – I

Introduction - Definition and scope - Hydrologic cycle – Types and Forms of precipitation - Adequacy of rain gauges - Recording and non-recording gauges – Estimation of missing rainfall data.Mean precipitation over an area-– Thiessen and Isohyetal methods. Frequency analysis – Intensity-duration analysis - Rainfall Hyetograph - Rainfall Mass Curve - Double Mass curve.

UNIT – II

Interception – depression and detention storage – Infiltration- Measurement – Infiltrometers- Horton's equation, Infiltration equations, Infiltration indices. Evaporation Process- Measurement of Evaporation - Pan Coefficient - Horton's equation– evaporation suppression - Evapo - transpiration – measurement.

UNIT – III

Watershed, catchment and basin – catchment characteristics – factors affecting runoff - Components of runoff - Runoff estimation using empirical, Strange's table and SCS methods Stream flow and stream gauging – measurement of discharge- Area- velocity method, floats, current meter- Stage – Discharge rating curve.

UNIT- IV

Hydrograph Analysis – Components of hydrograph - Baseflow separation- Unit hydrograph – assumptions, limitation, derivation, applications- Synthetic unit hydrograph – S-hydrograph Flood Routing- Muskingum method – Modified pulse method.

UNIT –V

Groundwater- Types of aquifer – Aquifer parameters- Dupuit's assumptions-steady flow to wells for confined and unconfined Aquifer- Pumping test- Rain Water Harvesting (RWH) in rural and urban areas – RWH from roof top and open areas – Artificial recharge structures.

TEXT BOOKS

1. Subramanya.K., "**Engineering Hydrology"**, Tata McGraw Hill, New Delhi , 1999
2. Jayarami Reddy.P., "**Hydrology"**, Tata McGraw Hill, New Delhi , 1999
3. Ragunath.H., "**Hydrology"**, Wiley Eastern Limited, New Delhi, 1998.

REFERENCES

1. Ven Te. Chow, Maidment D.R. and Mays L.W. "**Applied Hydrology**," McGraw Hill International Book Company. New York, 1995.
2. Ven Te Chow, "**Hand book of Applied Hydrology"**, McGraw Hill Book Co., Inc., New York, 1964.
3. Vijay P.Singh, "**Elementary Hydrology"**, Prentice Hall of India, New Delhi, 1994.

T397 MECHANICS OF STRUCTURES	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

UNIT – I

Axial and bending stresses

Direct and bending stresses – uniaxial and biaxial eccentricities – middle third rule – core of the section – analysis of long column – different end conditions – Euler's theory – Rankine's formula – long column under eccentric loading.

UNIT – II

Principal stresses and strain

Analysis of two dimensional state of stress – biaxial state of stress – principal stresses and strains on inclined plane – Mohr's circle – Theories of failure

UNIT – III

Slope and deflections of determinate Beam.

Determination of slope and deflection of determinate beams – cantilever, simply supported and over hanging beam - Double Integration Method, Macaulay's Method and Moment Area Method

UNIT – IV

Slope and deflection of propped and fixed beams

Analysis of propped and fixed beam for shear force and bending moment – slope and deflection by Double Integration Method and Moment Area Method –Beams with yielding of supports

UNIT – V

Continuous Beams

Theorem of Three Moments – analysis of continuous beam with prismatic member - Beams with yielding of supports

TEXT BOOKS

1. Bhavikatti. S. S., Strength of Materials, Vikas Publishing House (P) Ltd., New Delhi, Second Edition, 2002.

2. Punmia. B. C., Jain, A. K., and Jain, A. K., Strength of Materials and Theory of Structures, Vols. I & II, XI Edition, Laxmi Publications (P) Ltd, New Delhi, 2002.

3. Hearn, E. J., Strength of Materials, Pergamon Press, Oxford,

P834 FLUID MECHANICS AND MACHINERY LAB	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

Note: A minimum of twelve (12 No) shall be done and recorded

1. Verification of Bernoulli's theorem.
2. Venturimeter : Determination of Coefficient of discharge.
3. Orificemeter : Determination of Coefficient of discharge.
4. Orifices : Determination of Coefficient of discharge by steady and unsteady flow methods.
5. Mouthpieces : Determination of Coefficient of discharge by steady and unsteady flow methods.
6. Characterization of laminar and turbulent flows by Reynold's apparatus.
7. Determination of friction factor of Pipes.
8. Determination of loss of head in pipes due to bend /sudden contraction/ sudden expansion.
9. Determination of Coefficient of discharge for rectangular notch / V – notch.
10. Determination of Manning's and Chezy's coefficients in open channel.
11. Study on Characteristics of Hydraulic Jump
12. Measurement of force due to impact of jets on vanes of different types.
13. Performance studies on Pelton turbine.
14. Performance studies on Francis turbine /Kaplan turbine.
15. Performance studies on single stage centrifugal pump.
16. Performance studies on Reciprocating pump.

P891 ENGINEERING GEOLOGY LAB	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

1. Description of Minerals by physical properties.
2. Description and Engineering uses of Rocks
3. Description and engineering consideration of Structural Models
4. Field Structural problems
5. Identification of Land forms, Drainage pattern and other features on Topo Sheets
6. Study and drawing of Geological cross sections
7. Study and Interpretation of satellite imageries
8. Electrical resistivity survey and Interpretration
9. Seismic Refraction survey using Hammer sounding method and interpretation.
10. Global positioning System (GPS) and its Functioning

V -SEMESTER

T369 BASIC STRUCTURAL ANALYSIS	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

COURSE OBJECTIVES

1. To study the analysis of pin jointed truss
2. To study the rolling loads and influence diagrams
3. To study the strain energy
4. To study the arches and suspension bridges
5. To study about unsymmetrical bending

COURSE OUTCOMES

1. Able to analyse pin jointed truss
2. Analyze rolling loads and draw influence line diagrams
3. Write the equations for strain energy and solve them
4. Analyze the arches and suspension bridges
5. Understand concept of unsymmetrical bending

UNIT – I

Analysis of pin jointed truss

Stability and equilibrium of pin jointed trusses – perfect frame -analysis of pin jointed plane truss by method of Joints, method of sections and tension coefficient method..

UNIT – II

Rolling loads and influence line diagrams

Single concentrated load – uniformly distributed load (longer and shorter than span) - two concentrated loads – several concentrated loads – equivalent UDL. Influence lines – ILD for reaction, shear force and bending moment for simply supported beams subjected to concentrated loads, uniformly distributed load (longer and shorter than span) – two concentrated loads – several concentrated loads.

UNIT – III

Strain energy

Strain energy – expression for different forms of strain energy – axial bending and shear - Castigliano's theorems – determination of slope and deflection of determinate and indeterminate beams and portal frames.

UNIT – IV

Arches and suspension bridges

Equation of the cable – tension in cable at different levels – cable subjected to point loads and UDL – length of cable stiffening girders – analysis of three hinged stiffening girder - moving loads and ILD in three hinged stiffening girder Types of arches - parabolic and circular arches – linear arch – Eddy's theorem – Analysis of three hinged arch - moving loads and ILD of three hinged arches.

UNIT – V

Unsymmetrical bending

Unsymmetrical bending – introduction – product of inertia – principal axes – principal moment of inertia – stresses due to unsymmetrical bending –shear center for sections with one axis of symmetry.

TEXT BOOKS

1. Bhavikatti. S. S., Strength of Materials, Vikas Publishing House (P) Ltd., New Delhi, Second Edition, 2002.
2. Bhavikatti. S. S., Structural Analysis – I, Vikas Publishing House (P) Ltd., New Delhi,
   Second Edition, 2002.
3. Punmia. B. C., Jain, A. K., and Jain, A. K., Strength of Materials and Theory of Structures, Vols. I & II, XI Edition, Laxmi Publications (P) Ltd, New Delhi, 2002.

T378 DESIGN OF R.C.C. ELEMENTS	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

COURSE OBJECTIVES

1. To study the principles of Limit State method of design
2. To study the concepts of Limit state of collapse under shear and torsion
3. To study the design principles of slabs
4. To study the concepts of Limit state method of collapse under compression
5. To study the concepts of Working stress method

COURSE OUTCOMES

1. Apply the principles of limit state method of design
2. Apply the concepts of Limit state of collapse under shear and torsion
3. Design the one-way and two-way slabs
4. Apply the concepts of Limit state of collapse under compression
5. Apply the concepts of Working stress method

UNIT – I

Principles of Limit State method of design – characteristic load and strength – Partial safety factor – stress block parameters Limit State of collapse – flexure – balance and under reinforced – design of singly and doubly reinforced rectangular section– analysis and design of under-reinforced flanged section – l/d ratio with medication factor for deflection calculation – cover for durability and fire resistance.

UNIT – II

Limit State of collapse – shear and torsion - design of a rectangular section for shear, shear-torsion and bending-torsion. Design for development length – end anchorages. Reinforcement details in beam for flexure, shear and torsion – serviceability requirements.

UNIT – III

Design of slabs - one way and two way – simply supported, continuous and restrained, using coefficients given in IS code Reinforcement details in one way and two way slabs – serviceability requirements.

UNIT – IV

Limit State of Collapse – compression; design of columns for axial load – square, rectangular and circular cross section with lateral and spiral ties. Design of short and long columns for uniaxial and biaxial eccentricities using interaction charts – Reinforcement details for columns – serviceability requirements.

UNIT – V

Concept of Working Stress Method – analysis and design of flexural member using working stress method – design of singly and doubly reinforced section – shear and torsion. Deflection calculation – short term and long term deflection – crack width calculation

TEXT BOOKS

1. Krishna Raju N. and Pranesh R.N., "**Reinforced concerete design IS 456-2000, Principles and practice**", New Age International (P) Ltd, publishers, New Delhi, 2003.
2. Ashok K. Jain, "**Reinforced Concrete Limit State Design**", 4th Edition Nem Chand & Bros, Roorkee,1993.
3. Punmia B.C et al, "**Comprehensive RCC Design**" Laxmi publications (P) Ltd, New Delhi,1998.
4. Gambhir M.I., "**Reinforced Concrete Design**", Macmilan India Limited, 1993.

T380 DESIGN OF STEEL STRUCTURES	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

COURSE OBJECTIVES

1. To get introduced to different types of connections and joints
2. To study about design of compression members
3. To study about design of tension members
4. To study about behaviour of steel beams
5. To learn design principles of beam members

COURSE OUTCOMES

1. Design different types of connections and joints
2. Design compression members
3. Design tension members
4. Design laterally restrained steel beams
5. Design beam columns

UNIT- I

What are steel structures? ; What a steel structure consists of? ; Structural steel; Products of structural steel ; Standards , Codes and Specifications; Fatigue ; Brittle fracture ; Corrosion protection of steel structures ; Design philosophies ; Methods of structural analysis ; Plate(Local) buckling ; Classification of sections, Design of Joints - Bolted and Welded Connections under axial and eccentric loadings.

UNIT- II

Compression Members: Introduction ; Euler's buckling theory ; Behaviour of real columns ; Types of sections ; Design of columns ; Validity of design strength calculations ; Design of compression members ; Design Procedure ; Built-up compression members.

UNIT- III

Tension Members: Design of Axially and Eccentrically Loaded Tension Members - Tension Splices- Design of Lug Angles, Column bases: Design of Column bases, Slab Bases, Gusseted base,

UNIT- IV

Behaviour of steel beams – Limit state of serviceability - design of laterally restrained steel beam Design of laterally unrestrained beams – lateral torsional buckling of beams – factors affecting lateral stability.

UNIT- V

Design of beam column – Short beam column – long beam column – strength of beam columns – Mode of failure.

TEXT BOOKS

1. Subramanian.P, Design of steel structures, Oxford Publishers, New Delhi, 2007.
2. Design of steel structures by K.S.Sai Ram, Pearson Education, 2010
3. Limit state design of steel structures by M.R.Shiyekar , PHI.

4. Learning Ramachandra, 'Design of Steel Structures', Vol. I & II, Standard book house, Delhi.

REFERENCES

1. Punmia B.C, Ahok Kumar Jain and Arun Kumar Jain, Comprehensive Design of Steel Structures, Lakshmi publications (P) Ltd., New Delhi, 1998.
2. Arya, A.S. and Ajmani, J.L., 'Design of Steel Structures', Nem Chand and Bros, Roorkee, 2000
3. Solmon and Johnson, 'Steel Structures- Design and Behaviour', Intext Educational Publishers, 1971

T393 IRRIGATION AND WATER RESOURCES ENGINEERING	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	3	25	75	100

COURSE OBJECTIVES

1. To study the development of water resources and terminology used
2. To learn the different methods of irrigation
3. To study about types of reservoirs
4. To study about design, failures and remedies of dams
5. To study the diversion head works

COURSE OUTCOMES

1. Understand the development of water resources and terminology used
2. Analyze the different methods of irrigation for adaptability
3. Assess the technical and sedimentation aspects of reservoirs
4. Design the dams based on forces acting on it
5. Design the diversion head works

UNIT – I

Introduction-Importance of water resources-status and development of Indian water resources-Soil- Water – Plant relationship- Wilting point- Crop rotation- Cropping season. - Crop Water relationships- Estimation of Evapo-transpiration, Consumptive use – Blaney criddle method, modified Penman method- Crop factor – Critical stages of crop growth for water requirement

UNIT – II

Duty-Delta, factors affecting duty-improvement of duty- Irrigation methods: Flooding, Furrow, Contour, Drip and Sprinkler- relative merits and limitations – Evaluation of irrigation methods – Irrigation efficiency- Irrigation Water Quality

UNIT – III

Reservoir types - Planning procedure for single and multipurpose projects – Fixation of Storage capacity - Strategies for reservoir operation - Sedimentation of reservoirs –River training works-types of works.

UNIT - IV

Dams- forces acting – failures and remedies – design of gravity dam - energy dissipators ogee spillways Components of irrigation network: Weirs, failures of weirs, Bligh's theory, Lanes weighted creep theory, Khosla's theory,

UNIT – V

Diversion head works- Divide wall, Fish ladder- Sluices, Head regulator-Silt control at head works – Silt excluder and silt ejector. Cross drainage works-functions of Aqueduct, Syphon aqueduct, Level crossing, inlet and outlet Canal outlets – Canal alignment - Design of canal by Lacey's theory, Kennedy's theory. Canal regulators - Water logging and Canal lining-canal maintenance

TEXT BOOKS

1. Santhosh Kumar Garg, "**Irrigation Engineering and Hydraulic Structures**," Khanna Publishers, New Delhi, 2003
2. Punmia.B.C, "**Irrigation and Water Power Engineering**," Standard Publishers, New Delhi, 1997.

REFERENCES

1. Michael A.M., "**Irrigation – Theory and Practice"**, Vikas Publishing House, New Delhi, 1990.
2. Sharma R.K., "**Irrigation Engineering and Hydraulic Structures**", Oxford and IBH Publishing company, New Delhi, 1994.
3. Dilip Kumar Majumdar, "**Irrigation Water Management Principles and Practice**", Prentice – Hall of India, Private Limited, New Delhi, 2000.
4. Modi.P.N., "**Irrigation Water Resources and Water Power Engineering**", Standard Book House, Delhi, 1995

T407 SOIL MECHANICS	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

COURSE OBJECTIVES

1. To study the different types and physical properties of soil
2. To study the permeability and effective stress distribution in soil
3. To study the shear strength parameters in soil
4. To analyze the stress distribution in soils
5. To study the concept of compaction and stability of soils

COURSE OUTCOMES

1. Understand the different types and physical properties of soil
2. Understand the permeability and effective stress distribution in soil
3. Determine the shear strength parameters of soil
4. Analyze the stress distribution in soil
5. Understand the compaction and stability of soils

UNIT –I

Types and physical properties of soil

Types of soil – Physical properties of soil and their determination – Important definitions related to three phase diagram and relationships – Field identification of soils – Classification of soils based on grain size distribution – Hydrometer analysis.

Consistency and plasticity characteristics of Soil

Determination of consistency limits and their significance to the field behaviour of soil – Classification of soils based on grain size and plasticity characteristics of soils.

UNIT –II

Permeability characteristics of soils

Darcy's Law and its validity – Factors affecting permeability – Laboratory determination of permeability for cohesive and cohesionless soils – Permeability of layered deposits

Concept of effective stress in soils

Terzaghi's effective stress concept for saturated soil deposits – seepage flow and seepage pressure – Quick sand condition and critical hydraulic gradient

UNIT- III

Shear strength of soils

Analysis of shear failure – shear and normal stress at a point – Mohr's stress circle – Relationship that can be obtained from Mohr's circle – Mohr's strength theory – Mohr's coulomb failure criterion Laboratory methods of determination of shear strength parameters of cohesive and non-cohesive soils – Direct shear test – Triaxial shear test – Unconfined compression test and Laboratory vane shear test – Advantages of triaxial test over other tests – Classification of shear test based on drainage conditions.

UNIT-IV

Stress Distribution in soils

Boussinesq's and Westergaard's theories for point loads and their comparison – Approximate methods of determination of stresses and its validity – Computation of stresses beneath

circular and square loaded areas – Concept of pressure bulb – Newmark's chart and its applications.

Compressibility characteristics of soils

Terzaghi's theory of one-dimensional consolidation – Concept of consolidation – Determination of coefficient of consolidation from consolidometer test data by Square root of time method and log time method – Calculation of consolidation settlement.

UNIT –V

Soil Compaction

Concept of compaction – Methods of laboratory compaction of soils – Factors affecting compaction – Zero air voids curve and its significance – Field compaction control.

Stability of slopes

Stability analysis of finite earth slopes – Factors of safety – Taylor's stability number and its significance – Stability analysis by method of Slices and F = 0 analysis – Different conditions of slope stability analysis.

TEXT BOOKS

1. Arora. K.R, "**Soil Mechanics and Foundation Engineering**", Standard Publishers & Distributors, Nai Sarak, Delhi, 1987
2. Murthy.V.N.S, "**A Text book of Soil Mechanics and Foundation Engineering**", Kripa Technical Consultants, Bangalore, 1992
3. Venkataramaiah, "**Geotechnical Engineering**", Wiley Eastern Ltd., Madras, 1993.
4. Punmia. B.C, "**Soil Mechanics and Foundation Engineering**", A.Saurabh and Co.,(P) Ltd., Madras, 1988.

REFERENCES

1. Taylor. D.W, "**Fundamentals of Soil Mechanics**", Asia Publishing house, 1948.
2. Terzaghi and Peck, "**Soil Mechanics in Engineering**", Asia Publishing house,
3. Joseph E. Bowles, "**Physical and Geotechnical Properties of Soils**", McGraw Hill Publishing Co., Newyork, 1994.
4. Lambe.T.W., "**Soil Testing for Engineers**", John wiley & Sons, Newyork, 1990.
5. Gopalranjan and Rao.A.S.R., "**Basic and Applied Soil Mechanics**", Wiley Eastern Ltd, New Delhi, 1997.

T412 WATER SUPPLY ENGINEERING	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	4	25	75	100

COURSE OBJECTIVES

1. To study the different sources and demands of water
2. To study the different intake works and quality aspects for water supply
3. To study the sedimentation design principles of water treatment
4. To study the filtration and chlorination aspects of water treatment
5. To study the distribution systems of water supply

COURSE OUTCOMES

1. Estimate the water demands of a community
2. Understand the different intake works and quality aspects for water supply
3. Design the sedimentation tanks for water treatment
4. Design the filtration and chlorination plants for water treatment
5. Analyze and design the distribution systems for water supply networks

UNIT-I

Importance and need for protected water supply - Water demands - Factors affecting per capita demand - Types of demand - fluctuations in demand - Population forecasting - Different methods – Sources of water - Classification and adequacy - Impounding reservoirs - Mass curve analysis –Well hydraulics – Darcy's law - Yield from shallow and deep wells of confined and unconfined aquifer - Infiltration wells and galleries.

UNIT-II

Intake works – Types of intakes - Methods of conveyance of water - Different types of pipe materials - Types of pipe joints - Pipe laying and testing - Corrosion of pipes - Pumps for lifting water - Quality of water - Importance of testing of water - Physical, chemical and biological analysis of water - Standards of water quality desired for domestic water supplies – BIS and WHO Standards - Water borne diseases.

UNIT-III

Treatment of water - Objectives of water treatment - Methods of treatment - Screening - Theory of sedimentation – Types of settling - Stoke's Law - Sedimentation tanks - Design of continuous flow sedimentation tanks - Sedimentation aided with coagulation - Theory of coagulation - Types of coagulants - mixing devices - Flocculator - Settling tank - optimum coagulant dosage - Jar test.

UNIT-IV

Filtration - Theory of filtration - Filter media - Sand filters - Types of sand filters - Slow sand filters - Rapid sand filters - Pressure filters - Design - Operation – Maintenance - Disinfection - Methods of disinfection - Chlorination - Dosage - Various forms - Types of chlorination - Softening of water - Removal of temporary and permanent hardness - Different methods – Other treatment methods – desalination- Reverse osmosis process – Electro dialysis – Fluoridation – Defluoridation - Aeration.

UNIT-V

Distribution of water - Layouts of distribution networks - Method of distribution - Distribution

reservoirs - Storage capacity of reservoir - Leakage detection and prevention. Analysis of pipe networks - Hardy Cross method - Equivalent Pipe method - Appurtenances in distribution system – House connections.

TEXT BOOKS

1. Garg S.K, "**Water Supply Engineering**", Khanna Publishers, Eleventh Edition, New Delhi. 1999.

REFERENCES

1. Punmia B C, Jain and Jain., "Water Supply Engineering", Laxmi Publications, New Delhi, 1992
2. Steel E.W., "**Water Supply and Sewerage**", Mc Graw Hill Publishers, New
2. Delhi. 1979
3. Fair & Geyer, "**Water and WasteWater Engineering Vol. I & II**",Wiley Eastern Publishers, New Delhi. 1966
4. Peavy Rowe, Tchobanoglous, "**Environmental Engineering**", McGraw Hill Publishers, New Delhi. 1985
5. Hazen William's Nomogram for C.I pipes.
6. Modi. P.N., "**Water Supply Engineering**", Standard Book House, Delhi. 1998.
7. Birdie G.S and Birdie J.S, "**Water Supply and Sanitary Engineering**" Dhatpat Rai Publishing Company New Delhi, 1998.

P889 CONCRETE TECHNOLOGY LABORATORY	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

COURSE OBJECTIVES

To determine the properties of cement, fine aggregate, coarse aggregate and concrete

COURSE OUTCOMES

Determine the properties of cement, fine aggregate, coarse aggregate and concrete

1. Determination of (a) Normal consistency of cement (b) Fineness of cement using 90 microns IS sieve.
2. Determination of Initial setting and final setting time of cement.
3. Determination of (a) Specific gravity of cement (b) soundness of cement.
4. Determination of Fineness modulus of (a) Fine aggregate (b) Coarse aggregate.
5. Determination of workability of concrete by conducting Slump cone test .
6. Determination of workability of concrete by conducting Compaction factor / Vee-Bee consistometer test
7. Determination of (a) Cube compressive strength (b) Split tensile strength of concrete.
8. Determination of modulus of elasticity of concrete by conducting compression test on concrete cylinder
10. Determination of Bulk density and Specific gravity of (a) fine aggregate (b) coarse aggregates.
11. Determination of Bulking of fine aggregate.
12. Non-destructive test on concrete using Rebound Hammer / Ultrasonic Tester

P886 ADVANCED SURVEY FIELD WORK	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

COURSE OBJECTIVES

To study the instruments such as total station, theodolite and execute small experiments

COURSE OUTCOMES

Operate the instruments such as total station and Theodolite for carrying out investigations required in the field

Theodolite

1. Traversing and adjustment of traverse
2. Determination of Horizontal and Vertical distances by stadia methods
3. Determination of Elevations and Heights
4. Height and distances – Single plane method
5. Height and distances – Double plane method

Tacheometry

6. Tacheometry – Constants of Tacheometer
7. Stadia Tachometry
8. Tangential Tacheometry
9. Tacheometric contouring – Radial method

Total Station

10. Study of Instrument – Determination of Distances, Directions and Elevations
11. Determination of Boundaries of a Field and computation of area.
12. Determination of Heights of objects.

Setting Out

12. Setting of simple circular curve using tape and chain.
13. Setting of simple circular curve using tape or/and theodolite
14. Setting of a simple circular curve using Total Station.
15. Setting out for Building.

Survey Camp is to be conducted for a minimum period of seven days to train in one of the following areas:

i. Preparation of a contour Plan/ Map.
ii. Earth work Computations for a high way / canal projects
iii. Marking of a Sewer line/ Water supply line.
iv. Any type of Execution works.

NOTE

50% Weight- age of total marks of this laboratory is to be given for total survey camp work including for Report submission by each batch.

VI -SEMESTER

T371 CLASSICAL STRUCTURAL MECHANICS	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

COURSE OBJECTIVES

1. To study the reciprocal theorem and ILD for forces in determinate trusses and indeterminate beams
2. To study the different energy methods for trusses
3. To study the slope-deflection method
4. To study the moment distribution method
5. To study the Kani's method

COURSE OUTCOMES

1. Understand the reciprocal theorem and draw ILD for forces in determinate trusses and indeterminate beams
2. Analyze the trusses using strain energy method
3. Analyze the beams using slope-deflection method
4. Analyze the beams using moment distribution method
5. Analyze the beams using Kanis method

UNIT – I

Maxwell's reciprocal theorem – Betti's reciprocal theorem – Muller Breslau's theorem

ILD for forces in Determinate Trusses and Indeterminate Beams

ILD for reaction, bending moment and shear force for propped cantilever and two span continuous beams (up to two degree redundancy).

UNIT- II

Energy Methods for Trusses

Analysis of indeterminate trusses by strain energy method – degree of redundancy – internal and external redundancy – lack of fit – temperature stresses (upto two degree of redundancy)

UNIT – III

Slope – Deflection Method

Derivation of Slope deflection equation - Analysis of statically indeterminate beams and frames (single storey single bay only) – continuous beams with and without support yielding – analysis of portal frames (single storey single bay only) – gable frames – box culvert.

UNIT IV

Moment – Distribution Method

Stiffness, carry over and distribution factors – analysis of statically indeterminate beams and frames (single storey single bay only) – continuous beams with and without support yielding – portal frames (single storey single bay only) – gable frames – box culvert.

UNIT – V

Kani's method

Rotation, translation and distribution factors – analysis of statically indeterminate beams and frames up to two degree of redundancy – continuous beams with and without support yielding – analysis of portal frames (single storey single bay only)

TEXT BOOKS

1. Punmia. B. C., Jain, A. K., and Jain, A. K., Strength of Materials and Theory of Structures, Vol. II, Eleventh Edition, Laxmi Publications, New Delhi, 2002.
2. Bhavikatti. S. S., Structural Analysis, Vol. I, Vikas Publishing House (P) Ltd., New Delhi, Second Edition, 2002.

REFERENCES

1. Wang. C. K., Intermediate Structural Analysis, McGraw Hill Publishing Co., Tokyo, Fourth Edition, 1989.
2. Jindal, R. L., Indeterminate Structural Analysis, S.Chand & Co. New Delhi, Third Edition, 1997.
3. Kinney. S.J., Indeterminate Structural Analysis, Oxford IBH Publishing Co., 1999

T379 DESIGN OF RCC STRUCTURES	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

COURSE OBJECTIVES

1. To study the design aspects of shallow foundations
2. To study the design aspects of flat and grid slabs
3. To study the design aspects of stair case
4. To study the design of retaining walls
5. To study the design aspects of RCC water tanks

COURSE OUTCOMES

1. Design the shallow foundations
2. Design the flat and grid slabs
3. Design the stair case
4. Design the retaining walls
5. Design the RCC water tanks

UNIT- I

Design of shallow foundation – square – rectangular isolated footing of uniform thickness and sloped footing – combined – rectangular and trapezoidal footing

UNIT-II

Yield line theory – Design of circular, flat and grid slabs with different boundary conditions subjected to UDL.

UNIT-III

Design of stairs spanning horizontally – Design of dog legged stair.

UNIT-IV

Types of retaining walls, Forces on retaining walls; Stability requirements; Design and detailing of cantilever type retaining wall.

UNIT-V

Design of RCC water tanks –surface, underground, and elevated- rectangular and circular - Staging.

TEXT BOOKS

1. Punmia B.C, Ashok Kumar Jain, Arun Kumar Jain "**Comprehensive RCC Design**" Laxmi publications (P) Ltd, New Delhi, 1998
2. Ashok K. Jain, "**Reinforced Concrete Limit State Design**", 4th Edition Nem Chand & Bros, Roorkee,1993
3. Krishnaraju. N, "**Advanced Reinforced Concrete design**", CBS Publishers & Distributors, New Delhi, 1988.

REFERENCES

1. Varghese, "**Limit State Design of Reinforced Concrete**", Prentice Hall of India Pvt., Ltd., New Delhi, 2002
2. Varghese, "**Advanced Reinforced Concrete Design**", Prentice Hall of India Pvt., Ltd., New Delhi, 2002
3. Unnikrishna pillai and Devdas Menon, "**Reinforced concrete design**", Tata McGraw Hill Publishing company Ltd, New Delhi, 1998

IS CODES

1. IS 456:2000 Plain and Reinforced Concrete – Code of Practice.
2. SP 16:1980 Design Aids for Reinforced Concrete to IS:456-1978.
3. IS 3370 (1-4):1965 Code of Practice for Concrete Structures for the Storage of Liquids.
4. IS 875 (1-5):1987 Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures.

T388 FOUNDATION ENGINEERING	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

COURSE OBJECTIVES

1. To study the various aspects of site investigations and selection of foundations
2. To study the shallow foundations and bearing capacity of the soils
3. To study the deep foundations and understand the group capacity of piles
4. To study the earth pressure theories
5. To study the special foundations

COURSE OUTCOMES

1. Understand the several aspects of site investigations and selection of foundations
2. Design the shallow foundations and estimate bearing capacity of soils
3. Design the deep foundations
4. Analyze the earth pressure theories
5. Design the caisson and other special foundations

UNIT- I

Site investigation and Selection of foundations

Objective of site investigation – Methods of investigation – Planning of Site investigation – Depth of soil exploration – Significant depth – Spacing of bore holes – Standard penetration test and its significance in soil exploration – Correction to Standard penetration values – Functions and requisites of foundation – Different types of shallow foundations and situations under which they are adopted. Soil sampling techniques – Sampling Disturbance – Methods of obtaining undisturbed samples – Requirements of an undisturbed sample.

UNIT-II

Shallow Foundations and Bearing Capacity of Soils

Bearing Capacity of soils – Factors affecting Bearing capacity of soil – Terzaghi's and Meyerhof's bearing capacity theories- General principle of Design of Shallow Foundations – Floating Founadtion — Plate bearing test and its limitations – Vibro Floatation method of improving bearing capacity of sandy soils. Settlement of foundation – Causes of total and differential settlement of foundations in sand and clays – Methods of controlling settlement – Code provisions – Conventional procedure for proportioning of footing for equal settlement.

UNIT –III

Deep Foundations

Pile foundation – Consideration leading to the selection of pile foundation – Functions of piles – Types of piles – Friction pile, End bearing pile – Pile grouping – Soil structure interaction - Estimation of individual pile capacity by Static and Dynamic approaches.

Group Capacity of Piles

Pile group efficiency – Downward drag phenomenon on piles and its significance in the design of pile foundations – Pile load test (Constant rate penetration test only) and its interpretation – Impact of pile driving (within the site and neighbouring area)

UNIT-IV

Earth Pressure Theories

Rankine's and Coulomb's earth pressure theories and their comparison – Earth pressure at rest – Active and Passive earth pressures for cohesive and non cohesive soils and their determination by analytical methods only (No graphical procedures)

Retaining Walls

Different types of Retaining Walls – Design principles of Cantilever and Counterfort Retaining walls (Structural Design not included).

UNIT-V

Special Foundations

Caisson Foundation – Necessity of selection – Types of Caisson foundation – Design principles of Caisson foundation (Structural Design not included). Foundation in filled up grounds – Foundation on expansive soil – Use of under-reamed pile foundations – Principles of Machine foundations – Design principles and code provisions.

TEXT BOOKS

1. Arora K.R, "**Soil Mechanics and Foundation Engineering**", Standard Publishers &
1. Distributors, Nai Sarak, Delhi. 1987
2. Brahma.S.P, "**Foundation Engineering**", Tata McGraw Hill Publishing Co., Ltd., New
3. Delhi. 1985
4. Shamsher Prakash, Swamisaran and Gopal Ranjan , "**Analysis and Design of Foundations and Retaining Structures**", Sarita Prakashan, Meerut, New Delhi. 1987.

REFERENCES

1. Wayne C. Teng, "**Foundation Design**", Printice Hall of India Ltd., New Delhi. 1965.
1. Peck.R.B, Hanson,W.E and Thomburn.T.W, "**Foundation Engineering**", John Wiley and Sons, New York. 1974.
2. Nayak.N.V, "**Foundation Design Manual**", Dhanpat Rai and Sons. 1982.
3. Leonards.C.A, "**Foundation Engineering**", McGraw Hill Book Co., Inc., New York. 1962.

T364 HIGHWAYS AND AIRPORT ENGINEERING	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	3	25	75	100

COURSE OBJECTIVES

1. To study the concept of highway planning and alignment
2. To study the various geometric elements
3. To study the different highway materials used for their construction
4. To study the issues of Highway design and maintenance
5. To study the site selection, design and planning of airports

COURSE OUTCOMES

1. Understand the concept of highway planning and alignment
2. Design the various geometric elements
3. Understand the different highway materials used for their construction
4. Understand the issues of Highway design and maintenance
5. Plan and design the important features of airports

UNIT- I

Highway planning and Alignment

History of road development in India – Jayakar committee recommendations - Institutions for Highway planning design and implementation at different levels - Engineering Surveys for Alignment – conventional and modern methods (Remote sensing, GIS and GPS techniques) IRC classification of urban and rural roads – Highway cross sectional elements – Right of way, Carriage way, Camber, Kerbs, Shoulders and Footpaths

UNIT – II

Geometric Elements

Geometric Standards – Super elevation, Widening of pavements and Transition curves – Ruling, Limiting, Exceptional and Minimum Gradients – Sight Distance – Factors affecting Sight Distance – PIEV Theory – Stopping Sight Distance (SSD) – Overtaking Sight Distance (OSD) – Sight Distance at Intersection Geometric Design of Hill Roads

UNIT- III

Highway Materials and Construction

Subgrade soil - Aggregates - Bituminous materials – Desirable properties – California Bearing Ratio Test and Field Density Test for soil – Crushing, Abrasion and Impact Test for aggregates – Penetration, Ductility, Viscosity, Binder content and Softening point Test for bitumen Construction of Earth, Gravel, WBM, Bituminous and Cement Concrete roads as per IRC and MORTH specifications – BOT and BOLT concepts for highway construction.

UNIT- IV

Highway Design and Maintenance

Design principles of Flexible and Rigid Pavements – Design of Flexible pavement (CBR method, IRC Recommendations – Problems) Design of Rigid Pavement (IRC Recommendations – Problems), Defects in flexible pavements – surface defects, cracks,

deformation, disintegration – symptoms, causes and treatments. Failures in rigid pavements – scaling, shrinkage, warping, structural cracks, spalling of joints and mud pumping – special repairs.

UNIT – V

Airport Engineering

Importance of Airports in National Transportation Sector – Airport Planning - Standards for planning of airports as per ICAO – Site selection survey – Airport Zoning – Runway – Orientation – Geometric design – Different types, pattern and layout Taxiways and Aprons – Holding Aprons – Planning and layout of Terminal Buildings, Hangars and Parking area

TEXT BOOKS

1. Khanna,S.K and Justo, "**Highway Engineering**", New Chand and Bros, Roorkee, 8th edition, 2001.
2. Khanna,S.K and Arora,M.G & Jain,S.S, "**Airport Planning and Design**", New Chand and Bros, Roorkee, 2001.

REFERENCES

1. Kadiyali,L.R., "**Principles and Practice of Highway Engineering**", Khanna Publishers Ltd. New Delhi, 2000
2. Sehgal,S.B and Bhanot,B.L, "**Highway and Airport Engineering**", S.Chand and Company Ltd. New Delhi, 1978
3. Venkatappa Rao,G, "**Principles of transportation and Highway Engineering**", Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2000.

IS Codes

1. IRC Standards
2. Bureau of Indian Standards (BIS) Publications on Highway Materials
3. MORTH Guidelines for Highway Engineering.

T405 SANITARY ENGINEERING	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	4	25	75	100

COURSE OUTCOMES

1. To study the factors affecting sewage generations and sewer design parameters
2. To study the Decomposition cycles and quality characteristics of sewage
3. To study the preliminary and primary treatment aspects of sewage
4. To study the treatment aspects of sewage and sludge
5. To study the disposal options of sewage

COURSE OUTCOMES

1. Estimate sewage generation from a community and design the sewers
2. Analyse the quality parameters of sewage for their importance in sewage treatment
3. Design the primary treatment system of sewage treatment
4. Design the biological treatment systems for sewage and sludge
5. Select appropriate disposal methods for disposing sewage

UNIT-I

Systems of sanitation - Estimating quantity of sewage - Dry weather flow - Estimating storm run off by rational formula - Systems of sewerage - Separate, combined and partially separate system - Different shapes of sewer - Hydraulic design of sewers - Use of Nomograms & charts.

UNIT –II

Forces acting on sewers - Sewer materials – Laying and testing of sewers - Sewer appurtenances - Maintenance of sewer - cleaning and ventilation of sewers –Pumping of sewage – Types of pumps - Characteristics of sewage - Decomposition - Aerobic and anaerobic decomposition – carbon, nitrogen, sulphur cycles - Physical and chemical quality of sewage - BOD and their testing - BOD curve – BOD equation - Problems - Population equivalent.

UNIT-III

Treatment of sewage - Primary treatment - Screening - Grit chamber - Design of grit chamber - Skimming tanks - Primary sedimentation tanks and its design - Secondary treatment of sewage – Activated sludge process – Methods of aeration for activated sludge process - Bulking of sludge and its control – Design considerations in ASP, BOD loading, F/M ratio, sludge age, sludge volume index – Modifications in ASP – Other treatments viz Oxidation ponds , aerated lagoon, stabilization ponds, oxidation ditches.

UNIT-IV

Biological filtration of sewage - Contact beds, intermittent sand filters - Trickling filters – Types of trickling filter– Low rate and high rate trickling filters - Design of trickling filters – Advanced biological treatment - Sludge digestion - Sludge characteristics - Digestion process - Digestion tanks - Design - Disposal of digested sludge.

UNIT-V

Disposal of sewage - Methods of disposal - By dilution - Self purification of natural streams - Zones of pollution in a river - Oxygen deficit – Deoxygenation and reoxygenation curves – Oxygen -Deficit curve - Streeter - Phelps equation - problems - Disposal on lakes, sea -

Disposal on land – Effluent irrigation and sewage farming - Sewage sickness. Disposal of sewage in isolated buildings - Septic tanks - Construction details – Designconsiderations - Code provisions - Dispersion trenches - Soaking pit – Sanitary practices in rural areas.Drainage and sanitation in buildings - Plumbing system - Types of traps - Systems of plumbing -Single stack system - One pipe system -Two pipe system - Sanitary fittings.

TEXT BOOK

1. Garg.S.K, "**Sewage disposal and Air Pollution Engineering**", Khanna Publishers New Delhi. 2001

REFERENCES

1. Birdie G.S, Birdie J.S, "**Water Supply and Sanitary Engineering**", Dhanpat Rai PublishingCompany, New Delhi, 1998
2. Peavy, Rowe, Tchobanoglous , "**Environmental Engineering**", McGraw Hill Publishers, NewDelhi. 1985
3. Hussain S.K, "**Water Supply and Sanitary Engineering** ", Oxford & IBH Publishers PublishingCo.Pvt Ltd., New Delhi. 1985
4. Punmia B.C, Ashok Jain, "**Waste water Engineering**", Laxmi Publications, New Delhi, 1998
5. Mark J. Hammer, Mark J.Hammer, Jr, "**Water and Wastewater Technology**", Prentice Hall ofIndia Pvt., Ltd., New Delhi, 2002.
6. Duggal K.N., "**Elements of Environmental Engineering**", S.Chand & Company Limited, NewDelhi, 2000.
7. Manual on sewerage and sewage treatment, CPHEEO, Ministry of urban affairs and employment,Govt. of India, New Delhi, 2001

T385 ENVIRONMENTAL IMPACT ASSESSMENT	L	T	P	Credits	Internal	External	TOTAL
	3	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study the framework of EIA
2. To study the air and noise quality impacts of developmental projects
3. To study the Energy and Wild life impacts of developmental projects
4. To study the Water quality impact of developmental projects
5. Understand the different methodologies available for environmental and energy assessment.

COURSE OUTCOMES

1. Realize the importance of EIA.
2. Assess impacts of air and noise qualities
3. Assess impacts of energy and wild life
4. Assess impacts of water quality
5. Assess the suitability of the available methodologies.

UNIT-I

Introduction

Historical perspective of environmental protection laws and acts in India- Definition of EIA, Industrial policy statement of the Govt. of India.

Legal Aspects

Constitutional provisional - Fiscal incentives for environmental protection – National Standards - Bureau of Indian Standards and WHO standards.

Socio Economic Impact

Types of impact -Steps in performing socioeconomic impact assessment- Analysis of public services and facilities impact-Social impacts-Impacts of economic profile of the community.

UNIT-II

Air Quality Impact

Background -Typical considerations and factors-Impact of industry- Transportation- Human settlements and mitigation methods.

Noise Impact

Noise and sound-The effects of noise on people-Noise scales and rating methods-Estimating transportation noise impacts and planning.

UNIT-III

Energy Impact

Energy impact consideration- sources data - energy conservation data - EIA of hydrothermal and nuclear power plants.

Forest and Wild Life Impact

Biological concepts and terms-Impact on flora and fauna-Mitigation measures and alternatives.

UNIT-IV

Water Quality Impact

Water quality criteria and standards- water quality impacts by development projects-Assessment of water qualities-impact of water quality on Agriculture, human beings and Industries - Planning for protected water supply.

UNIT-V

Methodology of EIA

EIA methodologies, Preliminary assessment and qualification-Comparison of alternatives-Cost benefit analysis-Public involvement-Exchange of information, training- Case studies on EIA of development projects and Environmental auditing.

TEXT BOOKS

1. John .G. Rau & David G Hooten , "**Environmental impact analysis Handbook**", McGraw Hill Publishing & Co, Newyork. 1990.
2. Shukla,S.K& Srivatsava,P.R, "**Concepts in Environmental Impact Analysis**", CommonwealthPublications, New Delhi, 1992.
3. Y.Anjaneyulu Environmental Impact Assessment Methodologies, B.S. Publication, Sultan Bazar, Hyderabad
4. Suresh K. Dhameja Environmental Science and Engineering, S.K.,Katania & Sons Publication., New Delhi

REFERENCES

1. Jain RK, LV,Stacey G.S., "**Environmental impact Analysis**", Van Nostrand Co. Newyork, 1977
2. **Guidelines to environmental impact assessment in developing countries**, UNEP, 1985.
3. John E. Heer and Joseph Hagerty.D "**Environmental Assessment and statements**", Van NostrandRanhold Co, Newyork. 1977.
4. Larry W.Canter,, "**Environmental Impact Assessment**" McGraw Hill Book Co. New Delhi, 1996.
5. Golden J. "**Environmental impact Data Book**", An Ambor Science,. 1979.

T387 FINITE ELEMENT METHOD	L	T	P	Credits	Internal	External	TOTAL
	3	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study the fundamental aspects of finite element method
2. To study the one-dimensional problems
3. To analyze the trusses using FEM
4. To analyze a two dimensional problem
5. To analyze two dimensional isoparameteric elements and numerical integration problems

COURSE OUTCOMES

1. Understand the fundamental aspects of FEM
2. Solve one dimensional problems
3. Analyze and solve Trusses
4. Solve two dimensional problems
5. Analyze and solve two dimensional isoparameteric elements and numerical integration problems

UNIT – I

Fundamental Concepts

Introduction - Stresses and equilibrium - Boundary conditions - Strain displacement relations - Stress strain relations - Potential energy and equilibrium – Weighted Integral and Weak Formulations – Variational Approach – Rayleigh Ritz Method

UNIT – II

One - Dimensional Problems

Introduction - Modeling - Co-ordinates and shape functions - Potential energy approach - Galerkin Approach - Assembly of global stiffness matrix and load vector - Properties of K - FE Equations - Treatment of Boundary conditions - Quadratic shape functions.

UNIT – III

Trusses

Introduction – Plane trusses – Local and Global coordinate systems – Element Stiffness Matrix – Stress Calculations – Introduction to three dimensional trusses

UNIT – IV

Two dimensional Problems

Introduction – Finite element modelling – Constant Strain Triangle – Iso-parametric representation – Potential energy approach - Element Stiffness – Force terms – Stress calculations – Introduction to beam element.

UNIT – V

Two dimensional isoparametric elements and Numerical Integration

Introduction – Four node quadrilateral – Shape functions – Element stiffness matrix – element force vectors – Higher order elements and Applications – Nine node quadrilateral – Eight node quadrilateral – Numerical Integration –One point formula – Two point formula - Two dimensional integrals

TEXT BOOKS

1. Tirupathi R. Chandrupatla, Ashok D. Belegundu, "**Introduction to Finite Elements in Engineering**", Third Edition, Prentice Hall of India,2002.
2. Finite Element Method by S.S.Bhavikatti

REFERENCES

1. Reddy.J.N, "**An Introduction to the Finite Element Method**", M/s. Tata McGraw Hill Publishing Co., Ltd., New Delhi, 2003.
2. Desai.C.S and Abel.J.F, "**Introduction to Finite Element Method**", East Western Press Pvt. Ltd., New Delhi, 1987
3. Zienkiewics.O.C, "**The finite element method**" fourth edition, M/s. Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2000.
4. Rajasekaran, S, "**Finite Element Analysis in Engineering Design**", A.H. Wheeler Publishing, 1993

T389 GROUND IMPROVEMENT TECHNIQUES	L	T	P	Credits	Internal	External	TOTAL
	3	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study the role of ground improvement in foundation engineering
2. To study the drainage and dewatering aspects
3. To study the in-situ treatment of soils
4. To study the grouting technique in soil
5. To study the Geosynthetics applications

COURSE OUTCOMES

1. Understand the ground improvement methods
2. Understand the drainage and dewatering approaches
3. Apply the techniques of in-situ treatment of soils
4. Apply the techniques of grouting in soils
5. Apply the Geosynthetics applications in soils

UNIT - I

INTRODUCTION

Role of ground improvement in foundation engineering – Ground improvement methods – Geotechnical problems in lateritic, alluvial and black cotton soils – selection of Ground improvement techniques based on soil conditions-use of piezometers-inclinometers in field

UNIT - II

DRAINAGE AND DEWATERING

Well point system – Vacuum dewatering system – Electro-osmatic method – Seepage analysis for two dimensional flow – fully penetrating slots in homogeneous deposits (simple cases only).

UNIT - III

INSITU TREATMENT OF SOILS

Insitu densification of Granular and consolidation of cohesive soils – Dynamic compaction – Vibrofloatation – Sand pile compaction – Stone Column - Preloading with sand drains and fabric drains.

UNIT - IV

GROUTING TECHNIQUE

Suspension grouts – solutions grouts – Grouting equipment and method – Grouting with soil, Bentonite – cement mixes and asphalt – Grout monitoring schemes.

UNIT - V

GEOSYNTHETICS APPLICATIONS

Types of Geosynthetic materials- Geotextile – Types – Geotextiles in Filtration, Drainage, seperation and reinforcement – Geomembranes – Containments and barriers – Application to Ground Anchors.

TEXT BOOKS

1. Koerner.R.M., *Construction and Geotechnical Methods in Foundation Engineering*, McGraw Hill Publishing Company, New york, 1984.
2. Purusothamaraj.P., *Ground Improvement Techniques*, Laxmi Publication (P) Ltd., New Delhi, 2000.

REFERENCES

1. Moseley. M.P., *Ground Improvement*, Blackie Academic and Professional, Chapman and Hall, Glassgow,1993.
2. Manfred R.Hausmann, *Engineering Principles of Ground Modification*, McGraw Hill Publishing Company, New york, 1990.
3. John, N.W.M., *Geotextiles*, John Blackies and Sons Ltd., London, 1987

T400 PRESTRESSED CONCRETE	L	T	P	Credits	Internal	External	TOTAL
	3	0	0	3	25	75	100

COURSE OBJECTIVES:

1. Distinguish between RCC and PSC members
2. Understand principle in various methods of pre stressing systems
3. Evaluate the losses in pre tensioned members
4. Evaluate the losses post tensioned members
5. Analyze and design members subjected to flexure and shear.

COURSE OUTCOMES:

1. Understand the general mechanical behavior of prestressed concrete.
2. Perform analysis and design of prestressed concrete members and connections
3. Identify and interpret the appropriate relevant industry design codes.
4. Become familiar with professional and contemporary issues in the design and fabrication of prestressed concrete members.
5. Perform an industry relevant design project in a team setting.

UNIT – I

General principles

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.

I.S.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 – II

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.

Analysis of sections for flexure; Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.

UNIT – III

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 – IV

ANALYSIS OF END BLOCKS: by Guyon's method and Mugnel method, Anchorage zone strusses – Approximate method of design – Anchorage zone reinforcement – Transfer of prestress pre-tensioned members.

Composite section: Introduction – Analysis of stress – Differential shrinkage – General design considerations.

UNIT – V

DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS: Importance of control of deflections – factors influencing deflections – short term deflections of uncracked member's prediction of long term deflections.

TEXT BOOKS

1. Krishnaraju N, "**Prestressed Concrete**", Tata McGraw Hill Publishing Co.,Ltd., New Delhi, 1995.
2. Rajagopalan.N, "**Prestressed Concrete**",Narosa Publishing House, New Delhi, 2002.
3. Sinha.M.C & Roy.S.K, "**Fundamentals of Prestressed Concrete**", S.Chand & Company Ltd, New Delhi, 1994.

REFERENCES

1. James R. Libby, "**Modern Prestressed Concrete**", Design principles and Construction methods - Van Standard Rainford Co., New York, 1977
2. Lin. T.Y, & Ned. H.Burns, "**Design of Prestressed Concrete Structures**",John Wiley & Sons, New York, 1981.
3. Arthur H.Nilson, "**Design of Prestressed Concrete**", John Wiley & Sons, New York, 1978.
4. Dayaratnam, P, "Prestressed Concrete Structures", Oxford and IBH, New Delhi, 1982.

IS Codes

1. IS 1343:1980 Code of Practice for Pre Stressed Concrete
2. IS 3370(Part 3):1965 Code of Practice for Concrete Structures for the Storage of Liquids-Part 3 Pre stressed Concrete
3. IS 3370(Part 4):1965 Code of Practice for Concrete Structures for the Storage -Part 4

NOTE : These codes are permitted in the End Examinations

T372 COASTAL ENGINEERING	L	T	P	Credits	Internal	External	TOTAL
	3	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study the factors affecting coastal topography
2. To study the wave formation and transformation
3. To study the wave forces on structures
4. To study the sediment movement
5. To study the coastal protection methods

COURSE OUTCOMES

1. Understand the factors affecting coastal topography
2. Understand the wave formation and transformation
3. Understand the wave forces on structures
4. Understand the sediment movement
5. Understand the coastal protection methods

UNIT – I

Coastal zone: Definition and sub division – Factors influencing coastal topography - Waves: Definitions - Classification – Liner wave theory – Assumptions and derivations of relationships – Pressure within progressive wave – Wave energy – Problems.

UNIT – II

Wave Transformation: Wave generation – Shoaling – Refraction – Reflection – Diffraction – Breaking of waves – Near shore currents – Tides - Tsunamis - Wave Hindcasting – forecasting - Sea level changes.

UNIT – III

Wave forces on Structures: Force due to non breaking, breaking and broken waves on vertical, sloping, curved, stepped barriers and on piles – Problems.

UNIT – IV

Sediment Movement : Types – Littoral Drift – Erosion process – Near shore, long shore currents and effects - Beach profile changes – case studies – Beach process - Environmental parameters- Coastal erosion in India - Dredging – Dredgers - Environmental effects of dredging - Remote sensing and GIS application in coastal engineering.

UNIT – V

Coastal Protection: Methods – Function – Types - Design concepts – Sea walls – Bulkhead – Revetment – Groins – Artificial beach nourishment – Scour – Maintenance of coastal structures.

TEXT BOOKS

1. Narasimhan & S. kathiroli, Harbour and Coastal Engineering (Indian Scenario) Vol - I &Vol – II, NIOT- Chennai
2. Shore Protection Manual (Vol – I, II, III) U.S. Army Crops of Engg. USA.

REFERENCES

1. Ippen, A.T., Estuarine and coastline Hydrodynamics, McGraw Hill Book Co., New York
2. Wiegel. R.L. Oceanographical Engineering., Prentice Hall, Eagle Wood Cliffs, New Jercy
3. Dean .R.G. and Darymple, R.A. Water Mechanics for Engineers and scientists.

P890 COMPUTER APPLICATIONS IN CIVIL ENGINEERING LAB	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

COURSE OBJECTIVES

1. To generate the programming code for civil engineering applications

COURSE OUTCOMES

1. Generate and execute the programming code for civil engineering applications

Note: A minimum of twelve (12No) shall be done and recorded

Students are required to write and execute programmes to solve the following problems. Programmes shall be in C or C++ language or MATLAB/JAVA. *or*MS-Office Softwares

CYCLE-1

(Write any SIX programmes)

1. Design of Reinforced Beam for flexure by limit state method.
2. Design of T- Beam for flexure by limit state method.
3. Design of Reinforced beam for Shear by limit state method.
4. Design of simply supported one-way slab.
5. Design of steel tension member
6. Design of steel compression member
7. Design of slab base for a steel column
8. Design of laterally supported steel beam
9. Design of beam to column framed connection using bolts

CYCLE-2

(Write any THREE programmes)

1. Classification of soil by Indian standard classification system.
2. Stresses due to applied loads both Boussinesq and Westerguard analysis
3. Concentrated load b) circular loaded area c) Rectangular loaded area
4. Determination of permeability coefficient by constant head and falling permeability tests.
5. Determination of index properties of soil**.**

CYCLE-3

Write any THREE programmes)

1. Design of an open channel
2. Analysis of water distribution networks (Hardy cross method).
3. Determination of the height of the building when base is accessible.
4. Determination of included angles from the given bearing and check for local attraction.

P895 SOIL MECHANICS LABORATORY	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

COURSE OBJECTIVES

2. To study the engineering, index and strength properties of soil

COURSE OUTCOMES

2. Determine the engineering, index and strength properties of soil for field applications

Note: A minimum of twelve (12No) shall be done and recorded

1. Determination of water content by oven drying method.
2. Determination of specific gravity by
   b) Density bottle method
   c) Pycnometer method.
3. Gradation analysis
   b) Mechanical Sieve analysis
   c) Hydrometer analysis.
4. Determination of Atterberg limits
5. Determination of free swell index
6. Determination of field unit weight by
   b) Core cutter method.
   c) Sand replacement method.
7. Determination of permeability by
   b) Constant head permeameter.
   c) Variable head permeameter.
8. Direct shear test.
9. Vane shear test.
10. Unconfined compression test
11. IS - Light compaction test
12. IS - Heavy compaction test
13. Triaxial shear test.
14. Consolidation test.

VII -SEMESTER

T373 COMPUTATIONAL METHODS OF STRUCTURAL ANALYSIS	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

COURSE OBJECTIVES

1. To study about Flexibility matrix method
2. To study about Stiffness matrix method
3. To study about plastic behaviour of structures
4. To study about building frames
5. To study about finite element method

COURSE OUTCOMES

1. Analyse and solve beams and frames using flexibility method
2. Analyse and solve beams and frames using stiffness method
3. Analyse and solve members for their plastic behaviour
4. Analyse and solve building frames
5. Analyse and solve simple problems using FEM

UNIT- I

Flexibility and stiffness matrices: Flexibility and stiffness - Flexibility matrix - Stiffness matrix - Relation between flexibility and stiffness matrix.

Flexibility method: Analysis of continuous beams and rigid frames (single-bay, single-storey with vertical legs only).

UNIT- II

Stiffness method: Analysis of continuous beams and rigid frames (single-bay, single-storey with vertical legs only).

UNIT- III

Plastic behaviour of structures: Idealised stress-strain curve for mild steel: Ultimate load carrying capacity of members carrying axial tension - Plastic bending of beams - Stages of bending of rectangular sections - Evaluation of fully plastic moment - Evaluation of shape factors - Moment-curvature relationships - Plastic hinge - Load factor - Conditions and basic theorems of plastic analysis - Determination of collapse load for beams (simply supported beams, propped cantilever beams , fixed and continuous beams) - Portal frames.

UNIT- IV

Analysis of building frames: Substitute frame method - Analysis for vertical loads

Analysis of frames for lateral loads: Portal method and cantilever method.

UNIT - V

Finite element method: Introduction - Description of method - Stress analysis problems - FEM Vs classical methods - Necessity of FEM.

Basic equations of elasticity - Plane-stress and plane-strain problems - Matrix displacement equations for bar element, truss element , beam element and solution.

Element shapes, nodes , nodal unknowns and coordinate systems.

Shape functions: Polynomial shape functions - Convergence requirements - Finding shape functions using polynomials and Lagrange polynomials. Strain displacement matrix for bar element, CST element and beam element. Assembling stiffness equations.

Text books:

1. GS Pandit/SP Gupta, Structural Analysis - A Matrix Approach-, 2/e, Tata Mcgraw -Hill Education Pvt Limited , New Delhi.
2. BC Punmia, Theory of structures -,12/e, Laxmi Publications, New Delhi.
3. SS Bhavikatti, Finite Element analysis -, 3/e, New Age International (P) Limited, Publishers, New- Delhi.

References:

1. V. N. Vazirani & M. M. Ratwani, Structural Analysis, Vol. II Khanna Publishers, Delhi.
2. Devdas Menon, Advanced structural analysis, Narosa Publishing House.
3. G. Ramamurty, Applied finite element analysis, IK International Publishing House Pvt ltd, New-Delhi.

T386 ESTIMATION AND QUANTITY SURVEYING	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

COURSE OBJECTIVES

1. To study about methods of building estimates
2. To study about estimate of RCC works
3. To study about road and canal estimate
4. To study about analysis of rates
5. To study about valuation of properties

COURSE OUTCOMES

1. Prepare estimate of buildings
2. Prepare estimate of RCC works
3. Prepare canal and road estimates
4. Prepare rate analysis of works
5. Prepare valuation of properties

UNIT – I

Estimate Of Buildings

Methods of estimating; Main items of work; Deduction for openings; Degree of accuracy; Units of measurement.

Methods of building estimates

Individual wall method; Centre line method; Arch masonry calculation; Estimate of steps.

Estimate of residential building

Estimate of a building from line plan.

UNIT – II

Estimate of RCC works Standard hooks and cranks; Estimate of RCC slab; RCC beam; RCC T–beam slab and RCC
column with foundation.

UNIT – III

Road Estimating

Estimate of earthwork; Estimate of pitching of slopes; Estimate of earthwork of road fromlongitudinal sections; Estimate of earthwork in hill roads.

Canal estimate

Earthwork in canals–different cases; Estimate of earthwork in irrigation channels.

UNIT – IV

SpecificationsPurpose and method of writing specifications; General specifications. Detailed Specifications for Brick work; R.C.C; Plastering; Mosaic Flooring; R.R.Stone Masonary.

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 – V

Valuation

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

Miscellaneous Topics

Gross income; Net income; Scrap value; Salvage value; Obsolescence; Annuity; Capitalized value; Years purchase; Life of structures; Sinking fund; Standard rent; Process of fixing standard rent; Mortgage.

TEXT BOOKS

1. B.N. Dutta, Estimating & Costing in Civil Engineering, U. B. S. Publishers & Distributors, New Delhi.
2. G S Birdie, Estimating & Costing, Dhanpat Rai Publishing, New Delhi

REFERENCES

1. M Chakraborthy, Estimating, Costing, Specification and valuation
2. S. C. Rangwala, Valuation of Real properties, Charotar Publishing House, Anand.

T402 RAILWAYS, DOCKS AND HARBOUR ENGINEERING	L	T	P	Credits	Internal	External	TOTAL
	4	1	0	4	25	75	100

COURSE OBJECTIVES

1. To study about Railway planning and permanent way
2. To study about track junctions
3. To study about signals and interlocking
4. To study about harbour components
5. To study about Docks and navigational aids

COURSE OUTCOMES

1. Learn about railway track constructions and maintenance of permanent way
2. Learn about track junctions
3. Learn the concepts of signals and interlocking
4. Exposed to harbour components
5. Exposed to Docks and navigational aids

UNIT – I

Railway Planning and Permanent Way

Role of Indian Railways in National Development - Alignments – Role of Remote Sensing, GIS and GPS - Permanent way – Specification of Components Gauges - Typical cross sections – Embankments and cuttings – Construction, renewal and maintenance of permanent way – Rail joints and welding of rails.

UNIT – II

Track Junctions

Points and crossings – Devices and layouts - Most commonly employed layouts – Special fittings and safety devices – Station and yard – Different types and their typical layouts – General equipments – Track junction – Movable diamond crossing

UNIT – III

Signals and Interlocking

Signals – Different types and their working – Location of signals – Principles and mechanism of interlocking – Safety devices – Different system of control on movement of trains Introduction to modern trends in Indian railways in the design of high speed tracks – MRTS and suburban railways – Electric traction – BOT and BOLT (basic concepts)

UNIT – IV

Harbour Components

Harbours and Ports – Requirement and classification - Wind and waves – Hydrographic surveying – Breakwaters and pier heads – Docking platforms – Piers, wharves, jetties and quays – Fender mooring accessories – Entrance channels – Inland water transport and container transportation

UNIT – V

Docks and Navigational Aids

Docks – Wet and dry – Marine railways – Offshore docks – Floating docks, temporary docks – Locks Dredgers and dredging – Transit sheds and warehouses – Terminal building – Navigational aids and signals

TEXT BOOKS

1. Saxena.S.C and Arora.S, "**A Text Book of Railway Engineering**", Dhanpat Rai Publications Pvt., Ltd,New Delhi, 2005
2. Bindra.S.P, "**A course work in Docks and Harbour Engineering**", Dhanpat Rai Publications Pvt., Ltd, New Delhi, 2003

REFERENCES

1. Rangwala.S.C, "**Principles of Railway Engineering**", Charotar Publishing House, Court Road, Anand, 2000
2. Bindra.S.P, "**A course in bridge, tunnel and railway engineering**", Dhanpat Rai Publications Pvt., Ltd, New Delhi, 1996
3. Ahuja and Birdi, "**Roads, railways, bridges and tunnels engineering**", Standard Book House, New Delhi, 2000
4. Srinivasan.R, "**Dock, Harbour and Tunnel Engineering**", Charotar Publishing House, Court Road, Anand, 1989

T402 PRINCIPLES OF MANAGEMENT AND PROFESSIONAL ETHICS	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study about Management functions and Structure
2. To study about Management of Organization
3. To study about Organizational behaviour
4. To study about Group Dynamics
5. To study about Professional ethics

COURSE OUTCOMES

1. Exposed to Management functions and Structure
2. Exposed to Management of Organization
3. Exposed to Organizational behaviour
4. Exposed to Group Dynamics
5. Exposed to Professional ethics

UNIT - I

MANAGEMENT FUNCTIONS & STRUCTURE

Management – Definition – Basic Function – Contribution of Taylor & Fayol. Types of structure – Line, staff, Functional, Committee, Project& Matrix – Structures. Departmentalization – Centralization – Decentralization – span of control. Management By Objectives – Management By Exception.

UNIT - II

MANAGEMENT OF ORGINASATION

Forms of Business / Industrial Ownership – Sole Trader, Partnership, Company, Performance Appraisal – Basic Principles – Pitfalls – Methods to Overcome. Industrial Safety – Causes of Accidents – Cost of Accident – How to minimize Accidents. Plant Layout & Maintenance – Need, Types & Managerial Aspects.

UNIT - III

ORGANISATIONAL BEHAVIOUR

OB – Definition – Nature & Scope – Contributing Disciplines – Importance of OB to Managers. Personality – Definition – Theories – Factors Influencing Personality. Motivation – Definition – Theories.Theory X & Y – Transactional Analysis.Morale & Job Satisfaction – Factors Influencing Job Satisfaction.

UNIT - IV

GROUP DYNAMICS

Group – Definition – Types – Determinants of Group Cohesiveness – Communication – Process – Barriers – Effective Communication. Leadership Theories – Factors Contributing to Effective Leadership – Role of Trade Union in Organizations – Functions of Trade Union – Why Trade Union is required? – Types of Trade Union.

UNIT - V

PROFESSIONAL ETHICS

Ethics in Workplace – Formulation of Ethics – Managerial Ethics – Managing Ethical Behaviour – Codes of Ethics – Encouraging Ethical Behaviour – Social Responsibility – Spirituality.

TEXT / REFERENCE BOOKS

1. Gupta C.B., Management Theory and Practice, 14th Edition, Sultan Chand & Sons, 2009.
2. Dr. Prasad L.M., Principle & Practice of Management, 7th Edition, Sultan Chand &Sons, 2008.
3. Aswathappa, Organisational Behaviour, 8th Edition, Himalaya Publishing House, 2010.
4. Dr. Prasad L.M., Organisational Behaviour, 4th Edition, Sultan Chand & Sons, 2008.
5. Harold Koontz, Principles of Management, 1st Edition, Tata McGraw Hill, 2004

T382 ENGINEERING ECONOMICS AND ACCOUNTANCY	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study about significance of managerial economics in other disciplines
2. To study about Demand Utility analysis and forecasting
3. To study about Production and cost analysis
4. To study about pricing and their methods in practice
5. To study about financial accounting system

COURSE OUTCOMES

1. Exposed to significance of managerial economics in other disciplines
2. Exposed to Demand Utility analysis and forecasting
3. Exposed to Production and cost analysis
4. Exposed to pricing and their methods in practice
5. Exposed to financial accounting system

UNIT- I

INTRODUCTION

Economic Activities – Nature of economics – Significance of economics – Managerial economics and other disciplines – Micro economics and macroeconomics – Normative and positive economics, objectives of the firm– Methods of managerial economics.

UNIT - II

DEMAND UTILITY ANALYSIS AND FORECASTING

Concept of demand – Types of demand factors determining demand – Law of demand – Elasticity of demand – Point elasticity and arc elasticity – Demand forecasting – Fore casting Methods.

UNIT - III

PRODUCTION AND COST ANALYSIS

Production function – Least cost combination of inputs – Returns to scale and factor productivities – Statistical Production – Laws of production – Concept and nature of cost – Accounting costs and economic costs – Determination of cost – Cost output relation and cost curves

UNIT - IV

PRICING

Determinants of price – Objective of Pricing – Market conduct, performance and structure – Types of Competition – Pricing under different market structure price discrimination – Pricing methods in practice.

UNIT - V

FINANCIAL ACCOUNTING SYSTEM

Significance of accounting – Branches of accounting terminology – Double entry book keeping Journals and ledgers – Mechanics of accounting – Trial balance, balance sheet – Project and loss account – Financial ratio analysis – Fund flow analysis – Cash flow analysis Capital Budgeting and its limitations.

TEXTBOOKS

1. Ramachandra Aryasri A and Ramana Murthy V V, "Engineering Economics and Financial Accounting", Tata McGraw Hill Publishing Company Limited , New Delhi, 2006.
2. Kesavan R, Elanchezhian C and Sunder Selwyn T, Engineering Economics and Financial Accounting" Laxmi Publication (P) Ltd , New Delhi, 2005.

REFERENCES

1. Mote V L Samuel Paul and Gupta G S, "Managerial Economics – Concepts and Cases" Tata McGraw Hill Publishing Company Limited , New Delhi, 1981.
2. Maheswari S N, "Financial and Management Accounting", Sultan Chand & Sons New Delhi, 1999.

T370 BRIDGE ENGINEERING	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study the various components of Bridges and their site selection
2. To study about culverts and concrete bridges
3. To study about T Beam bridges
4. To study the design aspects of sub structure of bridges
5. To study about foundations for bridges

COURSE OUTCOMES

1. Exposed to various components of Bridges and their site selection
2. Design culverts and concrete bridges
3. Design T Beam bridges
4. Design the pier and abutments
5. Design the foundations for bridges

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; Preliminary Drawings; 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 – II

Concrete Bridges

Various types of bridges; I. R. C. Specifications for road bridges.

Culverts Design of R. C. slab culvert.

UNIT – III

T – Beam Bridge

Pigeaud's method for computation of slab moments; Courbon's method for computation of moments in girders; Design of simply supported T – beam bridge.

UNIT – IV

Sub Structure For Bridges

Pier and abutment caps; Materials for piers and abutments; Design of pier; Design of abutment; Backfill behind abutment; Approach slab.

UNIT – V

Bearings For Bridges

Importance of bearings; Bearings for slab bridges; Bearings for girder bridges; Expansion bearings; Fixed bearings; Design of elastomeric pad bearing.

Foundations For Bridges

Scour at abutments and piers; Grip length; Types of foundations; Design of well foundation.

TEXT BOOK

1. Johnson Victor, Essentials of Bridge Engineering, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

REFERENCE

1. Jagadeesh and Jayaram, Design of bridge structures, PHI Learning

T408 SOLID WASTE MANAGEMENT	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study the generation and characteristics of solid wastes
2. To study the collection, processing and transport of solid wastes
3. To study the materials processing and recovery systems
4. To study the incineration and landfilling mechanism for solid waste management
5. To study about hazardous solid wastes

COURSE OUTCOMES

1. Exposed to generation and characteristics of solid wastes
2. Understand the collection, processing and transport of solid wastes
3. Exposed to materials processing and recovery systems
4. Exposed to incineration and landfilling mechanism for solid waste management
5. Exposed to concept of hazardous solid wastes

UNIT –I

Generation and Characteristics of Solid Wastes

Goals and Objective-Public awareness-Sources and types of solid wastes-Generation Composition of municipal solid wastes – Factors affecting- Sampling – Physical and chemical characteristics of solid wastes

UNIT-II

Collection

Collection services, collection system – Hauled-, Stationary and Manual transportation systems - collection routes

Processing Techniques and Equipments

Purpose of processing – Onsite handling, storage and processing - Mechanical volume reduction – Chemical volume reduction – Mechanical size reduction – Component separation – Drying and dewatering.

Transfer and Transport

Transfer stations – Transport - Means and methods- Location of transfer stations.

UNIT –III

Materials processing and recovery systems

Recovery of chemical conversion products, recovery of biological conversion products, recovery of energy from conversion products, materials and energy recovery systems- Flow sheets- Refuse Derived Pellets – **Composting -** Anaerobic and aerobic composting, vermi composting – Windrow composting

UNIT-IV

Incineration

Incineration – Types- Working-Problems with Incineration - Location and design consideration –Pyrolysis – Concept and usage - Waste heat recovery options.

Land Filling

Methods and operations – Site selection – Reactions occurring in completed land fills – Gas and leachate movement and control – Methane recovery – Integrated waste management policy

UNIT-V

Hazardous Wastes

Identification and classification of hazardous wastes – Indian Regulations – Generation – On site storage, collection, Storage, transfer and transport – Processing and disposal, chemical fixation and encapsulation

TEXT BOOK

1. P.A.Vesilind, W.Worrell & Debra Reinhart "Solid Waste Engineering", Cengage Learning, 2002 Ed (Reprint 2009)
2. Howard S. Peavy, Donald R. Rowe, George Tchobanoglous, "Environmental Engineering", McGraw Hill Publishers, New Delhi. 1985

REFERENCES

1. Garg.S.K, "Sewage disposal and Air Pollution Engineering", Khanna Publishers New Delhi. 2001
2. George Tchobanoglous, Hilary Theisen, "Integrated Solid Waste Management", McGraw Hill Publishers, New Delhi. 1993.
3. Suresh K Dhameja, "Environmental Engineering and Management", S..K.Kataria & Sons 2nd Edition 2005

T381 EARTHQUAKE RESISTANT DESIGN OF STRUCTURES	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study the basics of seismology
2. To study the theory of vibrations
3. To study the principles of earth quake resistant design
4. To study the behaviour of reinforced concrete and steel elements under cyclic loading
5. To design the RC frames for earthquake loads

COURSE OUTCOMES

1. Exposed to the basics of seismology
2. Exposed to the theory of vibrations
3. Understand the principles of earth quake resistant design
4. Check the behaviour of reinforced concrete and steel elements under cyclic loading
5. Design the RC frames for earthquake loads

UNIT – I

Elements of seismology - Definitions of Magnitude, Intensity, Epicenter, etc., General features of tectonics of seismic regions, Seismographs. Seismic zones as per IS 1893-2002.

UNIT – II

Theory of vibrations - Free vibrations of single degree, two-degree and multiple degree freedom systems, damping ratio, logarithmic decrement, Transmissibility, Response spectra

UNIT – III

Principles of earthquake resistant design – Methods of dynamic analysis – Choice of the method - Architectural requirements of buildings – Plan and vertical irregularities .

UNIT – IV

Behaviour of reinforced concrete and steel elements under cyclic loading –Confinement-Ductility and absorption of energy- Introduction to Indian Standard Codes -IS:4326 – 1993 and IS13920-1993.

UNIT –V

Design of RC frames for earthquake loads – calculation of loads as per IS 1893 – 2002 – Load combinations - Design of beams and columns for earthquake resistance.

TEXTBOOKS

1. Pankaj Agrarwal & Manish Shrikhande “Earthquake resistant Design of Structures”, Prentice Hall of India Pvt Ltd.New Delhi, 2007.
2. Mario Paz. “Structural Dynamics – Theory & Computations” CSB Publishers & Distributors Shadhdara, Delhi 1985.

REFERENCES

1. Anil K.Chopra, “Dynamics of Structures Theory and Applications to Earthquake Engineering” Prentice Hall of India (P) Ltd., New Delhi 1996.

2. Pauley T and Priestley M.J.N, Seismic Design of Reinforced Concrete and Masonry Buildings, John Wiley & Sons, New York, 1992.
3. Stratta, J.L "Manual of seismic Design" Prentice Hall Inc. NJ 1987.

T411 TRAFFIC ENGINEERING	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

UNIT - I

INTRODUCTION

Significance and scope – Characteristics of Vehicles and Road Users – Skid Resistance and Braking Efficiency – Components of Traffic Engineering – Road, Traffic and Land Use Characteristics – Traffic forecasting – Need and Methods.

UNIT - II

TRAFFIC SURVEYS

Types of Surveys – Volume counts – Capacity – Speed and Delay – Origin and Destination – Parking – Photographic Techniques – Accident Studies – Level of Services.

UNIT - III

TRAFFIC CONTROL MEASURES

Traffic signs – Road marking – Traffic signals – Design of Traffic signal and Signal Co-ordination – Miscellaneous Traffic control Aids – Street Furniture – Street Lighting – Recent trends in signal controlling the traffic.

UNIT - IV

DESIGN OF INTERSECTIONS

Geometric Design for Elements of Traffic management – Types of Intersection – Principles and Elements of Intersection Design – Channelization and Design of Rotary intersection – Criteria for recommending Grade Separated Intersection- Conflicts at Intersections.

UNIT - V

TRAFFIC MANAGEMENT 10 hrs.

Scope of Traffic Management Measures – Traffic System Management (TSM) and Travel Demand Management (TDM) – Restrictions of turning movement – One way streets – Tidal flows – Cycle tracks and Exclusive bus lanes – Introduction to Intelligence Transport System (ITS), RTS, BRTS, MRTS.

TEXT BOOKS

1. Kadiyali L.R., “Traffic Engineering and Transport Planning”, 6th Edition, Khanna Technical Publications, 2005.
2. Khanna K and Justo C.E.G., “Highway Engineering”, 8th Edition, Khanna Publishers 2003.

REFERENCES

1. Bindra S.P., "A course in Highway Engineering", Dhanpat Rai & Sons, 2001.
2. Guidelines of Ministry of Road Transport and Highways, Government of India, 2000.
3. Hobbs F.D. and Richardson P.R. "Traffic Engineering", Pergamon Press, Vol. I and II, 1997.
4. Indian Roads Congress (IRC): "Guidelines and special publications on Traffic Planning and Management", IRC: 102 - 1988
5. Subhash Saxena, “A Course in Traffic Planning and Design”, 7th Edition, Dhanpat Rai Publications, 2009.

T403 REMOTE SENSING AND GIS	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study the fundamentals of remote sensing
2. To study the data acquisition procedures
3. To study the data analysis procedures
4. To study the geographical information systems
5. To study the applications of remote sensing and GIS

COURSE OUTCOMES

1. Exposed to the fundamentals of remote sensing
2. Exposed to the data acquisition procedures
3. Exposed to the data analysis procedures
4. Exposed to the geographical information systems
5. Exposed to the applications of remote sensing and GIS

UNIT- I

Fundamentals of Remote Sensing

Physics of remote sensing – Energy sources – Radiation Principles – Black Body Radiation – Plank's Law – Stefan – Boltzman law - Energy interaction with atmosphere – Atmospheric characteristics – Scattering – Raleigh, Mie, Non-selective and Raman scattering - Absorption – Atmospheric Windows and its significance – Energy interaction with earth surface features – Absorption, Transmission, Scattering , Radiance, Irradiance, Incident & Reflection – EMR interaction with ozone, water vapour, water, soil, vegetation and rock.

UNIT- II

Data Acquisition

Spectral reflectance of earth surface features in different wave length regions of EMR – Visible, Infrared (IR), Near IR, Middle IR, and Thermal IR. – Spectral Signature – Spectral Signature Curves. Satellites – Classification – based on orbit and Purpose -Sensors - Resolutions (Spectral, Spatial, Temporal and Radiometric) of IRS series, LANDSAT, SPOT, IKONOS AND ERS satellites – Description of Sensors in IRS series, LANDSAT, SPOT, IKONOS AND ERS satellites – description of multispectral scanning - Data Acquisition (Signal detection, Recording, and Scanning Mechanism).

UNIT- III

Data Analysis

Image interpretation elements - Visual interpretation of satellite Images – Interpretation key characteristics of digital satellite image - Digital Image Processing – Stretching – Filtering – Edge Enhancement - Band Rationing – Image Classification.

UNIT- IV

Geographical Information Systems

Definition – Components – Hardware and Software – Data structures in GIS – Raster and vector data structures – Types of Data – Spatial and Non spatial - Data base structures – Data input and output – Analysis using vector and raster data – Retrieval, Reclassification, Overlaying and Buffering - Maps – Types of maps – Projection – Types of Projection.

UNIT- V

Applications of Remote Sensing and GIS

Introduction to GPS and its applications - Integration of Remote Sensing and GIS – Hydrological & Water resources assessment and mapping – Soil and Geological mapping – Land use and Land cover mapping – Environmental assessment and Planning – Urban sprawl mapping and Transportation studies.

TEXT BOOKS

1. Prithvish Nag and M.Kudrat ,"**Digital Remote Sensing**", Concept Publishing Company, New Delhi, 1998
2. John R.Jensen,, "**Remote Sensing of the environment – An Earth resource perspective**," Pearson Education Publication (Singapore – low priced ed.,), Indian branch, Delhi, 2005
3. Anji Reddi, Remote Sensing and Geographical Information Systems, BS Publications, 2001.
4. Srinivas.M.G (Edited by), Remote Sensing Applications, Narosa Publishing House, 2001.

REFERENCES

1. Lillesand,T.M and Kiefer.W, "**Remote Sensing and Image Interpretations**", John Wiley & Sons, New York, 1987
2. Burrough, P.A., "**Principles of Geographical Information Systems for Land Resources Assessment**," Clarandone Press, Oxford, 1986.

P887 COMPUTER AIDED ANALYSIS AND DESIGN IN CIVIL ENGINEERING	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

COURSE OBJECTIVES

1. To study the analysis and design applications of civil engineering structures using STAADPro
2. To draw the structural drawings using AutoCad

COURSE OUTCOMES

1. Analyze and design civil engineering structures using STAADPro
2. Draw structural drawings using AutoCad

Note: A minimum of ten (10No) experiments shall be performed and recorded
Students are required to analyze, design and/or draw the following structures using software package like STAAD Pro/AutoCAD

Part-A

SOFTWARE: STAAD PRO or Equivalent
Note: A minimum of 6 no. shall be done and recorded

1. Basics of STAADPRO
2. Analysis and Design of a Continuous Beam
3. 2-D Frame Analysis and Design
4. 3-D Frame Analysis and Design
5. Design and analysis of multi-storied building
6. Analysis of plane truss
7. Retaining Wall Analysis and Design
8. Simple tower Analysis and Design

Part-B
Any four experiments using AutoCad (2 from DRCS, 2 from DSS)
DRCS

1. Reinforcement particulars of T-beams and L-beams.
2. Reinforcement detailing of continuous beams.
3. Reinforcement particulars of columns and footings.
4. Detailing of One way, Two way and continuous slabs.

DSS

5. Detailing of Compound beams including curtailment of flange plates.
6. Detailing of Column including lacing and battens.
7. Detailing of steel roof trusses including particulars at joints.
8. Detailing of Plate girder including curtailment, splicing and stiffeners.

1. Ramachandra, Design of Steel Structures, Standard Book
2. S.K.Duggal, Design of Steel Structures –Tata McGraw Hill, New Delhi
3. Varghese, "**Limit State Design of Reinforced Concrete**", Prentice Hall of India Pvt., Ltd., New Delhi, 2002
4. Unnikrishna pillai and Devdas Menon, "**Reinforced concrete design**", Tata McGraw Hill Publishing company Ltd, New Delhi, 1998

P897 TRANSPORTATION ENGINEERING LABORATORY	L	T	P	Credits	Internal	External	TOTAL
	0	0		2	25	75	100

COURSE OBJECTIVES

1. To determine the properties of aggregates, bitumen and subgrade for field samples

COURSE OUTCOMES

1. Determine the properties of aggregates, bitumen and subgrade for field samples

Note: A minimum of twelve (12No) shall be done and recorded

Tests On Aggregates

1. Aggregate Crushing value test.
2. Aggregate impact value test.
3. Los Angele's abrasion test.
4. Deval's attrition value test.
5. Shape test
   a) Flakiness index test
   b) Elongation index test
   c) Angularity number test. .
6. Specific gravity Test.

Tests On Bituminous Materials

7. Penetration test.
8. Softening point test.
9. Flash and fire point test.
10. Ductility test.
11. Viscosity test.
12. Bitumen Extractions Test.
13. Specific gravity of Bitumen.

Test On Bituminous Mixes

14. Marshall stability test.

Test On Soil Subgrade

15. California bearing ratio test.

P892 ENVIRONMENTAL ENGINEERING LABORATORY	L	T	P	Credits	Internal	External	TOTAL
	0	0	3	2	25	75	100

COURSE OBJECTIVES

To determine the properties of water and wastewater for field samples

COURSE OUTCOMES

Determine the properties of water and wastewater for field samples

Note: A minimum of twelve (12No) shall be done and recorded

1. Determination of total, suspended and dissolved solids in water / sewage sample.
1. Determination of fixed and volatile solids in water / sewage sample.
2. Determination of Settleable Solids.
3. Determination of turbidity of water / sewage sample.
4. Determination of pH value of water / sewage sample.
5. Determination of optimum dose of coagulant.
6. Determination of residual chlorine.
7. Determination of temporary and permanent hardness of water sample.
8. Determination of chloride concentration of water / sewage sample.
9. Determination of acidity of water sample.
10. Determination of alkalinity of water sample.
11. Determination of fluorides in water sample.
12. Determination of Dissolved Oxygen of water / sewage sample.
13. Determination of Biochemical Oxygen Demand (BOD) of waste water.
14. Determination of Chemical Oxygen Demand (COD) of waste water.

VIII -SEMESTER

T375 CONSTRUCTION MANAGEMENT	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	4	25	75	100

COURSE OBJECTIVES

1. To study the role of construction project managers
2. To study about project planning & Organization
3. To study about labour, materials and equipment utilization
4. To study about contracts
5. To study about Network analysis

COURSE OBJECTIVES

1. Get introduced to the role of construction project managers
2. Get introduced to project planning & Organization
3. Get introduced to labour, materials and equipment utilization
4. Become familiar to contracts and its specifications
5. Plan the appropriate network to solve the problem faced

UNIT - I

CONSTRUCTION PROJECT MANAGEMENT

Introduction – Project Life Cycle – Major Types of construction – Selection of professional services – Construction contractors – Financing of constructed facilities – Legal & Regulatory requirements – Role of project managers

UNIT - II

PROJECT PLANNING & ORGANIZATION

Development of project plan, objective and conception– Programming – Scheduling – Project Organization – Project budget fund flow statement – Controlling system

UNIT - III

LABOUR, MATERIAL & EQUIPEMENT UTILIZATION

Introduction – Labour Productivity – Factors affecting job site productivity – Materials Management – Material procurement & Delivery – Inventory control – Plant & Equipment management

UNIT - IV

CONTRACTS

Introduction – Types of Contract – Contract document – Specifications – Important conditions of contract – Tender and tender document – Deposits by the contractor – Arbitration – M. Book, R.A Bills & Advances – Muster Roll – Stores

UNIT - V

NETWORK ANALYSIS

Introduction – Basic concepts of network analysis – CPM and PERT – Use of CPM & PERT Techniques – Problems, and prospects and applications of CPM & PERT – Introduction to software applications in project Management

TEXT BOOKS

1. S. Sanga Reddy & Meyyappan, "Construction Management", Kumaran Publications, 2009.
2. Gahlot, P.S & Dhir, D.M., "Construction Planning and Management", Wiley Eastern Limited, 1992.
3. Chitkara, K.K., "Construction Project Management", Tata McGraw Hill Publishing Co, Ltd., New Delhi, 1992.
4. Punmia B.C., "Project Planning and Control with PERT and CPM", Laxmi Publications, New Delhi, 1987.

REFERENCES

1. Jerome D. Wiest & K. Levy, "Management Guide to PERT/CPM",
2. Clough R.H. & Sears. G.A, "Construction Project Management" 2008.

T404 REPAIR AND REHABILITATION OF STRUCTURES	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study about the durability of concrete structures
2. To study the distress in concrete structures-causes, effects and remedial measures
3. To study the maintenance and repair strategies
4. To study the different materials used for repair
5. To study the different techniques of repair

COURSE OUTCOMES

1. Get exposed to concepts of durability of concrete structures
2. Understand effects in buildings due to climate, temperature, chemicals, wear and erosion
3. Learn about several aspects such as inspection, structural appraisal, economic appraisal
4. Know about different materials used for repair
5. Understand the different techniques of repair

UNIT – I

Durability of Concrete Structures

Permeability of concrete- Sulphate attack- Methods of control- Durability of concrete in seawater- Action of sewage- Thermal properties of concrete- Fire resistance- Resistance to freezing and thawing- resistance to abrasion, erosion and cavitation.

UNIT – II

Distress in Concrete Structures- Causes, Effects and Remedial measures

Effects due to climate, temperature, chemicals, wear and erosion, design and construction errors, corrosion mechanism, effects of cover thickness and cracking, methods of corrosion protection, inhibitors, resistant steels, coatings, cathodic protection.

UNIT – III

Maintenance and Repair Strategies

Inspection, structural appraisal, economic appraisal- Diagnosis of distress-Procedure. Quality assurance- Need- components - Conceptual bases for quality assurance schemes

UNIT – IV

Materials for Repair

Special concretes and mortars, special cements for accelerated strength gain, expansive cement, polymer concrete, sulphur infiltrated concrete, ferro-cement, fibre reinforced concrete.

UNIT – V

Techniques of Repair

Rust eliminators and polymer coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete epoxy injection, mortar repair for cracks.Trench less Technology for underground pipe laying.

TEXT BOOKS

1. Shetty. M.S, "**Concrete Technology Theory and Practice**", S. Chand Company, New Delhi. (Units I, IV& V), 1992
2. Gambhir,M.L., "**Concrete Technology**", Tata McGraw Hill Publishing Co. New Delhi 1998.
3. Dension Campbell, Allen and Harold Roper, "**Concrete Structures, Materials, Maintenance and Repair**", Longman Scientific and Technical Publications, UK. (Units II to V), 1991.

REFERENCES

1. ACCE (I), Madurai Centre, "**Workshop on Cracks, Corrosion and Leaks**", July, 2003
2. Allen.R.T and Edwards.S.C, "**Repair of Concrete Structures**", Blakie and Sons, UK, 1997
3. Peter H. Emmons, "**Concrete Repair and Maintenance illustrated problem analysis, RepairStrategy, Techniques**", Galgotia Publication, 2001.

Web sites

1. www.fix concrete.org
2. www.structurescan.com
3. www.4specs.com
4. www.trenchlessonline.com
5. www.nodig-construction.com
6. www.tunneling.com

T398 MODERN CONSTRUCTION SYSTEMS AND TECHNIQUES	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study about low cost housing techniques
2. To study about the foundation system used in low cost housing
3. To study about prestressing systems
4. To study about planning of construction equipment
5. To study about bridge launching techniques

COURSE OUTCOMES

1. Get exposed to different low cost housing techniques
2. Get exposed to the foundation system used in low cost housing
3. Get exposed to prestressing systems
4. Learn about different types of construction equipments
5. Learn about bridge launching techniques

UNIT - I

LOW COST HOUSING

Introduction – Building Materials - Foundations - Walls - Roofs - Prefabrication - Case Study

UNIT - II

FOUNDATION SYSTEM

Introduction – Piling – Pier Construction – Caisson – Well Foundations – Footings Underpinning – Dewatering – Trenchless Techniques.

UNIT - III

PRESTRESSING SYSTEMS

Introduction – Principles and applications – Tensioning Devices – Pretensioning Systems – Hoyer's Long line system – Post Tensioning systems – Freyssinet, Gifford-Udall, Anderson and Magnel-blaton – Lee-McCall System – Thermo electric Pretensioning – Chemical Pretensioning – Ground anchors.

UNIT - IV

CONSTRUCTION EQUIPMENT PLANNING

Introduction – Earth moving equipments – Lifting equipments – Hauling Equipments – Paving Equipments – Productivity calculations.

UNIT - V

BRIDGE LAUNCHING TECHNIQUES

Introduction – Temporary and Enabling structures – Setting out of Bridges – Girder Erection – Balanced Cantilever Segmental construction – Cable Stayed Bridges – Fixing of Bearings – Case Study.

TEXT BOOKS

1. Krishnaraju N., "Prestressed Concrete", Tata McGraw Hill Publication, 2000.
2. Chudley R., "Construction Technology", [Vol. 3 and 4], ELBS Publisher, 2006

3. Madhava Rao A.G. and Ramachandra Murthy D.S.," Appropriate Low Cost Housing", Oxford & IBH Publication, 1997.
4. Johnson Victor, "Essentials of Bridge Engineering", Oxford & IBH Publication, 1995

REFERENCES

1. Horrison, "Construction Equipments Planning", Longman Publication.
2. Peurifoy, "Construction Methods and Planning", McGraw Hill Publication, 2000
3. Nainan P. Kurian, "Foundation Systems", Narosa Publication, 2005
4. Rakshit K.S., "Design and Construction of Highway Bridges", New Central Book Agency(P) Ltd, 2009

T406 SHORING, SCAFFOLDING AND FORM WORK	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study the planning, site equipment, and plant for framework
2. To study the form materials, and pressures on formwork
3. To study the shores and form design
4. To study the form work for building and failures
5. To study the tunnels, slip forms and safety practices for scaffolds

COURSE OUTCOMES

1. Get exposed to the planning, site equipment, and plant for framework
2. Get familiar to the form materials, and pressures on formwork
3. Get exposed to the shores and form design
4. Get familiar to the form work for building and failures
5. Get exposed to the tunnels, slip forms and safety practices for scaffolds

UNIT - I

PLANNING, SITE EQUIPMENT AND PLANT FOR FRAMEWORK

Lumber – Types – Finish – Sheathing ratio – Working stresses – Repetitive member stress – Plywood – Types and grades – Textured surfaces and strength – Reconstituted wood -Steel – Aluminium – Form lining materials – Hardware and fasteners – Nails in Plywood – Bolts, lag screws and connectors.

UNIT - II

FORM MATERIALS AND PRESSURES ON FORMWORK

Design considerations – Live loads and Wind pressure – Concrete pressure on form work- Concrete density – Height of discharge -Temperature -Rate of Placing – Consistency of concrete – Vibration – Hydrostatic pressure and pressure distribution. Beam forms – Slab forms – Column forms -Wall forms – Allowable stresses – Check for deflection, bending and lateral stability – Examples.

UNIT - III

SHORES AND FORM DESIGN

Simple wood stresses – Slenderness ratio -Allowable load -Tubular steel shores -Patented shores – Site Preparation, Size and spacing – Steel Tower Frames -Safety practices – Horizontal shores – llis shores -Dayton sure grip and Baker Roos shores – Safway Symons shores-Dead shore – Raking and Flying shores. Overall Planning -Detailed planning – Standard units – Corner units – schedule – Planning at Tender stage – Development of basic system – Planning for maximum reuse – Planning examples – Site layout plan – Crane arrangements – Recheck plan details – Planning for safety – Transporting plant -Wales and ties – Vertical transportable form work.

UNIT - IV

FORM WORK FOR BUILDINGS AND FAILURES

Location of job mill – Storage – Equipment. Prefabricated panel systems – Giant forms - Curved wall forms -Erections Practices – Column heads – Beam or girder forms – Suspended

forms – Suggested Tolerances – Concrete Joint construction – Flying system forms. Causes of failures – Case studies – Safety factors – Stripping sequence –
Reshore installation – Advantages of reshoring.

UNIT - V

TUNNEL FORMS, SLIP FORMS AND SAFETY PRACTICES FOR SCAFFOLDS

Shell forms – Design considerations – Loads – Building forms – Strength requirements - Tunnel forming components – Curb and gutter forms – Invert forms – Arch forms – Concrete placement methods – Cut and cover construction -Tolerances – Slip forms – Principles - Types – Advantages – Functions of various components – Planning -Safety in slip forms - Special structures built with slip form technique – Codal provisions -Types of scaffolds – Putlog and Independent scaffold – Single pole scaffolds – Fixing ties- Spacing of ties – bracing – knots safety net – General safety requirements – Gantry and system scaffolds – Shuttering for Precast members and continuous casting forms.

TEXT BOOKS

1. Robert L.Peurifoy and Garold D.Oberlender, "Formwork for Concrete Structures", McGraw- Hill, 1996
2. Hurd M.K., "Formwork for Concrete", 5th Edition, Special Publication Vol.4, American Concrete Institute, Detroit, 1983
3. Michael P. Hurst, "Construction Press", London & New York, 2003.
4. Austin. C.K., "Formwork for Concrete", Cleaver- Hume Press ltd., London 1986.
5. Tudor Dinescu and Constantin Radulescu, "Slip Form Techniques", Abacus Press Tum Bridge Wells, Kent, 1982.

REFERENCES

1. "Guide for Concrete Formwork", American Concrete Institute, Box No. 9150, Michigan 48219
2. "Safety Requirements for Scaffolding", American National Standards Institute. Broadway, New York, 10018

T394 MACHINE FOUNDATIONS	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study the basics of vibrations and dynamics
2. To study the dynamic properties of soils
3. To study the analysis and design of machine foundations
4. To design the framed foundations for high speed machinery
5. To study the use of springs and damping materials in machine foundations

COURSE OUTCOMES

1. Get exposed to the basics of vibrations and dynamics
2. Learn the dynamic properties of soils
3. Analyse and design the machine foundations
4. Design the framed foundations for high speed machinery
5. Familiar with use of springs and damping materials in machine foundations

UNIT - I

Introduction, nature of dynamic loads free vibrations of spring mass systems, forced vibrations viscous damping, principles of vibration measuring equipments.

UNIT - II

Dynamic properties of soils: Elastic properties of soils, coefficient of elastic uniform and non uniform compression and shear, effect of vibration on the dissipative properties of soils , determination of dynamic properties of soils , Codal provisions.

UNIT - III

Analysis and design of block type machine foundations: Review of methods for dynamic analysis- modes of vibration, foundations for machines inducing periodical forces and impact type forces.

UNIT - IV

Design of framed foundations for high speed machinery: Special consideration in planning, principles design criteria, structural design- foundations for miscellaneous machines.

UNIT - V

Vibration isolation, passive and active isolation, use of springs and springs and damping materials, construction aspects of machine foundations.

TEXT BOOKS

1. Barkon,D.D., Dynamics of basis of foundation, MGH,1974.
2. Bowle's.J.E., Foundation Analysis and design,4th edition,MGH,1998.

REFERENCES

Arora.K.R., Soil mechanics and foundation Engineering,SPD,2001

T368 ARCHITECTURE AND TOWN PLANNING	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study about the different factors involved in architecture design
2. To study about the basic principles of architecture design
3. To study about urbanization trends in India
4. To study about planning legislation in India
5. To study the planning of land uses

COURSE OUTCOMES

1. Get exposed to the different factors involved in architecture design
2. Learn the basic principles of architecture design
3. Get exposed to urbanization trends in India
4. Familiar to the planning legislation in India
5. Get exposed to planning of land uses

UNIT - I

Introduction to Architecture: Origin and definition – Influence of nature – Climate – Topography – material – Social condition – Economic condition on architecture. Architectural science - factors influencing architecture, aesthetic responses: Colour and aesthetic responses- formal and informal organization of solids and voids.

UNIT - II

Basic Principles: Concepts of beauty, unity, balance, composition, rhythm, harmony, style, character, integration, scale, proposition, contrast, shape and structure.

UNIT - III

Urbanization: Urbanization trends in India- Classification of towns - human settlements development policy - National approach. Urban growth: planning of towns in ancient India - Greek and Roman towns - Garden city concept - New towns & satellite towns –Urban Renewal- Planning standards for neighborhood

UNIT - IV

Evolution of planning legislation in India – Organisation and administration of planning agencies at national, state, regional level and metropolitan level – building bye law – Function of local Authority – Provision of Building regulations.

UNIT - V

Planning of Land uses: Residential area planning - Site & service programmes - Commercial areas - Industrial sites - rectangular areas, Principles of planning for traffic and transportation facilities – transport terminals pedestrian path and bikeways.

TEXT BOOKS

1. Gallion,D., et.al, The Urban pattern city planning & design, Affiliated East West Press Pvt. Ltd., NewDelhi.
2. Lewis Keeble, Town Planning Made Plain & Town & Country Planning Association, London, 1983.

REFERENCES

1. Rangwala, K.S., Town Planning, Charotar Publishing House, Anand, India.
2. Hiraqskar, G.K., Fundamentals of Town Planning, Dhanpat Rai &Sons., Delhi 2001.
3. Pickering,E., Architectural Design, John Wiley and Sons , London.

T392 INDUSTRIAL STRUCTURES	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study the classification of industrial structures
2. To study the roofs and roof materials
3. To study the designs aspects of silos and bunkers
4. To study about the design aspects of gable frames
5. To study the load analysis and design of transmission towers

COURSE OUTCOMES

1. Get exposed to the classification of industrial structures
2. Learn the different roofs and roof materials
3. Design the silos and bunkers
4. Design the gable frames
5. Perform load analysis and design the transmission towers

UNIT - I

Classification of Industrial Structures - Layout requirements - lighting and Ventilation - protection against noise and vibration - fire safety - factories act.

UNIT - II

Roofing configuration – types of trusses - Beams and lattice trusses - Type of roof covering materials - purlins - detailed design.

UNIT - III

Silos and Bunkers - Shape of hopper for different materials - design of vertical sides - hopper bottom - stiffening girder - staging -design - Conveyors and supporting structures.

UNIT - IV

Gable frames of uniform cross sections - varying depth – pin-jointed knee bracings - design of joints - analysis by various methods.

UNIT - V

Load Analysis and design of Transmission line Towers - Substation structures - Foundation analysis – Design Principle only.

REFERENCES

1 Punmia .B.C.,. Jain A.K, Arun Kumar Jain ,"Comprehensive R C C Designs", Laxmi To study the Publications (P) Ltd., New Delhi, 1998
2. Lother, "Advance Design in Steel Structure", Prentice Hall, USA, 1980
3. Salmon. C.G. and Johnson J.E. "Steel Structure - Design and Behaviour", Harper and Row - 1980
4. Wiliam McGuire - "Steel Structures", Prentice Hall of India New Jersey, 1968
5. Arya and Ajmani, "Design of Steel Structures" Nem Chand Bros, Roorkee, 1990
6. Dayaratnam. P. "Design of -Steel Structures", Wheeler & Co., New Delhi, 1999.

T399 PAVEMENT ANALYSIS AND DESIGN	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study the different types of pavement and stress distribution on them
2. To study the design aspects of flexible pavements
3. To study the design aspects of rigid pavements
4. To assess quality and serviceability conditions of roads
5. To study the stabilization of pavements

COURSE OUTCOMES

1. Understand the Pavement as layered structure
2. Design flexible pavements
3. Design rigid pavements
4. Evaluate the pavement for performance and maintenance as per IRC recommendations
5. Get exposure to Stabilisation with special reference to highway pavements

UNIT- I

TYPE OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM

Introduction - Pavement as layered structure - Pavement types - rigid and flexible -Stress and deflections in pavements under repeated loading.

UNIT – II

DESIGN OF FLEXIBLE PAVEMENTS

Flexible pavement design - Empirical - Semi empirical and theoretical Methods – Design procedure as per latest IRC guidelines – Design and specifi cation of rural roads.

UNIT – III

DESIGN OF RIGID PAVEMENTS

Cement concrete pavements - Modified Westergaurd approach - Design procedure as per latest IRC guidelines - Concrete roads and their scope in India.

UNIT – IV

PERFORMANCE EVALUATION AND MAINTENANCE

Pavement Evaluation [Condition and evaluation surveys (Surface Appearance, Cracks, Patches And Pot Holes, Undulations, Ravelling, Roughness, Skid Resistance), Structural Evaluation By Deflection Measurements, Present Serviceability Index], Pavement maintenance. [IRC Recommendations Only]

UNIT – V

STABILISATION OF PAVEMENTS

Stabilisation with special reference to highway pavements - Choice of stabilisers -Testing and field control –Stabilisation for rural roads in India -use of Geo-synthetics (geo-textiles & geo-grids) in roads.

TEXT BOOKS

1. Kadiyali, L.R., "Principles and Practice of Highway Engineering", Khanna tech. Publications,New Delhi, 2000.
2. Croney, D., Design and Performance of Road Pavements, HMO Stationary Offi ce, 1979.
3. Wright, P.H., "Highway Engineers", John Wiley & Sons, Inc., New York, 1996.
4. Design and Specifi cation of Rural Roads (Manual), Ministry of rural roads, Government ofIndia, New Delhi, 2001

REFERENCES

1. Yoder R.J and Witczak M.W., "Principles of Pavement Design", John Wiley, 1975.
2. Guidelines for the Design of Flexible Pavements, IRC:37 - 2001, The Indian roads Congress,New Delhi.
3. Guideline for the Design of Rigid Pavements for Highways, IRC:58-1998, The Indian RoadsCongress, New Delhi.

T--- AIR POLLUTION AND CONTROL	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study the global implications of air pollution
2. To study the importance of meteorological phenomenon in air pollution
3. To study the control techniques for air pollution
4. To study air pollution legislations
5. To study the basics of noise pollution and its impact on humans

COURSE OUTCOMES

1. Familiar with the global implications of air pollution
2. Get awareness on importance of meteorological phenomenon in air pollution
3. Design the air pollution control equipment
4. Get exposure to legislations enforce with regard to air pollution
5. Familiar with noise pollution and its control strategies

UNIT–I

Atmosphere as a place of disposal of pollutants – Historical over view – Global implications of air pollution – Units of measurements of pollutants – Air quality and emission standards – Air pollution indices – Ambient air quality standards. Sources and classification of air pollutants – man made, natural sources – Type of air pollutants – pollution due to automobiles Air pollution - Effects on human beings, plants and animals – Economic effects of air pollution – Effect of air pollution on meteorological conditions – changes on the Mesoscale, Micro scale and Macro scale.

UNIT–II

Sampling and measurement of particulate and gaseous pollutants – Ambient air sampling – stack sampling Environmental factors – Meteorology – temperature lapse rate and stability – Adiabatic lapse rate – Wind Rose – Inversion – Wind velocity and turbulence – plume behaviour – Dispersion of air pollutants – Maximum mixing depth – Dispersion model – Introduction to Gaussian plume model and plume rise.

UNIT-III

Control - source reduction methods – control by equipments – Particulate control methods – settling chamber, cyclone separators, inertial devices, electrostatic precipitator, scrubbers – Control of gaseous emissions – Absorption – Absorption equipment, adsorption and combustion devices.

UNIT –IV

Air pollution survey – Air pollution legislation and regulations – Industrial plant location and city planning – Air pollution in Indian cities. Case studies – some specific industries – cement industry – refineries – fertilizer – paper industry – sources of pollutants and its control – cost benefit analysis.

UNIT-V

Noise pollution – Properties of sound waves – characterization of noise – effects of noise on human being – sources of noise – noise control – different options

TEXT BOOKS

1. Rao.M.N & Rao.H.V.N, "**Air Pollution**", Tata McGraw Hill publishing Company Limited, 1989.
2. Rao.C.S, "**Environmental Pollution Control Engineering**", Wiley Eastern Limited, 1992.

REFERENCES

1. Stern AC, "**Air Pollution (Vol I)**", "**Air Pollution and its Effects (Vol II),**" **"Analysis, Monitoring and Surveying (Vol III)**, "Sources of Air Pollution and their Control" Academic press, New York, 1968.
2. **Air Pollution Act**, 1981 (India)
3. Danielson JA, "**Air Pollution Engineering Manual**," US Govt.Printing office, Washington DC, 1967
4. Mahajan.S.P, "**Pollution Control in Process Industries**", Tata McGraw Hill Publishing Co., New Delhi, 1991.
5. Howard S.Peavy, Donald R. Rowe and George Tchobanoglous, "**Environmental Engineering**," McGraw Hill Co., 1985
6. Starauss W, "**Air Pollution Control Part I & Part II**", Inter Science, New York, 1985.
7. Mackenzie L Davis and David A Corwell, "**Introduction to Environmental Engineering**" McGraw Hill Publishers, 1998.

T410 TOTAL QUALITY MANAGEMENT	L	T	P	Credits	Internal	External	TOTAL
	4	0	0	3	25	75	100

COURSE OBJECTIVES

1. To study about basic aspects of various parameters used in quality management
2. To study the TQM principles
3. To study the statistical tools used in TQM
4. To study the benchmarking tools used in TQM
5. To learn about the ISO Quality systems

COURSE OUTCOMES

1. Get awareness of the terminology used in TQM
2. Exposed to TQM principles
3. Learn the statistical tools used in TQM
4. Learn the benchmarking tools used in TQM
5. Exposed to ISO quality systems

UNIT - I

INTRODUCTION

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs – Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

UNIT - II

TQM PRINCIPLES

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, strategy, Performance Measure.

UNIT - III

STATISTICAL PROCESS CONTROL (SPC)

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

UNIT - IV

TQM TOOLS

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.

UNIT - V

QUALITY SYSTEMS

Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits.

TEXT BOOK

Dale H.Besterfiled, et at., Total Quality Management, Pearson Education Asia, 1999. (Indian reprint 2002).

REFERENCES

1. James R.Evans & William M.Lidsay, The Management and Control of Quality, (5th Edition), South-Western (Thomson Learning),2002 (ISBN 0-324-06680-5).
2. A.V. Feigenbaum. "Total Quality Management, McGraw-Hill, 1991.
3. Oakland.J.S. "Total Quality Management Butterworth – Hcinemann Ltd., Oxford.1989.
4. V. Narayana and N.S. Sreenivasan, Quality Management – Concepts and Tasks, New Age International 1996.
5. Zeiri. "Total Quality Management for Engineers Wood Head Publishers, 1991.

P894 QUANTITY ESTIMATION AND PROJECT MANAGEMENT	L	T	P	Credits	Internal	External	TOTAL
	0	0		2	25	75	100

COURSE OBJECTIVES

1. To apply the software tools for performing the planning of the civil engineering activities

COURSE OUTCOMES

1. Apply the software tools for planning the civil engineering activities

Note: A minimum of twelve (12No) shall be done and recorded

CYCLE-1

Quantity Surveying *(At least **SIX** of the following using softwares like MS Excel/ Qty./Road Estimate/Super Rate analysis etc.)*

1. Quantity estimation of a single storey residential building (different items).
2. Cost estimation of a single storey residential building.
3. Quantity estimation of a B.T.Road (different items).
4. Cost estimation of a B.T.Road.
5. Quantity estimation of a Canal (different items).
6. Cost estimation of a Canal.
7. Find out the labour requirement and preparing the Rate Analysis for different items of work.
    a) C.C b) R.C.C c) Brick work d) Flooring

CYCLE-2

Project Management *(Any **THREE** of the following using softwares like MS Project / Primavera etc.)*

1. Preparing the Project management report for a single storey residential building/Road/Canal by using the Bar Chart/Mile stone chart.
2. Preparing the Project management report for a single storey residential building by using the network technique (PERT/CPM).
3. Preparing the Project management report for a B.T.Road by using the network technique
   (PERT/CPM).
4. Preparing the Project management report for a Canal by using the network technique (PERT/CPM).

CYCLE-3 *(At least **THREE** of the following by using softwares like MS Excel)*

1. Quantity estimation of RCC roof slab and preparing schedule of bars
2. Quantity estimation of RCC beam and preparing schedule of bars
3. Quantity estimation of RCC Column with foundation footing and preparing schedule of bars
4. Quantity estimation of RCC retaining wall and preparing schedule of bars.