KUMARAGURU COLLEGE OF TECHNOLOGY

COIMBATORE – 641 049.

Academic Regulations 2013
(Norms and Rules)

B.E. / B. Tech Programmes
(2013-2014 onwards)

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KUMARAGURU COLLEGE OF TECHNOLOGY, COIMBATORE - 641 049.

REGULATIONS 2013

B.E. / B. Tech Programmes
CHOICE BASED CREDIT SYSTEM

These regulations are applicable to students admitted into B.E. / B. Tech Programmes from the academic year 2013 – 2014.

Preamble

The phenomenal growth of science and technology and the growth and spread of literature and arts have made available large volume of data and information for learners. Availability of such huge data, information and knowledge needs to be disseminated to the willing learners through a systematic educational system. If the education is compartmentalized and rigid academic systems are imposed, learners may not have the choice of the courses of their liking and hence will not meet the requirements to strengthen their knowledge in specific domains needed for their career. Hence there is a need for a paradigm shift from teacher centric to learner centric education system.

The CBCS offers flexibility to learners which includes multipoint entry, large number of electives, flexible pace for earning credits, carry over of credits, audit courses and choice of courses from other branches. In view of the above advantages, it has been decided to implement CBCS at KCT from the academic year **2009 – 2010**

The Objectives of CBCS

- To widen the horizon of knowledge by means of Core, General, Engineering Sciences & Technical Arts and Basic Science courses.
- To offer flexibility in choosing the courses of study according to their needs and learning capacity.
- To facilitate fast learners to earn extra credits.
- To elevate knowledge level on par with the students across the globe.
- To enlighten the students on the rich culture of our nation and ethical values through relevant courses.
- To improve interaction between the teacher and the students inside and outside the class room.

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1. Definitions and Nomenclature

1.1 University

University means the affiliating university, ANNA UNIVERSITY, CHENNAI

1.2 Institution

Institution means KUMARAGURU COLLEGE OF TECHNOLOGY, Coimbatore, an autonomous institution affiliated to Anna University, Chennai

1.3 Head of the Institution

Head of the Institution means the Principal of the College who is responsible for all academic activities and for the implementation of relevant rules of this regulation.

1.4 Programme

Programme means Degree Programme i.e., B.E / B. Tech Degree Programme.

1.5 Branch

Branch means specialization or discipline of B.E / B. Tech Degree Programme, suc as Civil Engineering, Textile Technology, etc.

1.6 Course

Every paper / subject of study offered by various departments is called a course. (e.g. Data Structures)

1.7 Curriculum

The various components / subjects / papers studied in each programme that provide appropriate knowledge in the chosen branch is called curriculum.

1.8 Credits

Course work is measured in units called credit hours or simply credits. The number of periods or hours of a course per week is the number of credits for that course. The details of credit allocation is given in Table **1.**

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Table 1

Nature of the Course	Periods / Hours per Week	Credits
Theory	3	3
	4	4
Laboratory	2 or 3	1
Special Laboratory	4 to 6	2
Theory + Laboratory	Theory) + 1 or 2 (Laboratory)	3
Tutorial	1	1
Project Work (Eighth Semester)	18 (Minimum)	6

Mini project, Technical Seminar and Industrial Training are also given 1 **to 2** credits depending on the amount of time allotted based on the specific requirement of the branch concerned.

1.9 Total credits

The total number of credits a student earns during the course of study period is called the total credits. A Student must earn **185 – 190** credits (varies with the branch) for successful completion of the B.E. / B. Tech regular programme (**Eight** semesters) and **138-140** credits for lateral entry (**Six** semesters).

2. Admission

2.1 First Year B.E. / B. Tech and Lateral Entry

The norms for admission, eligibility criteria such as marks, number of attempts, physical fitness and mode of admission will be as prescribed by the University.

2.2 For students readmitted from **2009** Regulations to **2013** Regulations (due to discontinuation for different reasons) a course committee will be constituted by the Principal to decide the Courses exempted and additional Courses to be appeared by the concerned student.

3. Branches of Study

The following branches of study approved by the University are offered by the College.

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B.E. Degree Programmes

- Aeronautical Engineering
- Automobile Engineering
- Civil Engineering
- Computer Science and Engineering
- Electronics and Communication Engineering
- Electrical and Electronics Engineering
- Electronics and Instrumentation Engineering
- Mechanical Engineering
- Mechatronics Engineering

B.Tech Degree Programmes

- Biotechnology
- Information Technology
- Textile Technology
- Fashion Technology

4. Components of Curriculum

There will be four components in the B.E. / B. Tech curriculum. They are

- Basic Science Courses, **(15 to 25%),**
- General Courses, **(5 to 10%),**
- Engineering Sciences and Technical Arts Courses **(15 to 25%)**
- Core Courses **(55 to 65%).**

Under these categories, theory and practical courses are offered. In the final year, the student will also undertake and complete a project work. The curriculum also includes Industrial training, Technical Seminar and Mini project.

4.1 Basic Science Courses

i. Mathematics

ii. Physics

iii. Chemistry

iv. Computer Literacy with Numerical Analysis

4.2 General Courses

i. Language / Communication skills

ii. Humanities and Social Sciences

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iii. Economics and Principles of Management
iv. Human Values & Culture
v. Soft skills
vi. Environment Science
vii. Professional Ethics

4.3 Engineering Sciences and Technical Arts Courses

i. Engineering Graphics
ii. Workshop Practice
iii. Engineering Mechanics
iv. Electrical Science I (Basic Electrical Engineering)
v. Thermodynamics and Heat Transfer
vi. Material Science and Engineering
vii. Electrical Science II (Electronics and Instrumentation)
viii. Engineering System Design
ix. Building Materials
x. Surveying
xi. Transport Phenomena

4.4 Core Courses

Core courses consist of branch specific courses. A minimum of **10%** of the core courses are made available as electives. Interdisciplinary electives are also available (within **10%** of the total electives).

4.5 Semester Curriculum

The curriculum of each semester shall normally be a blend of theory courses not exceeding **7** and practical courses not exceeding **4.** The total number of courses per semester shall not exceed **10**.

4.6 Medium of Instruction

The medium of instruction for lectures, examinations and project work is English, except for language courses other than English.

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5. Duration of the Programme

5.1 Each academic year will consist of **Two** semesters of **90** working days each

5.2 The normal and maximum permissible number of semesters for each programme is as given in **Table 2**.

Table 2.

Category	Number of Semesters	
	Normal	**Maximum Permissible**
Regular	8	14
Lateral Entry	6	12

6. Ward Counsellor

To help the students in planning their courses and for general guidance on the academic programme, the Head of the Department will allot a certain number of students to a teacher of the department who shall function as ward counsellor throughout their period of study. The ward counsellors shall advise the students and monitor the courses undergone by the students, check attendance and progress of the students and counsel them periodically. The ward counsellor may also discuss with the class advisor and HoD and parents about the progress of the students.

7. Class Committee

7.1 Every class will have a class committee constituted by the HoD. The members of the class committee will be as follows:-

1. Chairperson (a teacher who is not normally teaching any course for the class)
2. All teachers handling courses for the class
3. Students (a minimum of **6** consisting of **3** boys and **3** girls on pro-rata basis)

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7.2 The functions of the class committee shall include the following.

7.2.1 Clarify the regulations of the programme and the details of rules therein.

7.2.2 Inform the student representatives, the academic schedule including the dates of assessments and the syllabus coverage for each assessment.

7.2.3 Inform the student representatives the details of Regulations regarding weightage used for each assessment. In the case of practical courses (laboratory/ drawing / project work / seminar etc.) the breakup of marks for each experiment / exercise / module of work, should be clearly discussed in the class committee meeting and informed to the students.

7.2.4 Analyze the performance of the students of the class after each test and initiate steps for improvement.

7.2.5 Identify slow learners, if any, and request the teachers concerned to provide additional help / guidance / coaching to such students.

7.2.6 Discuss and sort out problems experienced by students in the class room and in the laboratories.

7.3 The class committee shall be constituted within the first week of commencement of any semester.

7.4 The chairperson of the class committee may invite the class advisor / ward counsellor and the Head of the Department to the meeting of the class committee.

7.5 The Principal may participate in any class committee meeting.

7.6 The chairperson is required to prepare the minutes of every meeting, submit the same through the Head of the Department to the Principal within two days of the meeting and arrange to circulate the same among the students and teachers concerned. Points requiring action by the management shall be brought to the notice of the management by the Principal.

7.7 The first meeting of the class committee shall be held within one week from

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the date of commencement of the semester, in order to inform the students about the nature and weightage of assessments as per the framework of the Regulations. Two or three subsequent meetings may be held in a semester at suitable intervals. During these meetings the student representatives shall meaningfully interact and express opinions and suggestions of the students of the class to improve the effectiveness of the teaching-learning process.

8. Course Committee for Common Courses

Each common theory course offered to more than one class / branch shall have a Course Committee comprising all the teachers teaching the common course with one of them nominated as Course Coordinator. The HoD will nominate the course committee for common course / courses handled in their department. The Principal will nominate the course committee for common courses handled in more than one department. This course committee will ensure that a common question paper is prepared for the tests / exams and uniform evaluation is carried out. The Course committee will meet a minimum of 3 times in each semester.

9. Requirements for Completion of a Semester

9.1 A student who has fulfilled the following conditions shall be deemed to have satisfied the requirements for completion of a semester.

9.1.1 Student should have earned a minimum of **80%** overall attendance and a minimum of **75%** attendance for individual courses including laboratory courses. If a student fails to secure the minimum overall attendance of **80%**, he / she will not be permitted to go to the subsequent semester. They are required to repeat the incomplete semester in the next academic year.

Note: All students are expected to attend all classes and secure 100**%** attendance. The above provision is made to allow for unavoidable reasons such as medical leave / participation in sports and NCC activities.

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9.1.2 A maximum of **10%** concession in the overall attendance can be considered for student on medical reasons or for participation in the University / State / National / International level sports events and NCC camps. Prior permission from the Principal is necessary in the prescribed format for permitting such students for the end semester examination.

9.1.3 The days of suspension of a student on disciplinary grounds will be considered as days of absence for calculating the percentage of attendance, for individual courses.

10. Requirements for Appearing for End Semester Examination

10.1 A Student who has fulfilled the following requirements will be eligible to appear for End Semester Exam.

10.1.1 Attendance requirements as per Clause Nos.

10.1.2 Registration for all eligible courses in the current semester and arrear examination (wherever applicable).

Note: Students who do not register as given in clause 10.1.2 will not be permitted to proceed to the subsequent semester.

10.2 A student is eligible to register for appearing for the examination of a course (both theory and practical) if the student has earned a minimum of **25** marks out of **50** in CAM and a minimum attendance of 75% in that course.

10.3 In view of conducting three internal tests, retests should be permitted only very rarely for genuine reasons with the approval of HoD and Principal. Such tests will be conducted before the last day of instruction of the concerned semester. Retest is not permitted for improvement.

10.4. If a student is prevented to register for any course in the end semester examinations for want of minimum of CAM (**25** marks out of **50**) he / she may be allowed to go to subsequent semester. The student is permitted to improve

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his / her CAM in that course by writing a supplementary test of **3** hours duration comprising all the units, in the next semester for **40** marks. The marks obtained in the original semester for attendance and assignment will be taken into account and added to the supplementary test mark to calculate the new CAM (for **50** marks).). If a student is prevented to register for any course in the End Semester examinations for want of minimum of attendance (75%), he/she may be allowed to go to the subsequent semester. The student is permitted to improve his/her attendance in that course by attending a summer term classes (refer clause 13.3)

10.5 If a student is prevented to register in the end semester examinations for want of minimum of CAM (**25** out of **50** marks) / minimum of attendance of 75% in more than four courses including practical courses, he / she will not be permitted to go to the subsequent semester. The student is required to repeat the incomplete semester in the subsequent academic year.

10.5.1 If a student fails to gain CAM of 25 out of 50 after four attempts in a particular course through supplementary test, his/her CAM is nullified in the fifth attempt and the student will be allowed to appear for end semester examination and based on his/her performance in the end semester exam alone his/her result will be declared (i.e. he/she has to score a minimum of 50 out of 100 in the end semester exam for being declared to have passed in that course.

10.5.2 The above rule under clause 10.5 does not apply for (regular) students in **First semester** and lateral entry students in the **Third semester**

11. Provision for Withdrawal from Examination

A student may, for valid reasons (medically unfit / unexpected family situations), be granted permission to withdraw (after registering for the examinations) from appearing for any course or courses in the end semester examination. This facility can be availed only ones during the entire duration of the degree programme. Withdrawal application will be valid only if the student is, otherwise, eligible to write the examination and the application for withdrawal is made prior to the examination in the concerned course or courses. The application for

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withdrawal should be recommended by the Head of the Department and approved by the Principal. Withdrawal will not be considered as appearance for the purpose of classification of degree under **Clause 19.**

12. System of Evaluation

12.1 General Guidelines

The total marks for each course (Theory and Practical) will be 100, comprising two components as given below.

a) Continuous Assessment Marks (CAM) – 50 Marks

b) End Semester Exam (ESM) – 50 Marks

12.2 Marks distribution

12.2.1 The Procedure for award of Continuous Assessment Marks (CAM) is as follows:-

1.Theory courses

The distribution of marks for theory courses is given in **Table 3**.

Table-3

S. No.	Components for CAM	Syllabus Coverage for the test / exam	Duration of the test in Hrs.	Marks (max.)	Question Paper Pattern
01.	Internal Test - I	1 ½ - 2 units of the syllabus	2	10	Part A - 10x1 = 10 Marks Q.No.-1 to 10 Objective type & fill in the blanks-50% each Part B - 05x2 = 10 Marks Q.No. 11 to 15 (Short Answer) Part C - 03x10 = 30 Marks Q.No-16 - compulsory Q.No.17 to 18-either or type **Total = 50 Marks**
02.	Internal Test - II	Next 1 ½ - 2 units of the syllabus	2	10	
03.	Internal Test – III	Next 1 ½ - 2 units of the syllabus	2	10	

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04.	Model Exam	Full Syllabus	3	20	Part A - 10x1 = 10 Marks Q.No.-1 to 10 Objective type & fill in the blanks-50% each Part B - 10x2 = 20 Marks Q.No.11 to 20 Short Answer Part C - 05x14 = 70 Marks Q.No.-21 -compulsory Q.No.-22 to 25 -Either or type **Total = 100 Marks**
05.	Assignment / Seminar	-	-	5	
06.	Attendance (Refer clause -12.1(iv))	-	-	5	
Total				**50**	

- **Model exam** is compulsory.

- The best two internal test marks will be considered for **CAM**

ii. Practical Courses

Every practical exercise / experiment in all practical courses will be evaluated based on the conduct of exercise / experiment and records maintained by the students. There will be at least one model practical examination.

The criteria for awarding marks for internal assessment is given in **Table 4**.

Table - 4

Items	Marks (Maximum)
Observation	10
Record	10
Model Practical	25
Attendance { Refer-12.1(iv) }	05
Total	**50**

Project Work

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The evaluation of the project work done by the student will be carried out by a committee constituted by the Principal on the recommendation of HoD. For each programme one such review committee will be constituted. There will be 3 assessments (each for 100 mark maximum) during the semester by the review committee. The student shall make a presentation on the progress made by him / her before the committee. There will be equal weightage for all 3 assessments. The total marks obtained will be reduced for 95 and the remaining 5 marks will be given for attendance vide clause 12.1(iv).

iTechnical Seminar & Mini Project:
These courses will be evaluated internally.

iv) Attendance Record and Marks for attendance

Every teacher is required to maintain an 'ATTENDANCE AND ASSESSMENT RECORD' for each course handled, which consists of students attendance in each lecture / practical / project work class, the test marks and the record of class work (topics covered). This should be submitted to the Head of the Department periodically (at least three times in a semester) for checking the syllabus coverage and the records of test marks and attendance. The HoD after due verification will sign the above record. At the end of the semester, the record should be verified by the Principal. These records will be kept in safe custody by respective HoD for five years.

The marks allocated for attendance is given in **Table 5.**

Table 5

% of Attendance	Marks
≤ 75	Nil
76 - 80	1
81 - 85	2
86 - 90	3
91 - 95	4
96 - 100	5

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12.2.2 End Semester Examination (ESM)

(a) Theory Courses

The End Semester Examination for theory courses will be conducted with the same pattern of Question Papers and duration as that of the Model Theory Examination. The evaluation will be for 100 **marks**. However, the question paper pattern for courses in engineering graphics and machine drawing will be designed differently to suit the specific need of the courses.

(b) Practical Courses

End semester examination for practical courses will be conducted jointly by one internal examiner and one external examiner appointed by the Controller of Examinations with the approval of the Principal.

The evaluation will be for **100** marks and the weightage for End Semester Practical Course will be **50.**

(C) Question Paper setting (ESM)

50% of theory courses in a semester will be randomly selected for setting question papers by External Examiners by the Controller of Examination. Head of the Department will give internal list of panel of examiners to set question papers in the remaining 50% of the theory courses.

(D) Evaluation of Answer Book

50% of theory courses in a semester will be randomly selected by the Controller of Examination for evaluation by External Examiners. Head of the Department will nominate senior faculty to evaluate the answer books in the remaining 50% of the theory courses.

12.3 Malpractice

If a student indulges in malpractice in any internal test / model examination / end semester examination, he / she shall be liable for punitive action as prescribed by the University.

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12.4 Supplementary Examination

After the publication of Eighth **semester** results, a supplementary exam will be offered to students who have failed in any of the theory courses in any of the semesters. Interested students should register for the supplementary exams required by them. Controller of Examination (CoE) will publish a schedule of supplementary examinations after the last date of registering for the supplementary examinations. The pattern of evaluation will be the same as that of end semester examinations. For non-theory courses supplementary exams are not applicable. The revaluation of answer script will not be applicable for supplementary exam however challenge of evaluation of answer script is allowed. The candidate who have more than 6 arrears are not eligible to apply for supplementary exam. Appearance in supplementary exam will be considered as another attempt and will be reflected in the grade sheet.

12.5 A student who has appeared and passed any course is not permitted to re-enroll / reappear in the course / exam for the purpose of improvement of the grades.

13. Passing Minimum

13.1 Passing minimum for each theory, practical courses and project work is **50%** in the continuous assessment and **50%** in the end semester examinations individually.

13.2 For students scoring less than the passing minimum marks in the end semester examinations, the term "**RA**" against the concerned course will be indicated in the grade sheet. The student has to reappear in the subsequent end semester examinations for the concerned course as arrears. The letter grade "**U**" will be indicated in the grade sheet for courses for which the student has insufficient attendance and / or insufficient **CAM.**

In case of a student having shortage of attendance (having sufficient **CAM**) the student should redo the course as a summer term course (**Clause13.3**) or in the

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regular semester as the case may be.

In case of a student having sufficient attendance but insufficient **CAM,** the student will be required to write the supplementary test for that course (refer clause **10.4**). The **"U"** grade once awarded stays in the record of the student. When the student passes the concerned course in the subsequent semester, the grade obtained will be awarded which will appear in the grade sheet of that semester.

For a student who is absent for theory / practical / project viva- voce, the term **"AB"** will be indicated against the corresponding course. The student should reappear for the end semester examination of that course as arrear in the subsequent semester.

The letter grade **"W"** will be indicated for the courses for which the student has been granted authorized withdrawal (**refer clause 11**).

13.3 Summer – Term Course

a) A summer term course may be offered by a department on recommendation of the Head of the Department and the approval of the Principal.

b) Summer term courses are offered only to those students who had taken the courses earlier and had obtained 'U' Grade due to insufficient attendance.

c) No student should register for more than three courses during a summer term.

d) Summer term courses will be announced by the Principal at the end of the even semester before the commencement of the end semester examinations. A student will have to register within the time stipulated in the announcement by paying the prescribed fees.

e) The number of contact hours and the assessment procedure for the summer term course will be the same as the regular semester course.

f) Withdrawal from a summer term course and examination is not permitted.

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14. Methods for Redressal for Grievances in Evaluation

Students who are not satisfied with the grades awarded can seek reddressal by the methods given in **Table 6.**

Table 6

S.No.	Redressal Sought	Methodology
01.	Request for photocopy of the answer script	To apply to CoE within 5 days of declaration of result along with the payment of the prescribed fee
02.	Request for revaluation of answer script	
03.	Request for revaluation along with the photocopy of answer script	
04.	Request for revaluation after obtaining photocopy of the answer script (Refer at S.No.01.)	To apply to CoE within 2 days of obtaining the photocopy along with the payment of the prescribed fee.
05.	Challenge of evaluation	To apply to CoE within 2 days of publication of revaluation results. (Refer clause 14.1)

These are applicable only for theory courses in regular and arrear end semester examinations.

14.1 Challenge of Evaluation

a) A student can make an appeal to the CoE for the review of answer scripts after paying the prescribed fee.

b) CoE will issue the photo copy of answer script to the student.

c) The faculty who had handled the subject will evaluate the script and HoD will recommend.

d) A Committee consisting of 2 experts appointed by CoE will review and declare the result.

f) If the result is in favor of the student, the fee collected will be refunded to the student.

h) The final mark will be announced by CoE.

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15. Classification of Performance

Classification of performance of students in the examinations pertaining to the courses in a programme is done on the basis of numerical value of Cumulative Grade Point Average **(CGPA).** The concept of **CGPA** is based on Marks, Credits, Grade and Grade points assigned for different mark ranges. **Table 7** shows the relation between the range of marks, Grades and Grade points assigned.

Table 7

Range of Marks	Grade	Grade Points (GP)
100 - 90	S – Outstanding	10
89 - 80	A – Excellent	9
79 - 70	B - Very Good	8
69 - 60	C - Good	7
59 - 55	D – Fair	6
54 – 50	E – Average	5
< 50	RA	0
Shortage of Attendance	U	-
Insufficient CAM		
ithdrawal from examination	W	-
Absent	AB	-

15.1 Semester Grade Point Average (SGPA)

On completion of a semester, each student is assigned a Semester Grade Point Average which is computed as below for all courses registered by the student during that semester.

$$\text{Semester Grade Point Average} = \sum (C_i \times GP_i) / \sum C_i$$

Where C_i is the credit for a course in that semester and **GP** is the Grade Point earned by the student for that course. The **SGPA** is rounded off to two decimals.

15.2 Cumulative Grade Point Average (CGPA)

The overall performance of a student at any stage of the Degree programme is evaluated by the Cumulative Grade Point Average **(CGPA**) up to that point of time.

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Cumulative Grade Point Average = $\sum(C_i \times Gp_i) / \sum C_i$

Where C_i is the credit for a course in any semester and **GP** is the grade point earned by the student for that course.

The **CGPA** is rounded off to two decimals.

16. Issue of Grade Sheets

16.1 Separate grade sheet for each semester will be given to the students by the CoE after the publication of the results.

16.2 After the completion of the programme a consolidated grade sheet will be issued to the student.

16.3 Separate grade sheet for supplementary examination will be given to the students by the CoE after the publication of supplementary examination results.

17. Temporary Break of Study from a Programme

17.1 Break of study is not normally permitted. However, if a student intends to temporarily discontinue the programme in the middle of the semester / year for valid reasons (such as accident or hospitalization due to prolonged ill health) and wish to rejoin the programme in the next year, he / she shall apply in advance to the Principal through the Head of the Department stating the reasons. The application shall be submitted not later than the last date for registering for the semester examinations in that concerned semester. Break of study is permitted only once during the entire period of the degree programme.

17.2 The student permitted to rejoin the programme after the break shall be governed by the rules and regulations in force at the time of rejoining.

17.3 The duration specified for passing all the courses for the purpose of classification of degree (vide Clause **19**) shall be increased by the period of such break of study permitted.

17.4 If a student is detained for want of requisite attendance, progress and good conduct, the period spent in that semester shall not be considered as permitted Break of Study and Clause 17.3 is not applicable for this case.

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18. Eligibility for the Award of Degree

A student shall be declared to be eligible for the award of the B.E. / B. Tech. Degree provided the student has successfully completed the course requirements and has passed all the prescribed examinations in all the Eight semesters **(Six** semester for lateral entry) within a maximum period of **7** years (**6** years for lateral entry) reckoned from the commencement of the first semester to which the candidate was admitted.

19. Classification of Degree

The degree awarded to eligible students will be classified as given in **Table 8.**

Table 8

S.No.	Class Awarded	Criteria
01.	First class with distinction	a) Passing of the examinations of all the courses in all Eight semesters (for regular) and all Six semesters (for lateral entry) in the first appearance. b) CGPA > 8.5 c) One year authorized break of study (Clause 17) and authorized withdrawal (Clause 11) is permissible.
02.	First class	a) Passing of the examinations of all the courses in all Eight semesters (for regular) and all Six semesters (for lateral entry student) within a maximum of Ten semesters for regular and a maximum of Eight semesters for lateral entry students. b) CGPA > 6.5 c) One year authorized break of study (Clause 17) and authorized withdrawal (Clause 11) is permissible.

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03.	Second class	a) All other students (not covered in clauses at S.No.1& 2 under Clause 19) who qualify for the award of the degree (vide clause 18) shall be declared to have passed the examination in Second Class. b) A student who is absent for the end semester examination in a course / project work Viva Voce after having registered for the same will be considered to have appeared for that examination for the purpose

20. Ranking

Students obtaining top **3** positions or top 10**% in** CGPA ranking (whichever is lower) in a branch will be considered as a rank holder. They should have passed all the prescribed courses in the first appearance and should have obtained a **CGPA of** > **8.5.** The student should also have a clean record of discipline during the period of study. Special certificates will be given to rank holders.

21. Award of Degree

The award of Degree will be approved by the Academic Council of the College.The degree will be issued by Anna University Chennai. The consolidated Grade Sheet will be issued by college.

22. Industrial Visit

Every student is expected to undertake at least one Industrial visit, starting from the Third semester of the Programme. The Faculty Advisor in consultation with the Head of the Department will organize the visit. Faculty should accompany the students during Industrial visits.

23. Personality and Character Development

All students shall enroll, on admission, in any one of the personality and character development programmes (the NCC / NSS / NSO / YRC) and undergo training for about 80 hours and attend a camp of about ten days. The training shall include classes on hygiene and health awareness and also training in first-aid.

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- National Cadet Corps (NCC) will have about 20 parades.

- National Service Scheme (NSS) will have social service activities in and around the College.

- National Sports Organization (NSO) will have Sports, Games, Drills and Physical exercises.

- Youth Red Cross (YRC) will have activities related to social services in and around college. However, YRC will not have special camps of 10 days. While the training activities will normally be during weekends, the camps will normally be during vacation period.

Every student shall put in a minimum of **75%** attendance in the training and attend the camp (except YRC) compulsorily. The training and camp (except YRC) shall be completed during the first year of the programme. However, for valid reasons, the Principal may permit a student to complete this requirement in the second year.

24. Discipline

Every student is required to be disciplined and maintain decorum both inside and outside the college campus. They should not indulge in any activity which can bring down the reputation of the University or College. The Principal shall constitute a disciplinary committee consisting of Principal, Two Heads of Department (of which one should be from the faculty of the student) to enquire into acts of indiscipline and notify the Academic Council about the disciplinary action taken.

25. Special Provisions

25.1 Option for Elective Courses

A student can have the option of taking 2 elective courses from other departments

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25.2 Fast Track Programme

Students who maintain a CGPA > 8.5 up to fourth semester and have passed all courses in first appearance (from semester 1 to semester 4 for regular category / semester 3 to semester 4 for Lateral Entry) are eligible for a fast track programme. Students can opt for the fast track programme from the Fifth Semester. The three elective courses of the Eighth semester can be taken in the earlier semesters (maximum one per semester) by the students. This will enable the students to be completely free from theory courses in the Eighth Semester. Students can pursue internship / industrial projects on a full time basis.

26. Revision of Regulation and Curriculum

The College may from time to time revise, amend or change the Regulations, scheme of examinations and syllabi, if found necessary. Academic Council assisted by Board of Studies and Standing Committee will make such revisions / changes.

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Note: - Printed during the year November – 2013.

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DEPARTMENT OF CIVIL ENGINEERING

Vision

Department of Civil Engineering aspires to become a world class Academic Centre for quality education and research in diverse areas of Civil Engineering with a strong social commitment.

Mission

Mission of the department is to achieve International Recognition by:

- Producing highly competent and technologically capable professionals and motivated young academicians.
- Providing quality education in undergraduate and post graduate levels, with strong emphasis on professional ethics and social commitment.
- Developing a scholastic environment for research, resulting in practical applications.
- Undertaking professional consultancy services in diverse areas of Civil Engineering.

Programme Educational Objectives (PEOs)

PEO1:

To provide strong foundation to graduates to pursue a successful profession or higher studies and take part in providing feasible solution for societal problems resulting in sustainable development of infrastructures.

PEO2:

To enrich competence of graduates to implement emerging techniques for planning, analysis, design and execution of Civil Engineering projects through lifelong learning.

PEO3:

To imbibe ethics and professionalism among the graduates that is to be practiced in their profession.

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Programme Outcomes (POs)

1. Apply knowledge of mathematics, science, and engineering for solving complex Civil Engineering problems.
2. Analyze and solve complex Civil Engineering problems using the principles of mathematics, natural sciences and Engineering sciences.
3. Design safe and sustainable structures / processes that are useful for the society by solving complex Civil Engineering problems.
4. Design various systems in the field of Civil Engineering by applying the concepts to investigate, conduct experiments and interpret data using appropriate codal provisions.
5. Apply appropriate modern tools and software for modeling and solution for Civil Engineering projects.
6. Apply building bye-laws and standards specified by the nodal agencies for the execution of Civil Engineering projects.
7. Understand environmental pollution problems, green building concepts and demonstrate sustainable engineering practices for Civil Engineering projects.
8. Apply ethical principles and commit to professional ethics in their profession.
9. Function effectively as an individual and as a team member in civil engineering projects encompassing multidisciplinary teams.
10. Design and create Detailed Project Reports (DPR) and associated documents, prepare presentation related to them and communicate both orally and in written form to a professional Civil Engineering group or individual.
11. Apply principles of project and financial management as a member or leader for managing Civil Engineering projects involving multi disciplinary environments.
12. Engage in lifelong learning for updating oneself on Civil Engineering contemporary advancements.

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KUMARAGURU COLLEGE OF TECHNOLOGY, COIMBATORE-49
(An Autonomous Institution Affiliated to Anna University, Chennai)
B.E CIVIL ENGINEERING
CURRICULUM & SYLLABUS 2013

SEMESTER - III

Code No.	Course Title	L	T	P	C
THEORY					
U13MA*T*304	Partial Differential Equations and Fourier analysis	3	1	0	4
U13CE*T*301	Fluid Mechanics	3	1	0	4
U13CE*T*302	Surveying –I	3	0	0	3
U13CE*T*303	Strength of Materials-I	3	1	0	4
U13CE*T*304	Building Construction	3	0	0	3
U13CE*T*305	Concrete Technology	3	0	0	3
PRACTICAL					
U13CE*P*301	Surveying Practical-I	0	0	3	1
U13CE*P*302	Concrete and Highway Laboratory	0	0	3	1
U13CE*P*303	Strength of materials Laboratory	0	0	3	1
U13GH*P*301	Human Excellence-Family values-I	0	0	2	1
Total					**25**

SEMESTER – IV

Code No.	Course Title	L	T	P	C
THEORY					
U13MA*T*401	Numerical Methods	3	1	0	4
U13GS*T*001	Environmental Science and Engineering	3	0	0	3
U13CE*T*401	Surveying- II	3	0	0	3
U13CE*T*402	Strength of Materials-II	3	1	0	4
U13CE*T*403	Applied hydraulics and hydraulic Machinery	3	1	0	4
U13CE*T*404	Geotechnical Engineering-I	3	0	0	3
PRACTICAL					
U13CE*P*401	Surveying Practical –II	0	0	3	1
U13CE*P*402	Fluid Mechanics Laboratory	0	0	3	1
U13CE*P*403	Building Planning and Drawing	0	0	3	1
U13GH*P*401	Human Excellence -Professional Values	0	0	2	1
				Total	25

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SEMESTER – V

Code No.	Course Title	L	T	P	C
THEORY					
U13CE*T*501	Structural analysis I	3	1	0	4
U13CE*T*502	Design of Reinforced concrete elements	3	1	0	4
U13CE*T*503	Water supply Engineering	3	0	0	3
U13CE*T*504	Design of Steel Structures	3	1	0	4
U13CE*T*505	Geotechnical Engineering-II	3	0	0	3
U13CE*T*506	Highway Engineering	3	0	0	3
PRACTICAL					
U13CE*P*501	Soil Mechanics Lab	0	0	3	1
U13CE*P*502	Environmental Engineering lab	0	0	3	1
U13EN*P*501	Communications skills laboratory	0	0	3	1
U13GHP501	Human Excellence Social Values	0	0	2	1
U13CE*P*503	Surveying camp			*1	1
				Total =	26

*1 week survey camp during the previous summer vacation

SEMESTER – VI

Code No.	Course Title	L	T	P	C
THEORY					
U13CE*T*601	Structural analysis II	3	1	0	4
U13CE*T*602	Design of masonry and Reinforced Concrete Structures	3	1	0	4
U13CE*T*603	Waste Water Engineering	3	0	0	3
U13CET604	Railways Airports and Harbour Engineering	3	0	0	3
U13GST005	Engineering Economics And Financial Management	3	0	0	3
	Elective-1	3	0	0	3
PRACTICAL					
U13CE*P*601	Computer Aided Design and Drawing (RCC and steel)	2	0	2	3
U13CEP602	Computer Applications Laboratory	0	0	3	1
U13CE*P*603	Industrial Training*	-	-	-	1
U13CEP604	Technical seminar	0	0	2	1
U13GHP601	Human Excellence National Values	0	0	2	1
				Total=	27

*2 weeks Industrial training during the previous winter vacation

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SEMESTER - VII

Code No.	Course Title	L	T	P	C
THEORY					
U13CET701	Estimation , Costing and Valuation	3	0	0	3
U13CE*T*702	Water Resources and Irrigation Engineering	3	0	0	3
U13GST008	Professional Ethics	3	0	0	3
	Elective-2	3	0	0	3
	Elective –3	3	0	0	3
	Elective –4	3	0	0	3
PRACTICAL					
U13CE*P*701	Design Project	0	0	3	1
U13CE*P*702	Design and drawing (Irrigation & Environmental Engg)	0	0	3	1
U13GHP701	Human Excellence Global values	0	0	2	1
				Total=	21

SEMESTER - VIII

Code No.	Course Title	L	T	P	C
THEORY					
	Elective - 5	3	0	0	3
	Elective - 6	3	0	0	3
	Elective -7	3	0	0	3
U13CEP801	Project Work	0	0	12	6
				Total	15

Total : 186 Credits

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List of Electives

Elective -I

Code No.	Course Title	L	T	P	C
U13CETE11	Environmental Impact Assessment Of Civil Engineering Projects	3	0	0	3
U13CETE12	Municipal Solid Waste Management	3	0	0	3
U13CETE13	Air Pollution Management	3	0	0	3
U13CETE14	Industrial Waste Management	3	0	0	3
U13CETE15	Traditional Architecture	3	0	0	3

Elective -II

Code No.	Course Title	L	T	P	C
U13CETE21	Water Resources Systems Analysis	3	0	0	3
U13CETE22	Ground Water Engineering	3	0	0	3
U13CETE23	Geographical Information System (Gis) And Remote Sensing	3	0	0	3
U13CETE24	Hydrology	3	0	0	3

Elective - III

Code No.	Course Title	L	T	P	C
U13CETE31	Transportation Planning	3	0	0	3
U13CETE32	Traffic Engineering And Management	3	0	0	3
U13CETE33	Urban And Regional Planning	3	0	0	3
U13CETE34	Town Planning And Architecture	3	0	0	3
U13CETE35	PAVEMENT ENGINEERING	3	0	0	3

Elective - IV

Code No.	Course Title	L	T	P	C
U13CETE41	Disaster Management And Mitigation	3	0	0	3
U13CETE42	Management Concepts & Practices	3	0	0	3
U13CETE43	Construction Planning & Scheduling	3	0	0	3
U13ECTE62	Digital Signal Processing	3	0	0	3
U13CSTE85	Grid And Cloud Computing	3	0	0	3

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Elective-V

Code No.	Course Title	L	T	P	C
U13CETE51	Geotechnical Earthquake Engineering	3	0	0	3
U13CETE52	Ground Improvement Techniques	3	0	0	3
U13CETE53	Repair And Rehabilitation Of Structures	3	0	0	3
U13CETE54	Earthquake Resistant Structures	3	0	0	3
U13CETE55	Prefabricated Structures	3	0	0	3
U13CETE56	Prestressed Concrete Structures	3	0	0	3
U13CETE57	Structural Dynamics	3	0	0	3

Elective-VI

Code No.	Course Title	L	T	P	C
U13CETE61	Matrix Methods of Structural Analysis	3	0	0	3
U13CETE62	Steel-Concrete Composite Structures	3	0	0	3
U13CETE63	Finite Element Method	3	0	0	3
U13CETE64	Tall Buildings	3	0	0	3
U13CETE65	Storage Structures	3	0	0	3
U13CETE66	Bridge Structures	3	0	0	3
U13CETE67	Industrial Structures	3	0	0	3
U13CETE68	Computer Aided Design Of Structures	3	0	0	3

Elective-VII

Code No.	Course Title	L	T	P	C
U13GST002	Total Quality Management	3	0	0	3
U13GST003	Principles Of Management	3	0	0	3
U13GST004	Operations Research	3	0	0	3
U13GST006	Product Design And Development	3	0	0	3

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THIRD SEMESTER

U13MAT302 PARTIAL DIFFERENTIAL EQUATIONS AND TRANSFORMS

L	T	P	C
3	1	0	4

COURSE OUTCOMES

After successful completion of this course, the students should be able

CO1: To form partial differential equations and solve certain types of partial differential equations.

CO2: To know how to find the Fourier Series and half range Fourier Series of a function given explicitly or to find Fourier Series of numerical data using harmonic analysis.

CO3: To know how to solve one dimensional wave equation, one dimensional heat equation and two dimensional heat equation in steady state using Fourier Series (Cartesian co-ordinates only).

CO4: To find the Fourier transform, sine and cosine transform of certain functions and use Parseval's identity to evaluate integrals.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S										
CO2	S	S										
CO3	S	S										
CO4	S	S										

FOURIER SERIES **9+3**

Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Parseval's identity – Harmonic Analysis.

FOURIER TRANSFORM **9+3**

Infinite Fourier transform pair – Infinite Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.

PARTIAL DIFFERENTIAL EQUATIONS **9+3**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions - Solution of PDE by variable separable method – Solution of standard types of first order partial differential equations (excluding reducible to standard types) – Lagrange's linear equation – Linear Homogeneous partial differential equations of second and higher order with constant coefficients.

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BOUNDARY VALUE PROBLEMS – ONE DIMENSIONAL EQUATIONS 9+3

Classification of second order quasi linear partial differential equations – Fourier series Solutions of one dimensional wave equation – One dimensional heat equations: Problems with temperatures and temperature gradients.

BOUNDARY VALUE PROBLEMS – TWO DIMENSIONAL EQUATIONS 9+3

Steady state solution of two-dimensional heat equation in Cartesian coordinates: Infinite and finite plates – Steady state solution of two-dimensional heat equation in Polar coordinates: Circular and Semicircular disks – Fourier series solutions.

L + T: 45 + 15 TOTAL: 60Hrs

TEXT BOOK:

1. Grewal B.S., "Higher Engineering Mathematics", Thirty Sixth Edition, Khanna Publishers, Delhi, 2001.
2. Veerarajan T., "Engineering Mathematics" (for semester IV), , Tata McGraw Hill, New Delhi (2001)
3. Kandasamy P., Thilagavathy K. and Gunavathy K., "Engineering Mathematics Volume III", S. Chand & Company ltd., New Delhi, 1996.
4. Ian Sneddon., "Elements of partial differential equations" , McGraw – Hill New Delhi, 2003.
5. Arunachalam T., "Engineering Mathematics III", Sri Vignesh Publications, Coimbatore (Revised) 2009.

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13CET301 **FLUID MECHANICS**

L	T	P	C
3	1	0	4

Course Outcomes :

After successful completion of this course, the students should be able

CO1: To understand the importance, application and inter-relationship of various properties of fluid.

CO2: To study the features and functions of various devices used to measure the pressure of fluid.

CO3: To study the features and function of various devices used to measure the velocity and discharge of fluid.

CO4: To obtain the knowledge regarding various theories those explain the behavior and performance of fluid flow through the pipe.

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S			M								
CO2	S			S								
CO3	S			S								
CO4	S			S								

PROPERTIES OF FLUID: **4**

Units of measurement, Newtonian and Non Newtonian fluids; Vapour pressure, compressibility and Elasticity; Surface Tension and Capillarity.

FLUID STATICS: **5**

Variation of static pressure; Pascal's law; Atmospheric, Absolute and gauge pressure; Pressure measurement by mechanical gauges and manometers; pressure on plane surfaces and curved surfaces.

BUOYANCY AND FLOATATION: **5**

Buoyancy ; Buoyant and Centre of Buoyancy; Stability of submerged bodies and floating bodies; Metacentre and metacentric height; Determination of Metacentric height- Experimental and Theoretical methods

DYNAMICS OF FLUID FLOW: **5**

Euler's equation of motion; Bernoulli's equation; Energy correction factor; momentum principle; Applications of momentum equation.

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KINEMATICS OF FLUID **8**

Methods of describing fluid motion; Classification of flow; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Three, two and one dimensional flows; irrotational and rotational flows; Streamline; pathline; Streakline; Equation for acceleration; Continuity equation; Velocity potential and stream function; flownet; Vortex flow-Free vortex and forced vertex flow.

FLOW MEASUREMENTS IN PIPES **5**

Discharge through Venturi meter; Discharge through orifice meter; Discharge through flow nozzle: Measurement of velocity by Pitot tube.

FLOW OVER NOTCHES AND WEIRS **4**

Flow through rectangular, triangular and trapezoidal notches and weirs; End contractions; Velocity of approach; Broad crested weir.

DIMENSIONAL ANALYSIS AND FLUID FLOW **9**

Rayleigh's method – Buckingham's π theorem – Geometric, Kinematic, and Dynamic similitudes – Scale effect – Distorted models Discharge and velocity measurements – Laminar and turbulent flows through pipe – Hagen-Poiseuille equation – Darcy-Weishbach equation – Major and Minor losses – Pipes in series and in parallel

L: 45 T: 15 Total: 60

TEXT BOOK:

1. P.N. Modi & S.M. Seth, "Hydraulics and fluid mechanics including hydraulic machines," Standard book house, New Delhi, 2005
2. R.K. Bansal, "Fluid mechanics and hydraulic machines," Laxmi Publications (P) Ltd, 2006.
3. K.L. Kumar , "Engineering fluid mechanics," Eurasia publishing house, 1995
4. Versteeg, H.K, and Malalasekera, W., "An Introduction to Computational Fluid Dynamics: The Finite Volume Method", Pearsons, 2007.

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U13CE*T*302 SURVEYING - I

L	T	P	C
3	1	0	4

COURSE OUTCOMES:

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

CO1: know the principle, different types of surveys and instruments used in surveying.
CO2: find the areas and distances by using linear methods
CO3: measure included angles and bearings by using compass.
CO4: measure horizontal angles and vertical angles by using theodolite.
CO5: measure the elevations and contours by using leveling instruments.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M			S	M							M
CO2	S											
CO3	S			S								
CO4	S			S	M							M
CO5	S			S	S							M

INTRODUCTION AND CHAIN SURVEYING 9

Definition - Principles - Classification - Field and office work - Scales - Conventional signs - Survey instruments, their care and adjustment - Ranging and chaining - Reciprocal ranging - Setting perpendiculars - well - conditioned triangles - Traversing - Plotting - Enlarging and reducing figures.

COMPASS SURVEYING AND PLANE TABLE SURVEYING 9

Prismatic compass - Surveyor’s compass - Bearing - Systems and conversions - Local attraction - Magnetic declination - Dip - Traversing - Plotting - Adjustment of errors - Plane table instruments and accessories - Merits and demerits - Methods - Radiation - Intersection - Resection - Traversing.

LEVELLING AND APPLICATIONS 9

Level line - Horizontal line - Levels and Staves - Spirit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and check levelling - Booking - Reduction - Curvature and refraction - Reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods - Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reservoirs.

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THEODOLITE SURVEYING **9**

Theodolite - Vernier and microptic - Description and uses - Temporary and permanent adjustments of vernier transit - Horizontal angles - Vertical angles - Heights and distances - Traversing - Closing error and distribution - Gale's tables - Omitted measurements.

TACHEOMETRIC SURVEYING **9**

Tacheometric systems - Tangential, stadia and subtense methods - Stadia systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Anallactic lens - Subtense bar.

L : 45 T: 15 Total : 60

TEXT BOOK:

1. S.K.Duggal, "Surveying (Volume-I) "Tata Mcgraw-Hill Publishing company Ltd. Newdelhi,2007.
2. Dr. B.C. Punmia, Ashok Kumar Jain, Ashok Kr. Jain, Arun Kr. Jain "Surveying (Volume –I)", Lakshmi Publications,2005.
3. Alak De , "Plane surveying", S.Chand & Company, New Delhi,2002.
4. A.M Chandra, "Plane Surveying", New age International, New Delhi, 2004.
5. S. S. Bhavikatti, "Surveying and Levelling (Volume-1)"I. K. International Pvt Ltd, 2009.
6. Basak, "Surveying & Levelling", Tata McGraw-Hill Education, 2000.

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U13CET303/U13CET607 STRENGTH OF MATERIALS -I

L	T	P	C
3	1	0	4

COURSE OUTCOMES

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

CO1: Understand the fundamental concepts of stress and strain in mechanics of solids and structures.

CO2: analyze determinate beams and trusses to determine shear forces, bending moments and axial forces.

CO3: Know concepts in designing shafts to transmit required power

CO4: design springs for its maximum energy storage capacities.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M										
CO2		S										
CO3	M	S										
CO4	M	S		M								

STRESS AND STRAIN **9**

Stress and strain at a point-Tension, Compression, Shear stress- Hooke's law-Relationship among elastic constants- Stress, strain diagram for Mild steel, TOR steel, Concrete- Ultimate stress-Yield Stress-Factor of safety-Thermal stresses-Thin cylinders and shells-Strain energy due to axial force-Resilience –stresses due to impact and suddenly applied load- Compound bars.

SHEAR AND BENDING IN BEAMS **9**

Beams and bending- Types of loads, supports- Shear force and bending moment diagrams for statically determinate beams with concentrated load, UDL, uniformly varying load. Theory of simple bending- Analysis of beams for stresses- Stress distribution at a cross section due to bending moment and shear force for cantilever, simply supported and overhanging beams with different loading conditions.

DEFLECTION **9**

Double integration method-Macaulay's methods- Area moment method- Conjugate beam method for the computations of slopes and deflections of determinate beams.

TORSION **9**

Torsion of Circular and Hollow Shafts- Elastic theory of Torsion- Stresses and Deflection in Circular solid and hollow shafts- Combined bending moment and torsion of shafts- strain

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energy due to torsion- Modulus of rupture- Power transmitted to shaft- Shaft in series and parallel- Closed and open coiled helical springs- Leaf springs- Springs in series and parallel- Design of buffer springs.

COMPLEX STRESSES AND PLANE TRUSSES **9**

2 D State of stress- 2 D Normal and Shear stresses on any plane- Principal stresses and principal planes- Mohr's circle- Plane trusses- method of joints – method of sections

L : 45 T: 15 Total : 60

TEXT BOOK:

1. Popov, E.P, "Engineering Mechanics of Solids", Prentice-Hall of India, New Delhi, 2007.
2. Rajput, R. K, "A Textbook of Strength of Materials", S. Chand, 2007.
3. Subramanian R., "Strength of materials", Oxford University Press, New Delhi 2005
4. Premalatha J. Mechanics of solids, Vignesh Publications, Coimbatore
5. R.K. Bansal Strength of materials, Laxmi Publications, New Delhi-2007.
6. William A.Nash, Theory and Problems of Strength of materials, Schaum's Outline series, Tata McGraw-Hill publishing co., New Delhi-2007.

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U13CE*T*304 BUILDING CONSTRUCTION

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1: have better idea regarding the different construction activities in the building construction.

CO2: plan for electrical systems for new buildings

CO3: choose appropriate refrigeration systems for various buildings.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			M			M						M
CO2						S						M
CO3	M			M		S						M

FOUNDATIONS **4**

Concept of foundations; Factors affecting selection of foundations; Types of foundations; Piles and their classification; Foundation on black cotton soils.

BRICK MASONRY **4**

Technical terms; Types of bonds in brick work and their suitability.

STONE MASONRY **2**

Technical terms; Types of bonds in brickwork and their suitability.

WALLS **1**

Classification of walls.

DAMPNESS AND DAMP PROOFING **3**

Causes of dampness; Methods of preventing dampness; Damp proofing materials and their classification; Methods of providing DPC under different situations.

FLOORS **3**

Technical terms; Types of ground floors; Repair of floors.

ROOFS **3**

Technical terms; classification of roofs; steel sloping roofs; Roof covering materials; Types of flat roofs; damp proofing & drainage on flat roofs.

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SCAFFOLDING, SHORING, UNDERPINNING AND FORM WORK 7

Types of scaffolding; types of shoring; Methods of underpinning; Types of formwork; centering.

CONSTRUCTION PRACTICES 9

Specifications, details and sequence of activities and construction co-ordination-site clearance-marking-earthwork-construction joints-movement and expansion joints-pre cast pavements-weather and water proof courses-roof finishes-acoustic and fire protection.

CONSTRUCTION EQUIPMENT 9

Selection of equipment for earth work- earth moving operations-types of earthwork equipment-tractors, motor graders, scrapers, front end waders, earth movers- equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting-Equipment for material handling and erection of structures- Equipment for dredging, trenching tunneling.

Total : 45

TEXT BOOK:

1. B.C.Punmia, "Building Construction" Laxmi Publications, New Delhi. 2000.
2. G.S.Birdie, T.D.Ahuja, "Building Construction and construction materials", Dhanpat rai Varghese. P.C. " Building Construction", Prentice hall of India Pvt.Ltd. New Delhi, 2007.
3. William H.Severns and Julian R.Fellows, "Air-conditioning and refrigeration", john Wiley and Sons, London, 1998.
4. Sharma S.C. " Construction equipment and Management" Khanna Publishers, New Delhi. 2002.

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U13CE*T*305 CONCRETE TECHNOLOGY

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1: acquire and apply fundamental knowledge in the fresh and hardened properties of concrete

CO2: identify the functional role of raw materials and apply this knowledge to mix design philosophy.

CO3: select the correct raw material components and mix design needed to formulate a concrete that meets prescribed specification requirements

CO4: develop an awareness of the utilization of special concretes

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S			S		S						M
CO2	S		S	S		S						S
CO3	S		S	S		S						S
CO4	M					S						S

INGREDIENTS OF CONCRETE **9**

Cement

Cement - their chemical composition and physical properties - uses - Tests on cement - fineness, consistency, soundness, initial setting time, final setting time - compressive strength.

Aggregates:

General classification of aggregates, particle shape and texture - bond between aggregates - strength of aggregate - other mechanical properties - bulking of sand, soundness of aggregates, alkali-aggregate reaction, thermal properties of aggregates - Grading of fine and coarse aggregates - Gap graded aggregates - Artificial aggregates - Heavy weight, light weight and normal aggregates - Sampling of aggregates - Tests on aggregates.

Water

Quality of water - Permissible impurities - Suitability of sea water.

CONCRETE ADMIXTURES **9**

Admixtures: Accelerators - catalysts - retarders - corrosion inhibitors - air entraining agent - workability agent Information regarding commercially available admixtures (Plastizers) - water repelling materials - pulverized fly ash - pozzolanas - Use of silica fumes.

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PROPERTIES OF FRESH CONCRETE **9**

Workability of concrete and tests - Test on fresh concrete to determine the 28^{th} day strength segregation and bleeding - Curing of concrete - Different methods - Autoclave.

Properties of Hardened Concrete:

Strength of concrete in compression - Tension and flexure - elastic properties of concrete - shrinkage of concrete - creep - thermal expansion - permeability - water tightness and crack control - Durability - thermal conductivity

Quality control:

General - Frequency of sampling - Test specimen - statistical analysis of test results - standard deviation - coefficient of variation - characteristic strength - acceptance and rejection criteria.

DURABILITY AND RESISTANCE OF CONCRETE TO DETERIORATION **9**

Corrosion of reinforcement - Reaction between aggregate and cement : reaction of chemicals in aggregates - Resistance to various chemicals - Concrete in sea water - Resistance to soft moorland waters - Resistance to sewage - resistance to freezing : freezing of green concrete - physics of saturated concrete - mechanism of disintegration - Resistance to erosion and abrasion -Resistance to fire : heat-resistant concrete.

SPECIAL CONCRETES **9**

Gap graded concrete - Light weight concrete Heavy weight concrete - Prepacked concrete - Ready mixed concrete - vacuum concrete - shotcrete - fibre reinforced concrete - polymer Concrete - Resin concretes - Ferrocement - High performance concrete - Sipcon Vaccum Dewatering.

Total : 45

TEXT BOOK:

1. Shetty M.S., 'Concrete Technology', S.Chand and Company, 2005.
2. Gambhir,M.L., 'Concrete Technology', Tata McGraw Hill, Publishing Company Limited, New Delhi 2004.
3. A.M.Neville, J.J.Brooks Pearson Education India Ltd,.2008.
4. A.R. Santhakumar, "Concrete Technology", Oxford University press,2004.
5. Kulkarni, "Text book of Concrete Technology", Tata McGraw Hill 2000.

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U13CE*P*301 SURVEYING PRACTICAL -I

L	T	P	C
0	0	3	1

COURSE OUTCOMES:

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

CO1: Operate various survey instruments and be able to implement theoretical knowledge in the field works.

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				S								M

COURSE CONTENTS

1. Study of chains and its accessories
2. Aligning, Ranging and Chaining
3. Chain Traversing
4. Compass Traversing
5. Plane table surveying: Radiation
6. Plane table surveying: Intersection
7. Plane table surveying: Traversing
8. Plane table surveying: Resection –Three point problem
9. Plane table surveying: Resection – Two point problem
10. Study of levels and levelling staff
11. Fly levelling using Dumpy level
12. Fly levelling using tilting level
13. Check levelling
14. LS and CS
15. Contouring

TOTAL : 45 Hrs

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U13CE*P*302 CONCRETE AND HIGHWAY LABORATORY

L	T	P	C
0	0	3	1

COURSE OUTCOMES :

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

CO1: assess the quality of the concrete through laboratory tests.
CO2 : Assess the durability properties of concrete
CO3: Design the mix proportion for the required concrete strength
CO4: Assess the quality of bitumen through laboratory tests.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				S		S						M
CO2				S		S						M
CO3	M			S		S						M
CO4	M			S		S						S

COURSE CONTENTS:

1. To determine the 28 day compressive strength of cement mortar cubes and grade of ordinary Portland cement.
2. Slump cone test & Compaction factor test to determine the workability of concrete.
3. To determine the modulus of rupture of concrete.
4. To design one given concrete mix (M20, M25, M30, M35, M40)
5. To determine the compressive strength and tensile strength of concrete by conducting tests on cubes and cylinders.
6. Water Permeability test for concrete
7. RCPT Test for concrete
8. Nondestructive tests for concrete cube and cylinder
9. Determination of flash point and fire point of bitumen
10. Determination of ductility of bitumen

TOTAL : 45 Hrs

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U13CE*P*303 STRENGTH OF MATERIALS LABORATORY

L	T	P	C
0	0	3	1

COURSE OUTCOMES:

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

CO1: measure deformations, forces, and strains under a variety of loading conditions, including tension, compression, bending, or any combination of these basic types of loading and assess the strength properties of given materials through laboratory tests.

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S			S								M

COURSE CONTENTS:

1. Test involving axial compression on bricks, concrete cube
2. Test involving axial tension on mild steel specimen to obtain the stress-strain curve and the strength.
3. Test involving torsion to obtain the torque Vs angle of twist and hence the stiffness
4. Verification of Maxwell Reciprocal Theorem on steel beam and obtain the load deflection curve, Young's modulus of elasticity and hence the stiffness of the material
5. Tests on helical spring (close coiled and open coiled)
6. Hardness tests (Brinell hardness, Rockwell hardness and Vicker hardness)
7. Double shear test
8. Test for impact resistance (Izod and Charpy tests)
9. Compression test on wood (parallel to grains and perpendicular to grain)
10. Test involving flexure on wooden beam to obtain the load deflection curve and hence the stiffness.

The student should learn the use of deflectometer and extensometer.

Total : 45 Hrs

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U13GHP 301 FAMILY VALUES – I

(Common to all branches of Engineering and Technology)

L	T	P	C
1	0	1	1

COURSE OUTCOMES:

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

CO1: Inculcate Family value

CO2: Aware of simple physical exercises.

CO3: Perform Yogasanas and meditations

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								S				
CO2								S				
CO3								S				

Restraint in family **4Hours**

Definition - Greatness of life force & mind. Introduction - Kayakalpa yoga -aim - maintaining youthfulness – sex & spirituality – ten stage of mind – mental frequency-method of concentration – kayakalpa philosophy - physical body – sexual vital fluid – life force – bio-magnetism - mind –food transformation into seven minerals – postponing the ageing process – death – importance of kayakalpa training.

Spiritual development through good Family life **4Hours**

Kayakalpa exercise – methods –aswinimudhra – ojus breathing – explanations – benefits – practices – Responsibility of men and women – introduction a good education – need of morality – spiritual development.Revision of previous physical exercises. Introduction – hints & caution – body massaging – accu-pressure –relaxation.

Peace in Family. **4Hours**

Family value – meaning – Introduction – values – benefits of blessings – effect of vibrations – make blessings a daily habit – greatness of friendship – individual & family peace – reason for misunderstanding in the family – no comment – no command – no demand – no ego – peace of mind.

Greatness of womanhood & Food is Medicine **4Hours**

Good–cultured behavioral patterns – love and compassion - Greatness of womanhood – Food is medicine (healthy food habits)

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Simplified physical exercises **7Hours**

Simplified physical exercises – Kaya Kalpa Yoga (Benefits related to the Patient, Tolerance, Sacrifice)

Meditation & Yogasanas **7Hours**

Thuriya meditation – introduction – practice – benefits. Asanas– ashtanga yoga – pathanjali maharishi –hints & cautions – posture - movement – involvement – standing asanas: thadasana – ekapathasana – chakrasana(side) – uthkatasana – trikonasana. Sittingasanas: thandasana – padmasana – vajrasana – suhasana – siddhasana – parvathasana – yogamudhra.Downward lying asanas: makkarasana – bhujangasana – salabhasana – navukasana– dhanurasana. Upward lying asanas: savasana - arthapavanamukthasana– pavanamukthasana – utthanapathasana – navasana& Surya namaskara.

Total: 30 Hours

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FOURTH SEMSTER

U13MA*T*401 NUMERICAL METHODS

L	T	P	C
3	1	0	4

COURSE OUTCOMES:

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

CO1:Solve a set of algebraic equations representing steady state models formed in engineering problems
CO2: Fit smooth curves for the discrete data connected to each other or to use interpolation methods over these data tables
CO3: Find the trend information from discrete data set through numerical differentiation and summary information through numerical integration
CO4: Predict the system dynamic behavior through solution of ODEs modeling the system
CO5: Solve PDE models representing spatial and temporal variations in physical systems through numerical methods.
CO6: Have the necessary proficiency of using MATLAB for obtaining the above solutions.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S										
CO2	S	S										
CO3	S	S										
CO4	S	S										
CO5	S	S										
CO6	S	S										

INTRODUCTION **2**

Simple mathematical modeling and engineering problem solving – Algorithm Design – Flow charting and pseudocode - Accuracy and precision – round off errors

NUMERICAL SOLUTION OF ALGEBRAIC EQUATIONS **5**

Solution of nonlinear equations - False position method – Fixed point iteration – Newton Raphson method for a single equation and a set of non- linear equations
Solution of linear system of equations by Gaussian elimination, Gauss Jordan method - Gauss Seidel method.

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CURVE FITTING AND INTERPOLATION **5**

Curve fitting – Method of least squares - Newton's forward and backward difference formulas – Divided differences – Newton's divided difference formula - Lagrange's interpolation – Inverse interpolation.

NUMERICAL DIFFERENTIATION AND INTEGRATION **5**

Numerical differentiation by using Newton's forward, backward and divided differences – Numerical integration by Trapezoidal and Simpson's 1/3 and 3/8 rules – Numerical double integration.

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS **10**

Initial value problems - Single step methods: Taylor's series method – Truncation error – Euler and Improved Euler methods – Fourth order Runge – Kutta method – Multistep methods: Milne's predictor - corrector method.

NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS (PDEs) 13

PDEs and Engineering Practice – Laplace Equation derivation for steady heat conduction – Numerical solution of the above problem by finite difference schemes – Parabolic Equations from Fourier`s Law of Transient Heat Conduction and their solution through implicit schemes – Method of Lines – Wave propagation through hyperbolic equations and solution by explicit method.

Use of MATLAB Programs to workout solutions for all the problems of interest in the above topics.

L + T : 45 + 15 = 60

REFERENCES:

1. Steven C.Chapra and Raymond P. Canale, " Numerical Methods for Engineers with Programming and Software Applications", SixthEdition, WCB/McGraw-Hill, 1998.
2. John H. Mathews and Kurtis D. Fink, "Numerical Methods using Matlab", Fourth Edition, Prentice Hall of India, 2004.
3. Gerald C. F. and Wheatley P.O, "Applied Numerical Analysis", Sixth Edition, Pearson Education Asia, New Delhi, 2002.
4. Sastry S.S, "Introductory Methods of Numerical Analysis", Third Edition, Prentice – Hall of India Pvt Ltd, New Delhi, 2003.
5. Kandasamy P., Thilagavathy K. and Gunavathy K., "Numerical Methods", S.Chand Co. Ltd., New Delhi, 2007.

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U13GST 001 ENVIRONMENTAL SCIENCE AND ENGINEERING
(common to all branches)

L	T	P	C
3	0	0	3

COURSE OUTCOMES:

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

CO1: Play an important role in transferring a healthy environment for future generations
CO2: Analyse the impact of engineering solutions in a global and societal context
CO3: Discuss contemporary issues that results in environmental degradation and would attempt to provide solutions to overcome those problems
CO4: Ability to consider issues of environment and sustainable development in his personal and professional undertakings
CO5: Highlight the importance of ecosystem and biodiversity
CO6: Paraphrase the importance of conservation of resources

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M	W				S					M
CO2		M	W				S					M
CO3		M	W				S					M
CO4		M	W				S					M
CO5		M	W				S					M
CO6		M	W				S					M

INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES **10**

Definition, scope and importance – Need for public awareness – Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests 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 – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – Role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles.

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ECOSYSTEMS AND BIODIVERSITY **14**

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 – Introduction, types, characteristic features, structure and function of the (a) Forest ecosystem (b) Grassland ecosystem (c) Desert ecosystem (d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to Biodiversity – Definition: genetic, species and ecosystem diversity – Biogeographical classification of India – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – 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.

ENVIRONMENTAL POLLUTION **8**

Definition – Causes, 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.

SOCIAL ISSUES AND THE ENVIRONMENT **7**

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 – Environment Production 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

HUMAN POPULATION AND THE ENVIRONMENT **6**

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.

Field Work

Visit to local area to document environmental assets- river / grassland / hill / mountain, visit to local polluted site- urban / rural / industrial / agricultural, study of common plants, insects, birds, study of simple ecosystems-pond, river, hill slopes etc.,

Total : 45 hours

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TEXT BOOK::

1. Deswal.S and Deswal.A, " A basic course in Environmental studies" Dhanpat Rai & Co, 2006.
2. Gilbert M.Masters, Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition, ISBN 81-297-0277-0, 2004.
3. Miller T.G. Jr., Environmental Science – Sustaining the earth, Wadsworth Publishing Co., 1993.
4. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad India., 2002
5. Trivedi R.K., Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards, Vol. I and II, Enviro Media. 1996
6. Cunningham, W.P.Cooper, T.H.Gorhani, Environmental Encyclopedia, Jaico Publ., House, Mumbai, 2001.
7. Wager K.D., Environmental Management, W.B. Saunders Co., Philadelphia, USA, 1998.
8. Townsend C., Harper J and Michael Begon, "Essentials of Ecology", Blackwell science Publishing Co., 2003
9. Trivedi R.K and P.K.Goel "Introduction to Air pollution" Techno-science Pubications. 2003,Yamuna R.T "Environmental Science" Inter Publications, 2008

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U13CET401 **SURVEYING II**

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1: set out of curves using various methods.

CO2: Principles and methods of measurement of horizontal vertical angles and leveling using Survey total station.

CO3: understand the working principle of GPS, its components, signal structure, processing techniques used in GPS observations and error sources.

CO4:demonstrate methods of survey in water bodies by hydrographic surveying, basic concepts adopted in photogrammetry

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M			S								
CO2	M			S	S							M
CO3	M				S							M
CO4	M			S								M

CURVES **9**

Reconnaissance, preliminary and location surveys for engineering projects - Lay out - Setting out works - Route Surveys for highways, railways and waterways - Curve ranging - Horizontal and vertical curves - Simple curves - Setting with chain and tapes, tangential angles by theodolite, double theodolite - Compound and reverse curves - Transition curves - Functions and requirements - Setting out by offsets and angles - Vertical curves - Sight distances

CONTROL SURVEYING **9**

Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals - Base line - Instruments and accessories - Corrections - Satellite station - Reduction to centre - Single and reciprocal observations - Modern trends – Bench marking

SURVEY ADJUSTMENTS **9**

Errors - Sources, precautions and corrections - Classification of errors - True and most probable values - weighted observations - Method of equal shifts - Principle of least squares - Normal equation - Correlates - Level nets - Adjustment of simple triangulation networks. minor / and special instruments.

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TOTAL STATION SURVEYING **5**

Basic Principle-classifications-Electro-optical system: Measuring principle, Working principle, Sources of Error, Infrared and Laser total station instruments. Microwave system, measuring principle, working principle, sources of Error, Microwave Total station instruments, Comparison between Electro-optical and Microwave system. Care and maintenance of Total Station instruments. Modern positioning systems-Traversing and Trilateration.

GPS SURVEYING **4**

Basic concepts – Different segments- space, control and user segments-satellite configuration- signal structure- orbit determination and representation- anti spoofing and selective availability-Task of control segment- Hand held and Geodetic receivers-data processing-Traversing and triangulation.

ADVANCED TOPICS IN SURVEYING **9**

Route Surveying-Reconnaisance- Route surveys for highways, railways and waterways-hydrographic surveying- Tides-MSL- Sounding methods- Three-point problem- Strength of fix-Sextants and station pointer- Astronomical Surveying-field observations and determination of Azimuth by altitude and hour angle methods- fundamentals of Photogrammetry and Remote sensing.

Total : 45 HRS

TEXT BOOK: :

1. Dr.B.C Punmia, Ashok K.Jain , Arun K.Jain , "Higher Surveying", Lakshmi Publications New Delhi, 2005.
2. A.M Chandra , "Higher Surveying", New age International, New Delhi.2004.
3. S.K.Duggal , "Surveying (Volume –II)"., Tata McGraw-Hill Publishing company Ltd, New Delhi.2004.
4. Satheesh Gopi, R.Sathikumar, N.Madhu, " Advanced Surveying - Total station, GIS and Remote sensing", Pearson Education India(2012).
5. Alfred Leick, "GPS satellite surveying", John Wiley & Sons Inc.,3rd Edition 2004.
6. Satheesh Gopi. Rasathishkumar, N.madhu, "Advanced Surveying, Total Station GPS and Remote Sensing", Pearson Education 2007.

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U13CE*T*402 STRENGTH OF MATERIALS -II

L	T	P	C
3	1	0	4

Course outcomes :

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

CO1: demonstrate various energy principles
CO2: analyse indeterminate beams like continuous beams and fixed beams
CO3: analyse the long and short columns and determine the design loads.
CO4: develop knowledge on state of stress in three dimensions
CO5: solve problems involving unsymmetrical bending in structural members.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S										
CO2	S	S										
CO3	S	S										
CO4	S	S										
CO5	S	S										

ENERGY PRINCIPLES **9**

Strain energy and strain energy density-strain energy in traction, problems on suddenly applied loads and impact loads, strain energy in shear, flexure and torsion - Castigliano's theorems -principle of virtual work - application of energy theorems for computing deflections in beams and trusses - Maxwell's reciprocal theorems

INDETERMINATE BEAMS **9**

Propped cantilever and fixed beams - fixed end moments and reactions for concentrated load (central, non central), uniformly distributed load, triangular load (maximum at centre and maximum at end), theorem of three moments – analysis of continuous beams - support reactions - shear force and bending moment diagrams for continuous beams - slope & deflections in continuous beams (qualitative study only)

COLUMNS **9**

Eccentrically loaded short columns-middle third rule - core of section - columns and unsymmetrical sections - (angle channel sections) - Euler's theory for long columns - critical loads for prismatic columns with different end conditions; Rankine – Gordon formula for eccentrically loaded columns - thick cylinders - compound cylinders.

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STATE OF STRESS IN THREE DIMENSIONS **9**

Spherical and deviation components of stress tensor - determination of principal stresses and principal planes (3 dimension) - volumetric strain - dilatation and distortion - theories of failure - principal stress dilatation - principal strain - shear stress - strain energy and distortion energy theories - application in analysis of stress, load carrying capacity and design of members –interaction problems and interaction curves - residual stresses.

ADVANCED TOPICS IN BENDING OF BEAMS **9**

Unsymmetrical bending of beams of symmetrical and unsymmetrical sections – shear flow - shear centre - channel section - curved beams – Winkler Bach formula - stress concentration - fatigue, fracture and creep

L : 45 T:15 Total : 60

TEXT BOOK:

1. R.K. Bansal "A Text book of Strength of materials" , Lakshmi Publications, New Delhi(2010).
2. D.S.Prakkash Rao " Strength of materials", University Press, Hyderabad (2002).
3. Dr. Sadhu singh " Strength of Materials", Khanna Publishers, Delhi (2006)
4. S.M.A Kazimi " Solid mechanics" Tata Mc- raw-Hill Publications Ltd. New Delhi, 2009
5. B.C. Punmia, Ashok kumar Jain , Arun kumar Jain " Theory of structures", Lakshmi publications (P) Ltd, New Delhi, 2007.
6. R.K.Rajput, "Strength of materials", S.Chand(2006).

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U13CE*T*403 APPLIED HYDRAULICS AND HYDRAULIC MACHINERY

L	T	P	C
3	1	0	4

COURSE OUTCOMES

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

CO1: Theories those explain behaviour and performance of fluid when it is flowing in an open channel.
CO2: demonstrate critical flow condition in channels
CO3: determine GVF profiles under non-uniform flow
CO4: the components, functions and use of different types of turbines
CO5: the components, functions and use of different types of pumps.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S		M								
CO2	M			S								
CO3	M			S								
CO4	M				M							M
CO5	M				M							M

UNIFORM OPEN CHANNEL FLOW **9**

Types and regimes of open channel flow – Velocity distribution in open channel – Wide open channels – Chezy's & Manning's uniform flow equations – Determination of normal depth – Most economical section

CRITICAL FLOW **9**

Specific energy – Specific energy diagram – Alternate depths – Critical flow condition in rectangular, triangular, trapezoidal, and circular channels – Flow through transitions (local bed rise and width contraction)

NON-UNIFORM FLOW **9**

Dynamic equation of gradually varied flow – Determination of GVF profiles – Direct and standard step methods – Hydraulic jump – Sequent depths – Surge

TURBINES **10**

Impact of jet on flat and curved plates – Classification of turbines – Pelton wheel turbine – Francis turbine – Kaplan turbine – Draft tubes – Cavitation – Case study

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PUMPS **8**

Centrifugal pump – Single and Multi stage pumps – Reciprocating pump – Indicator diagram – Separation & Cavitation – Air vessel – Other pumps – Case study

L: 45 T: 15 Total: 60

TEXT BOOK: :

1. K. Subramanya, "Flow in open channels," Tata McGraw-Hill publishing company limited, 2007
2. R.K. Bansal, "Fluid mechanics and hydraulic machines," Laxmi Publications (P) Ltd, 2006
3. V.T. Chow, "Open channel hydraulics," Blackburn Press, 2009
4. P.N. Modi & S.M. Seth, "Hydraulics and fluid mechanics including hydraulic machines," Standard book house, 2005.
5. K.G. Ranga Raju, "Flow through open channel," Tata McGraw-Hill publishing company limited, 1999

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U13CET404 GEOTECHNICAL ENGINEERING-I

L	T	P	C
3	0	0	3

Course Outcomes :

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

CO1: carry out soil classification

CO2: solve three phase system problems

CO3: solve any practical problems related to soil stresses estimation, permeability and seepage including flow net diagram.

CO4: estimate the stresses under any system of foundation loads.

CO5: solve practical problems related to consolidation settlement and time rate of settlement.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S			S								M
CO2	S											M
CO3	S	S										M
CO4	S											
CO5	M	S		S								M

UNIT-I **9**

Historical development of soil Engineering- Origin and general types of soils- soil structure, clay minerals- Three phase system- Identification and classification of soils.

UNIT-II **9**

Soil water-capillary phenomena- concept of effective and neutral stresses- Permeability- determination of coefficient of permeability in the laboratory- Seepage flow- Head, gradient, pressure- steady state flow- two dimensional- flow net.

UNIT-III **9**

Vertical stress distribution in soil – Boussinesq and Westergaard's equation- Newmark's influence chart – principle, construction and use- equivalent point load and other approximate methods- pressure bulb- Compaction.

UNIT-IV **9**

Shear strength- Mohr- Coulomb failure criterion- shear strength tests- Different drainage conditions- Shear properties of cohesionless and cohesive soils- Use of Mohr's circle- relationship between principle stresses and shear parameters.

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UNIT-V **9**

Compressibility and consolidation- Terzaghi's one dimensional consolidation theory – pressure void ratio relationship- preconsolidation pressure- Total settlement and time rate of settlement- coefficient of consolidation- curve fitting methods- Correction for construction time.

TOTAL : 45 HRS

TEXT BOOK: :

1. Murthy, V.N.S., " Soil Mechanics and Foundation Engineering", CBS Publishers Distribution Ltd., New Delhi. 2007.
2. Gopal Ranjan and rao A.S.R. " Basic and Applied soil mechanics", Wiley eastern ltd, New Delhi, 2000.
3. Arora K.R. " Soil Mechanics and Foundation Engineering", Standard Publishers and Distributors, new Delhi, 2002.
4. Das, B.M, "Principles of Geotechnical Engineering", Thompson Brooks/ Coles Learning, Singapore, 5th Edition, 2002.

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U13CE*P*401 SURVEYING PRACTICAL II

L	T	P	C
0	0	3	1

COURSE OUTCOMES :

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

CO1: Students completing this course would have acquired practical knowledge on handling survey instruments like Theodolite, Tacheometry and Total station and have adequate knowledge to carry out field marking for various engineering projects and curves setting.

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				S	S							M

COURSE CONTENTS :

1. Study on precise theodolite (microtheodolites)
2. Measurement of horizontal angles by reiteration and repetition and vertical angles
3. Total work station survey traverse
4. Heights and distances - Triangulation - Single plane method.
5. Tacheometry - Tangential system - Stadia system - Subtense system.
6. Setting out works - Foundation marking - Simple curve (right/left-handed) - Transition curve.
7. Demonstration of total station
8. Longitudinal and cross section by using total station
9. Measurements of vertical angle by using total station
10. Demonstration of EDM.
11. Double plane method by using total station
12. Contouring by using total station
13. Field observation and calculation of azimuth

Total : 45 Hrs

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U13CE*P*402 FLUID MECHANICS LABORATORY

L	T	P	C
0	0	3	1

COURSE OUTCOMES :

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

CO1: measure discharge in pipes
CO2: demonstrate the characteristic curves of pumps
CO3: demonstrate the characteristic curves of turbines

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				S	M							
CO2				S	M							M
CO3				S	M							M

COURSE CONTENTS

1. Determination of co-efficient of discharge of venturimeter
2. Determination of co-efficient of discharge of orificemeter
3. Determination of co-efficient of discharge of orifice/ mouth piece
4. Determination of co-efficient of discharge of notches (Rectangular/ triangular notch)
5. Study of impact of jet on flat plate (normal / inclined)
6. Study of friction losses in pipes
7. Study on performance characteristics of centrifugal pump (Constant speed)
8. Study on performance characteristics of submersible pump
9. Study on performance characteristics of reciprocating pump
10. Study on performance characteristics of Pelton wheel turbine
11. Study on performance characteristics of Francis turbine
12. Study on performance characteristics of Kaplan turbine

DEMONSTRATION EXPERIMENTS

13. Determination of Metacentric height
14. Study of minor losses in pipes
15. Verification of Bernoulli's theorem
16. Study on performance characteristics of Turgo wheel impulse turbine

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U13CE*P*403 BUILDING PLANNING AND DRAWING

L	T	P	C
0	0	3	1

COURSE OUTCOMES :

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

CO1: apply the principles of planning and byelaws used for building planning

CO2: draw plan, elevation and section for various structures.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				S								M
CO2				S								M

Course Content :

Classification of buildings- Principles of planning- Dimensions of buildings- Building bye-laws for floor area ratio, open spaces- Orientation of buildings- Lighting and ventilation- Planning and preparing sketches and working drawings of Residential buildings (Flat and sloping roof), schools, Hostels, Hospitals, Single-storey factory buildings with trusses. Detailed working drawings of the component parts- Doors and windows- Roof trusses- staircases.

TEXT BOOK:

1. Shah M.G. Kalec M. & Palki SY Building Drawing ,Tata Mcgraw Hill, New delhi, 2000.
2. Civil Engg. Drawing & House Planning - B.P. Verma, Khanna publishers, Delhi,2008
3. Building drawing & detailing - Dr. Balagopal & T.S. Prabhu, Spades Publishers, Calicut,2006.

4 . AutoCAD Manual – Autodesk Inc., California, USA 2010.

EXAMINATION GUIDELINE:

30% of the end semester examination paper shall deal with planning, while the rest 70% shall be based on the drafting skill.

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U13GHP 401 PROFESSIONAL VALUES

(Common to all branches of Engineering and Technology)

L	T	P	C
1	0	1	1

COURSE OUTCOMES:

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

CO1: Inspire students to become blissful humans.

CO2: Make the students able to a come out of greed and keep mind pure.

CO3: Outgrow the dangerous emotions

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								S				
CO2								S				
CO3								S				

Personality concepts - 5C's & 5E's **5**

Personality-concepts, definition,-types of personality-personality development activities- how to develop a good personality factors affecting personality development tools of improve personality-steps to a dynamic personality-5 C's and 5 E's

Time Management **5**

Self-development – importance of self development – how to develop oneself – continuous learning – laser focus +persistence – working a plan – sound mind follows sound body – complete responsibility – practice – those who make it, made it – never give-up – meditation – ten commandments of self development – self control technique for teenagers.

Leadership traits **5**

Leadership traits – style – factors of leadership – principles of leadership - time management – importance of time management – benefits – top five time sucks of the average Human – time management for college students. Passion for excellence – what is passion? – Why passion? – Value of life – index of life – fuel for fulfillment – secret of physical & spiritual fitness – improves learning ability.

Empowerment of Mind **5**

IQ, - Factors affecting the intelligence quotient – IQ and the brain – sex – race – age – relationship between IQ & intelligence – how to develop good intelligence quotient power – exercise can improve IQ – food plan to increase IQ – meditation – reading – playing – try right with opposite hands – learn new things - the IQ tests. EQ – emotional Intelligence – list

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positive & negative emotions. SQ – spiritual quotients – definition – basic science of spiritual quotient – how to build SQ? – Relationship between IQ, EQ, SQ.

Simplified Physical Exercise & Yogasanas & Meditation **10**

Panchendhriya meditation – Introduction – practice – benefits. Asanas – revision of previous asanas–standing asanas: natarasana –virabhadrasana – pathangusthasana– ardhachandrasana– utthithatrikonasana–parsvakonasana.

Total : 30 Hours

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FIFTH SEMESTER

13CET501 STRUCTURAL ANALYSIS-I

L	T	P	C
3	1	0	4

COURSE OUTCOMES :

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

CO1: analyze the pin jointed plane frames using energy and consistent deformation method
CO2: analyze indeterminate structures using various classical methods.
CO3: determine absolute maximum bending moment and shear force in beams due to moving loads.
CO4: find the maximum moment, shear and stresses produced in arches due to external loads, temperature effects and support settlements.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M									
CO2	S	S	M									
CO3	S	S	M									
CO4	S	S	M									

INDETERMINATE FRAMES **9**

Degree of static and kinematic indeterminacies for plane frames – analysis of indeterminate pin-jointed frames- rigid frames (Degree of indeterminacy upto two) – Energy and consistent deformation methods.

MOVING LOADS AND INFLUENCE LINES **9**

Influence lines for reactions in statically determinate structures- influence lines for member forces in pin-jointed frames- Influence lines for shear force and bending moment in beam sections- Calculation of critical stress resultants due to concentrated and distributed moving loads.

Muller Breslau's principle – Influence lines for continuous beams and single storey rigid frames- Indirect model analysis for influence lines of indeterminate structures.

ARCHES **9**

Arches as structural forms – Examples of arch structures – Types of arches – Analysis of three hinged, two hinged and fixed arches, parabolic and circular arches- Settlement and temperature effects.

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SLOPE DEFLECTION METHOD **9**

Continuous beams - rigid frames (with and without sway) – symmetry and antisymmetry- Support displacements.

MOMENT DISTRIBUTION METHOD **9**

Distribution and carryover of moments – Stiffness and carry over factors – Analysis of continuous beams – Plane rigid frames with and without sway- Neylor's simplification.

Total : 45 + 15 Tutorials = 60 Hrs

TEXT BOOK:

1. Punmia B.C, Ashok Kumar Jain and Arun Kumar Jain, "Theory of structures", Laxmi Publications Pvt. Ltd., New Delhi, 2004.
2. Muthu K.U, Azmi Ibrahim, M.Vijayanand, "Basic Structural Analysis", I K International Publishing House , 2011.
3. L.S.Negi & R.S.Jangid, " Structural Analysis", Tata McGraw Hill Publications, New Delhi, 6th Edition, 2003.
4. Reddy.C.S., " Basic Structural Analysis", Tata McGraw Hill Education Pvt.Ltd., New Delhi.
5. Vaidyanadhan R and Perumal, P, "Comprehensive Structural Analysis-Vol.1 &Vol.2", Laxmi Publications Pvt.Ltd, New Delhi, 2003.
6. Bhavikatti.S.S, " Structural Analysis-Vol.1 & Vol.2", Vikas Publishing Pvt Ltd., New Delhi. 2008.

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13CET502 DESIGN OF REINFORCED CONCRETE ELEMENTS

L	T	P	C
3	1	0	4

COURSE OUTCOMES :

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

CO1 : know about the various method of design of concrete structures.

CO2 : interpret IS codes for concrete element design.

CO3 : design various basic elements of reinforced concrete structures like beams, columns and footing.

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S				S						M
CO2				M		S						M
CO3	S	S				S						M

METHODS OF DESIGN OF CONCRETE STRUCTURES 9

Concept of Elastic method, Ultimate load method and limit state method – advantages of Limit State Method over other methods- Design codes and specification- Limit state philosophy as detailed in IS code – Design of beams and slabs by working stress method.

LIMIT STATE DESIGN FOR FLEXURE 9

Analysis and design of singly and doubly reinforced rectangular and flanged beams- Analysis and design of one way, two way and continuous slabs subjected to uniformly distributed load for various boundary conditions.

LIMIT STATE DESIGN FOR BOND, ANCHORAGE, SHEAR & TORSION 9

Behaviour of RC members in bond and Anchorage- Design requirements as per current code- Behaviour of RC beams in shear and torsion- Design of RC members for combined bending, shear and torsion.

LIMIT STATE DESIGN OF COLUMNS 9

Types of columns- Braced and unbraced columns – Design of short Rectangular and circular columns for axial, uniaxial and biaxial (using SP16) bending.

LIMIT STATE DESIGN OF FOOTING 9

Design of wall footing – Design of axially and eccentrically loaded rectangular isolated footing– Design of combined footing- rectangular, trapezoidal, strap.

Total = 45 + 15 Tutorial = 60 hrs

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TEXT BOOK:

1. Gambhir.M.L., Fundamentals of Reinforced Concrete Design", Prentice Hall of India Private limited, New Delhi, 2006.
2. Varghese, P.., "Limit state Design of Reinforced Concrete", Prentice Hall of India, Pvt. Ltd., New Delhi, 2002.
3. Subramanian, N. Design of Reinforced Concrete Structures", Oxford University Press, New Delhi, 2013.
4. Punmia, B.C., Ashok Kumar jain, Arun Kumar jain, " Limit state Design of Reinforced concrete, Laxmi Publications Pvt. Ltd., New Delhi, 2007.
5. Sinha, S.N., " Reinforced Concrete Design", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2002.

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13CET503 WATER SUPPLY ENGINEERING

L	T	P	C
3	0	0	3

COURSE OUTCOMES :

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

CO1:an insight into the structure of drinking water supply systems, including water transport, treatment and distribution.

CO2:an understanding of water quality and standards, and their relation to public health.

CO3:the ability to design and evaluate water supply project alternatives on basis of chosen selection criteria.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M		M		S	S					M
CO2		M		M		S	S					M
CO3		S	S			S	S				M	S

PLANNING FOR WATER SUPPLY SYSTEM 9

Public water supply system – Planning - Objectives – Design period – Population forecasting – Water demand – Sources of water and their characteristics – Surface and ground water - Impounding Reservoir Well hydraulics –Development and selection of source – water quality – characterization and standards – Impact of climate change.

CONVEYANCE SYSTEM 9

Water supply intake structures – Functions and drawings- pipes and conduits for water- Pipe materials – Hydraulics of flow in pipes – transmission main design – laying, jointing and testing of pipes – Drawings appurtenances – types and capacity of pumps – Selection of pumps and pipe materials.

WATER TREATMENT 9

Objectives – Unit operations and processes- principles, functions design and drawing of chemical feeding, flash mixers, flocculators, sedimentation tanks and sand filters – disinfection – Residue management – Construction and Operation maintenance aspects of water treatment plants.

ADVANCED WATER TREATMENT 9

Principles and functions of aeration – Iron and manganese removal, Defluoridation and demineralization – Water softening – Desalination – membrane Systems _ recent advances

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WATER DISTRIBUTION AND SUPPLY TO BUILDINGS **9**

Requirements of water distribution – Components – Service reservoirs – Functions and drawings – Network design – Economics – computer applications – Analysis of distribution networks- Appurtenances – operation and maintenance – leak detection, methods. Principles of design of water supply in buildings – House service connection- Fixtures and fittings – Systems of plumbing and drawings of types of plumbing.

Total : 45 hours

TEXT BOOK: :

1. Garg, S.K., " Environmental Engineering", Vol.1 Khanna Publishers, New Delhi, 2005.
2. Modi, P.N. " Water Supply Engineering", Vol.I Standard Book House, New Delhi, 2005.
3. Punmia B.C., Ashok K Jain and Arun K Jain, " Water Supply Engineering", Laxmi Publications Pvt. Ltd., New Delhi, 2005.
4. Government of India, "Manual on water Supply and Treatment", CPHEEO, Ministry of Urban Development, New Delhi, 2003.
5. Syed R. Qasim and Edward M. Motley Guang Zhu, "Water Works Engineering Planning", Design and Operation, Prentice Hall of India Private Limited, New Delhi, 2006.

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13CET504 **DESIGN OF STEEL STRUCTURES**

L	T	P	C
3	1	0	4

COURSE OUTCOMES :

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

CO1: design structural steel members subjected to compressive, tensile and bending forces.
CO2 : interpret IS codes for Structural steel element design.
CO3 : design structural systems such as purlin, roof trusses, and gantry girders.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		S		M		S						
CO2				M		S						
CO3		S		M		S						

INTRODUCTION **6**

Properties of steel – structural steel sections – Limit State Design Concepts- Loads on Structures -Connections using bolts and welding – Design of bolted and welded joints- Eccentric connections – Efficiency of joints.

LIGHT GAUGE SECTIONS **6**

Design of light gauge steel members- local and post buckling of thin element – light gauge steel compression members – tension members- beams and connections

TENSION MEMBERS **6**

Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag.

COMPRESSION MEMBERS **9**

Types of compression members – Theory columns – Basis of current codal provision for compression member design- slenderness ratio - Design of single section and compound section compression members – design of laced and battened type columns – design of column bases- Gusseted base.

BEAMS **9**

Design of laterally supported and unsupported beams – Built up beams – Beams subjected to uniaxial and biaxial bending – design of plate girders- Intermediate and bearing stiffeners – Flange and web splices.

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ROOF TRUSSES AND INDUSTRIAL STRUCTURES **9**

Roof trusses – Roof and side coverings – Design of purlin and elements of truss; end bearing- Design of gantry girder.

Total : 45 + 15 Tutorial = 60 Hrs

TEXT BOOK: :

1. Gambhir.M.L., " Fundamentals of Structural Steel design", McGraw Hill Education India Pvt.Ltd., 2013.
2. Shiyekar. M.R., " Limit State Design in Structural Steel", Prentice Hall of India Pvt. Ltd, 2nd Edition 2013.
3. Subramanian.N, " Design of Steel Structures", Oxford University Press, New Delhi, 2013.
4. Narayanan.R.et.al. "Teaching Resource on structural Steel design", INSDAG, Ministry of Steel Publications, 2002.
5. Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company, 2005.
6. IS800:2007, General Construction in Steel-Code of Practice, (Third Revision), Bureau of Indian Standards, New Delhi, 2007.

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13CET505 GEOTECHNICAL ENGINEERING-II

L	T	P	C
3	0	0	3

COURSE OUTCOMES :

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

CO1: select type of foundation required for the given soil condition.
CO2: analyze the group of piles for their load capacity.
CO3: carry out stability analysis of retaining walls.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M			S								M
CO2	M	S	M	S								M
CO3		S										

SITE INVESTIGATION AND SELECTION OF FOUNDATION 9

Scope and Objectives – Methods of exploration – auguring and boring – wash boring and rotary drilling – Depth of boring- spacing of bore hole – sampling techniques – representative and undisturbed sampling- methods- split spoon sampler, Thin wall sampler, Stationery piston sampler- Penetration tests (SPT and SCPT) – Bore log report –data interpretation- strength parameters and liquefaction potential – Selection of foundation based on soil condition.

BEARING CAPACITY AND SETTLEMENT 9

Introduction- Location and depth of foundation – Codal provisions – bearing capacity of shallow foundation on homogeneous deposits – Terzaghi's formula and BIS formula – factors affecting bearing capacity – problems – Bearing capacity from in-situ tests (plate load) Allowable bearing pressure – Seismic considerations in bearing capacity evaluation. Determination of Settlement of foundations on granular and clay deposits – Total and differential settlement – Allowable settlements – Codal provision – methods of minimizing total and differential settlements.

SHALLOW FOUNDATION 9

Types of footings – Contact pressure distribution: isolated footing – combined footings – Types and proportioning – Mat foundation – Types and applications – proportioning – Floating foundation – foundation subjected to Tensile force- Seismic force consideration – Codal provision (No structural design).

PILE FOUNDATION 9

Types of piles and their function – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil – static formula - dynamic formula –

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Capacity from insitu tests – negative skin friction – uplift capacity – Group capacity by different methods (Feld's rule, Converse – labara formula and block failure criterion) – Settlement of pile groups – interpretation of pile load test – Underreamed piles – Capacity under compression and uplift.

EARTH PRESSURE AND RETAINING WALLS 9

Plastic equilibrium in soils – active and passive states- Rankine's theory – cohesionless and cohesive soil – Coulomb's wedge theory – Condition for critical failure plane – Earth pressure on retaining walls of simple configurations – Culmann's Graphical method – pressure on the wall due to line load – Stability analysis of retaining walls.

Total hours = 45

TEXT BOOK: :

1. Venkatramiah C., Geotechnical Engineering, New Age International (P) Ltd , Publishers, New Delhi, 2006.
2. Murthy V.N.S., " Soil Mechanics and Foundation Engineering", CBS Publishers and Distributers Ltd., New Delhi, 2007.
3. Gopal Ranjan and rao A.S.R. " basic and Applied soil mechanics", New Age International Pvt.Ltd, New Delhi, 2005.
4. Purushothama Raj.P., " Soil Mechanics and Foundation Engineering", 2nd Edition, Pearson Education, 2013.
5. Varghese, P.C., " Foundation Engineering", Prentice Hall of India Private Limited, New Delhi, 2005.
6. Arora K.R. " Soil Mechanics and Foundation Engineering" , Standard Publishers and Distributors, New Delhi, 2005.

13CET506 HIGHWAY ENGINEERING

L	T	P	C
3	0	0	3

COURSE OUTCOMES :

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

CO1 : plan, design, and construction of highways as per IRC standards and others.
CO2 : do evaluation , maintenance and strengthening of existing pavements.
CO3 : select modern materials and methods of highway construction.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		S	S	M		S						M
CO2		S	S	M		S						M
CO3		S			S	S						M

HIGHWAY PLANNING AND ALIGNMENT 9

Significance of highway planning – Modal limitations towards sustainability – History of road development in India – Classification of highways – Locations and functions – Factors influencing highway alignment – Soil suitability analysis- Road ecology – Engineering surveys for alignment, objectives- conventional and modern methods.

GEOMETRIC DESIGN OF HIGHWAYS 9

Typical cross sections of Urban and Rural roads – Cross sectional elements – Sight distances – Horizontal curves, super elevation, transition curves, widening at curves – vertical curves – Gradients, Special consideration for hill roads – hairpin bends – Lateral and vertical clearance at underpasses.

DESIGN OF FLEXIBLE AND RIGID PAVEMENTS 9

Design principles – pavement components and their role – Design practice for flexible and rigid pavements (IRC methods only) – Embankments.

HIGHWAY CONSTRUCTION MATERIALS AND PRACTICE 9

Highway construction materials, properties, testing methods – CBR test for subgrade – tests on aggregate and bitumen – Construction practice including modern materials and methods, Bituminous and concrete road construction, Polymer modified bitumen, Recycling, Different materials – Glass, fiber, plastic, geo-Textiles, Geo- Membrane – Quality control measures- Highway drainage. Highway machineries.

EVALUATION AND MAINTENANCE OF PAVEMENTS 9

Pavement distress in flexible and rigid pavements – Pavement management systems – pavement evaluation , roughnesss, present serviceability index, skid resistance, structural

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evaluation, evaluation by deflection measurements – Strengthening of pavements – Types of maintenance – Highway Project formulation.

Total hours : 45 Hrs

TEXT BOOK: :

1. Khanna.S.K., Justo and Veeraragavan A. Highway Engineering", Nemchand Publishers, 2013.
2. Subramanian K.P., " Highways, railways, Airport and harbor Engineering", Scitech Publications (India) Chennai,2010.
3. Kadiyali.L.R., " Principles and Practice of Highway Engineering", Khanna Technical Publications, 8th edition Delhi, 2013.
4. Yang H. Huang, " Pavement Analysis and Design", Pearson Education Inc, Nineth Impression, South Asia, 2012.

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13CEP501 **SOIL MECHANICS LAB**

L	T	P	C
0	0	3	1

COURSE OUTCOMES :

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

CO1 : determine index properties and engineering properties such as shear strength, compressibility and permeability of soil by conducting appropriate tests.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M			S		S						M

LIST OF EXPERIMENTS

1. **DETERMINATION OF INDEX PROPERTIES**

a. Specific gravity of soil solids
b. Grain size distribution – Sieve analysis
c. Grain size distribution Hydrometer analysis
d. Liquid limit and plastic limit tests
e. Shrinkage limit and Differential free swell tests.

2. **DETERMINATION OF INSITU DENSITY AND COMPACTION CHARACTERISTICS**

a. Field density Test (Sand replacement method)
b. Determination of moisture – density relation using standard Proctor Compaction test.

3. **DETERMINATION OF ENGINEERING PROPERTIES**

a. Permeability determination (constant head and falling head methods)
b. One dimensional consolidation test (Determination of co-efficient of consolidation only)
c. Direct shear test in cohesionless soil
d. Unconfined compression test in cohesive soil
e. Laboratory vane shear test in cohesive soil
f. Tri-axial compression test in cohesion-less soil (Demonstration)
g. California Bearing Ratio Test

Total hours = 45

TEXT BOOK:

1. "Soil Engineering Laboratory Instruction manual" published by Engineering College Co-operative Society, Anna University, Chennai, 1996.
2. Saibaba Reddy, E. Ramasastri, K. " Measurement of Engineering Properties of Soils", New age International (P) Limited Publishers, New Delhi, 2002.

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13CEP502 ENVIRONMENTAL ENGINEERING LABORATORY

L	T	P	C
0	0	3	1

COURSE OUTCOMES :

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

CO1 : conduct various quality tests on water and will be able to decide the suitability of water for drinking and other purposes.

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M			S		S						M

List of Experiments

1. Determination of pH
2. Determination Turbidity
3. Determination of Hardness
4. Determination of Chlorides
5. Determination of Dissolved Oxygen
6. Determination of Optimum Coagulant Dosage
7. Determination of Suspended, Volatile and fixed solids
8. Determination of Iron
9. Determination Fluoride
10. Determination of Residual Chlorine
11. Determination of Ammonia Nitrogen
12. Determination of Sulphate
13. Determination of available Chlorine in Bleaching Powder
14. Determination OF C.O.D test
15. Estimation of Acidity & Alkalinity

Study experiments

16. Sampling and preservation methods and signification of characterization of water and Wastewater.
17. Use Of Gas Chromatograph for the Air and Gas Composition analysis
18. Determination B.O.D.
19. Introduction to Bacteriological Analysis (Demonstration only)
20. Heavy metal analysis using AAS.

Total : 45 hrs

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U13ENP501 COMMUNICATION SKILLS LABORATORY

(Common to all branches of Engineering and Technology)

L	T	P	C
0	0	3	1

COURSE OUTCOMES :

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

CO1 : have adequate exposure to soft skills needed for the corporate.
CO2 : understand the corporate culture.
CO3 : have good communication ability

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1										S		M
CO2										S		M
CO3										S		M

GRAMMAR IN COMMUNICATION 9

Grammar and Usage – Building Blocks, Homonyms, Subject and Verb Agreement, Error Correction - Grammar Application, Framing Questions – Question words, Verbal Questions, Tags, Giving Replies –Types of Sentences, Listening Comprehension –Listening and Ear training.

ASSERTIVE COMMUNICATION 9

Listening Comprehension in Cross–Cultural Ambience, Telephonic Conversations/Etiquette, Role Play Activities, Dramatizing Situations- Extempore – Idioms and Phrases.

CORPORATE COMMUNICATION 9

Video Sensitizing, Communicative Courtesy – Interactions – Situational Conversations, Time Management, Stress Management Techniques, Verbal Reasoning, Current Affairs – E Mail Communication / Etiquette.

PUBLIC SPEAKING 9

Giving Seminars and Presentations, Nuances of Addressing a Gathering - one to one/ one to a few/ one to many, Communication Process, Visual Aids & their Preparation, Accent Neutralization, Analyzing the Audience, Nonverbal Communication.

INTERVIEW & GD TECHNIQUES 9

Importance of Body Language –Gestures & Postures and Proxemics, Extempore, Facing the Interview Panel, Interview FAQs, Psychometric Tests and Stress Interviews, Introduction to GD, Mock GD Practices.

Total hours = 45

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Method of End Semester Evaluation : Practical : 60 marks, Online Exam : 40 marks

TEXT BOOK:

1. Bhatnagar R.P. & Rahul Bhargava, "English for Competitive Examinations", Macmillian Publishers, India, 1989, ISBN: 9780333925591
2. Devadoss K. & Malathy P., "Career Skills for Engineers", National Book Publishers, Chennai, 2013.
3. Aggarwal R.S., "A Modern Approach to Verbal & Non–Verbal Reasoning", S.Chand Publishers, India, 2012, ISBN : 8121905516

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U13GHP501 HUMAN EXCELLENCE - SOCIAL VALUES

L	T	P	C
0	0	2	1

COURSE OUTCOMES:

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

CO1: Know the duties and responsibilities of an individual in family and community
CO2: demonstrate skill required for the disparity among human being
CO3: Behave as responsible politics and society and education and society
CO4: Analyze impact of science in society

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								S				
CO2								S				
CO3								S				
CO4								S				

1. Evolution of man – Man in society.
2. Duties and Responsibilities, Duty to self, family, society and the world.
3. Disparity among human beings.
4. Social welfare – Need for social welfare – Pure mind for pure society.
5. Politics and society – Education and society-Case study and live examples.
6. Impact of science in society - social development & society upliftments by science.
7. Economics & society – role of economics in creating a modern society.
8. Central message of Religions.
9. Yogasanas-I
10. Meditation-II [Thuriatheetham]

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U13CEP503 **SURVEYING CAMP**

(During IV Semester Summer Vacation - 2 weeks)

L	T	P	C

COURSE OUTCOMES :

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

CO1 :conduct various types of survey in the field and prepare the necessary survey map and report using the measurements taken.

CO2 : handle advanced instruments like total station for the survey works.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M		S	S	M			S	S		M
CO2				S	S							M

One week camp using Theodolite, cross staff, leveling staff, tape, Plane table and total station. The camp must involve work on a large area . At the end of the camp, each student should independently complete the office work for the survey works done in the field. The camp record shall include all original field observations, calculation and plots.

a. Conventional surveying for civil Engineering project works
b. Triangulation.
c. Contour Surveying, L.S/C.S for road works.
d. Trilatteration
e. Total station surveying to plot a boundary

Evaluation Procedure

1. Internal Marks : 20 marks
   (decided by the staff in-charge appointed by the Institution)

2. Evaluation of Survey Camp Report : 30 marks
   (Evaluated by the external examiner appointed the Autonomous Examination)

3. Viva voce examination : 50 marks
   (evaluated by the internal examiner appointed by the HOD with the approval of HOI and external examiner appointed by the Autonomous Examination – with equal weightage

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SIXTH SEMESTER

U13CET601 STRUCTURAL ANALYSIS-II

L	T	P	C
3	1	0	4

COURSE OUTCOMES:

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

CO1: analyze Space Truss using tension Coefficient method
CO2: analyze cable suspension bridges
CO3: perform plastic analysis of indeterminate beams and frames
CO4: analyze structures by using matrix flexibility and stiffness methods
CO5: implement basic concepts of finite element analysis

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	M									
CO2	M	S	M									
CO3	M	S	M									
CO4	S	S	M									
CO5	M	S	M									

SPACE AND CABLE STRUCTURES **9**

Analysis of Space trusses using method of tension coefficients – Beams curved in plan Suspension cables – suspension bridges with two and three hinged stiffening girders.

PLASTIC ANALYSIS OF STRUCTURES **9**

Statically indeterminate axial problems – beams in pure bending – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames- upper and lower bound theorems.

MATRIX FLEXIBILITY METHOD **9**

Equilibrium and compatibility- Determinate Vs indeterminate structures – Indeterminacy – Primary structure – Compatibility conditions – Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy restricted to two).

MATRIX STIFFNESS METHOD **9**

Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacement vectors – Analysis of pin-jointed plane frames and rigid frames (with redundancy limited to two)

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INTRODUCTION TO FINITE ELEMENT METHOD **9**

Introduction - Discretization of a structure – Displacement functions – truss element – beam element – plane stress and plane strain – Triangular elements.

Total : 45 + 15 = 60 Hrs

TEXT BOOK: :

1. Punmia,B.C., Ashok Kumar and Arun Kumar Jain, " Theory of Structures", Laxmi Publications, 2004.
2. Vaidyanathan, R. and Perumal, P., " Comprehensive structural Analysis – Vol I & II", Laxmi Publications, New Delhi, 2003.
3. Negi L.S & Jangid R.S., " Structural Analysis", Tata McGraw Hill Publications, New Delhi, 2003.
4. Ghali.A, Nebille, A.M. and Brown, T.G, " Structural Analysis" A unified classical and Matrix approach", 6th Edition, Spon Press, London and New York, 2013.
5. Gambhir, M.L., " Fundamentals of Structural Mechanics and Analysis"., PHI Learning Pvt. Ltd., New Delhi, 2011.
6. William Weaver Jr & James M. Gere, " Matrix Analysis of Framed Structures", CBS Publishers and Distributors, delhi, 2004.

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U13CET602 DESIGN OF MASONRY AND REINFORCED CONCRETE STRUCTURES

L	T	P	C
3	1	0	4

COURSE OUTCOMES :

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

CO1 : comprehensive design knowledge of water tanks and retaining walls.
CO2 : knowledge on yield line theory and failure pattern of slab under different loads.
CO3 : knowledge on design of staircase, flat slab and road bridges.
CO4 : knowledge on design of brick walls and columns

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S			S						M
CO2			M			S						M
CO3			S			S						M
CO4			S			S						M

MASONRY **9**

Introduction, Classification of walls, Lateral supports and stability, effective height of wall and columns, effective length of walls, design loads, load dispersion, permissible stresses, design of axially and eccentrically loaded brick walls.

RETAINING WALLS

Design of Cantilever and Counterfort Retaining walls. **9**

WATER TANK **9**

Design of rectangular and circular water tanks both below and above ground level- Design of overhead water tank (As per IS 3370(Part I-III))

YIELD LINE THEORY **9**

Assumptions – Characteristics of yield line – Determination of collapse load/ plastic moment – Application of virtual work method – square, rectangular, circular and triangular slabs – Design problems

SPECIAL TOPICS 9

Design of staircase -Design of flat slabs – Design of Slab bridge.

Total : 45+15 Tutorial = 60 Hrs

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TEXT BOOK: :

1. Varghese, P.., " Advanced Reinforced Concrete Design", Prentice Hall of India, Pvt. Ltd., New Delhi, 2012.
2. Gambhir.M.L.," Design of Reinforced Concrete structures", Prentice Hall of India Private limited, New Delhi, 2012.
3. Subramanian, N. Design of Reinforced Concrete Structures", Oxford University Press, New Delhi, 2013.
4. Punmia, B.C., Ashok Kumar jain, Arun Kumar jain, " RCC Designs Reinforced Concrete Structures " , Laxmi Publications Pvt. Ltd., New Delhi, 2006.
5. Mallick, D.K. and Gupta A.P., " Reinforced Concrete", Oxford and IBH Publishing Company 1997.

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U13CET603 WASTE WATER ENGINEERING

L	T	P	C
3	0	0	3

COURSE OUTCOMES:

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

CO1 : Ability to estimate sewage generation and design sewer system including sewage pumping stations

CO2 : Required understanding on the characteristics and composition of sewage, self purification of streams.

CO3 : Ability to perform basic design of the unit operations and processes that are used in sewage treatment.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S			S	S					M
CO2				S		S						M
CO3		S		S		S						M

PLANNING FOR SEWERAGE SYSTEMS 9

Sources of waste water generation – Effects – Estimation of sanitary sewage flow – Estimation of storm runoff – factors affecting Characteristics and composition of sewage and their significance – Effluent standards – Legislation requirements.

SEWER DESIGN 9

Sewerage – Hydraulics of flow in sewers – Objectives – Design period – Design of sanitary and storm sewers – Small bore systems – Computer applications – Laying, joining & testing of sewers – appurtenances – Pumps – selection of pumps and pipe drainage – Plumbing system for buildings – One pipe and Two pipe systems.

PRIMARY TREATMENT OF SEWAGE 9

Objective – Selection of treatment processes – Principles, Functions, Design and Drawing of Units – Onsite sanitation – Septic tank with dispersion – Grey water harvesting – Primary treatment – Principles, functions design and drawing of screen, grit chambers and primary sedimentation tanks – Construction, operation and Maintenance aspects

SECONDARY TREATMENT OF SEWAGE 9

Objective – Selection of Treatment Methods – Principles, Functions, Design and Drawing of Units – Activated sludge process and Trickling filter – Oxidation ditches. UASB – waste stabilization ponds – Reclamation and Reuse of sewage – sewage cycle in residential complex – recent Advances in sewage Treatment – Construction and Operation & Maintenance of Sewage Treatment Plants.

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DISPOSAL OF SEWAGE AND SLUDGE MANAGEMENT **9**

Standards for Disposal – Methods – dilution – Self purification of surface water bodies – Oxygen sag curve – Land disposal – sludge characterization – Sludge digestion – Biogas recovery – Sludge Conditioning and Dewatering – disposal – Advances in Sludge Treatment and disposal.

Total hours : 45 Hrs

TEXT BOOK: :

1. Garg S.K., " Environmental Engineering" Vol II, Khanna Publishers, New Delhi, 2003.
2. Punmia, B.C., Jain, A.K., and Jain. A., " Environmental Engineering", Vol II, Lakshmi Publications, New Delhi, 2005.
3. Metcalf & Eddy, " Waste water Engineering" – Treatment and Reuse, Tata McGraw Hill Company, New Delhi, 2003.
4. "Manual of Sewerage and sewage Treatment ", CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1997.

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U13CET604 RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING

L	T	P	C
3	0	0	3

COURSE OUTCOMES:

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

CO1 : plan and design various civil engineering aspects of Railways

CO2 : design Airport runway and taxiway markings and lightings.

CO3 : knowledge on Planning and design of harbors and design principles of coastal structures.

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S			S						M
CO2			S			S						M
CO3			S			S						M

RAILWAY PLANNING 9

Significance of Road, Rail, Air and water transports- Coordination of all modes to achieve sustainability – Elements of permanent way – Rails, Sleepers, ballast, rail fixtures and fastenings- Track stress, coning of wheels, creep in rails, defects in rails- Route alignment surveys, conventional and modern methods- Soil suitability analysis- Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and crossings.

RAILWAY CONSTRUCTION AND MAINTENANCE 9

Earthwork – Stabilization of track on poor soil – Tunneling Methods, drainage and ventilation – Calculation of materials required for track laying – Construction and maintenance of tracks – Modern methods of construction & maintenance - Railway stations and yards and passenger amenities – Urban rail- Infrastructure for Metro, Mono and underground railways.

AIRPORT PLANNING 9

Air transport characteristics – airport classification – airport planning; objectives, components, layout characteristics, socio-economic characteristics of the Catchment area, criteria for airport site selection and ICAO stipulations, Typical airport layouts, case studies, Parking and circulation area.

AIRPORT DESIGN 9

Runway Design: Orientation, Wind Rose Diagram – Runway length – Problems on basic and Actual length, Geometric design of runways, Configuration and Pavement Design Principles – Elements of taxiway Design – Airport zones – Passenger Facilities and Services – Runway and Taxiway Markings and lighting.

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HARBOUR ENGINEERNG **9**

Definition of Basic terms : Harbor, Port, Satellite port, Docks, Waves and Tides – Planning and Design of Harbours : Requirements, Classification, Location and design principles – harbor layout and terminal facilities- Coastal structures : Piers, Break waters, Wharves, jetties, Quays, Spring fenders, Dolphins and Floating Landing Stage- Environmental concern of Port operations – Coastal Regulation Zone, 2011.

TEXT BOOK: :

1. Saxena Subhash C and Satyapal arora, " A course in Railway Engineering", Dhanpat rai and Sons, Delhi, 2003.
2. Satish Chandra and Agarwal M.M. " Railway Engineering", 2nd Edition, Oxford University Press, New Delhi, 2013.
3. Khanna S.K., Arora M.G and Jian S.S " Airport Planning and Design" Nemchand & Brothers, Roorkee, 2012.
4. Bindra S.P, " A Course in Docks and Harbour Engineering" Dhanpat rai and Sons, New Delhi, 2013.

U13GST005 ENGINEERING ECONOMICS AND FINANCIAL MANAGEMENT

L	T	P	C
3	0	0	3

COURSE OUTCOMES:

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

CO1 - Evaluate the economic theories, cost concepts and pricing policies
CO2 - Understand the market structures and integration concepts
CO3 - Understand the measures of national income, the functions of banks and concepts of globalization
CO4 - Apply the concepts of financial management for project appraisal
CO5 - Understand accounting systems and analyze financial statements using ratio analysis

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1											S	M
CO2											S	M
CO3											S	M
CO4											S	M
CO5											S	M

ECONOMICS, COST AND PRICING CONCEPTS 9

Economic theories – Demand analysis – Determinants of demand – Demand forecasting – Supply – Actual cost and opportunity cost – Incremental cost and sunk cost – Fixed and variable cost – Marginal costing – Total cost – Elements of cost – Cost curves – Breakeven point and breakeven chart – Limitations of break even chart – Interpretation of break even chart – Contribution – P/V-ratio, profit-volume ratio or relationship – Price fixation – Pricing policies – Pricing methods

CONCEPTS ON FIRMS AND MANUFACTURING PRACTICES 9

Firm – Industry – Market – Market structure – Diversification – Vertical integration – Merger – Horizontal integration

NATIONAL INCOME, MONEY AND BANKING, ECONOMIC ENVIRONMENT 9

National income concepts – GNP – NNP – Methods of measuring national income – Inflation – Deflation – Kinds of money – Value of money – Functions of bank – Types of bank – Economic liberalization – Privatization – Globalization

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CONCEPTS OF FINANCIAL MANAGEMENT **9**

Financial management – Scope – Objectives – Time value of money – Methods of appraising project profitability – Sources of finance – Working capital and management of working capital

ACCOUNTING SYSTEM, STATEMENT AND FINANCIAL ANALYSIS **9**

Accounting system – Systems of book-keeping – Journal – Ledger – Trail balance – Financial statements – Ratio analysis – Types of ratios – Significance – Limitations

Total hours = 45

TEXT BOOK:

1. Prasanna Chandra, " Financial Management (Theory & Practice) TMH
2. Weston & Brigham, " Essentials of Managerial Finance"
3. Pandey, I. M., "Financial Management"
4. Fundamentals of Financial Management- James C. Van Horne.
5. Financial Management & Policy -James C. Van Horne
6. Management Accounting & Financial Management- M. Y. Khan & P. K. Jain
7. Management Accounting Principles & Practice -P. Saravanavel

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U13CEP601 COMPUTER AIDED DESIGN AND DRAWING (RCC and STEEL)

L	T	P	C
2	0	2	3

COURSE OUTCOMES:

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

CO1:design and prepare structural drawings for concrete structures like Retaining walls, solid slabs, RCC Tee beam bridges and water tanks.

CO2:design steel structures like foot bridge, plate girder, gantry girder and framed connections.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				S	S	S						M
CO2				S	S	S						M

Course Content

1. Design and drawing of RCC cantilever and counter fort type retaining walls with reinforcement details
2. Design of solid slab and RCC Tee beam bridges for IRC loading and reinforcement details
3. Detailing of circular and rectangular water tanks
4. Design of Simple Industrial shed-gantry girder-
5. Design of steel foot bridge-
6. Design of Plate girder
7. Design of steel framed structures-connections

Total : 45

TEXT BOOK:

1. Krishnamurthy, D., "Structural Design & Drawing – Vol. 1", CBS Publishers & Distributors, Delhi 2006.
2. Krishnamurthy, D., "Structural Design & Drawing – Vol. 3 Steel Structures", CBS Publishers & Distributors, New Delhi 2008.
3. Dayaratnam, Limit state design of R.C structures, India Book House Ltd, 2004
4. Krishna Raju, "Structural Design & Drawing (Concrete & Steel)", University Press 2004

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U13CEP602 COMPUTER APPLICATIONS LABORATORY

L	T	P	C
0	0	3	1

COURSE OUTCOMES:

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

CO1 : hands on experience in the application of Software in the Civil Engineering field.
CO2 : knowledge on Project management, documentation and network analysis

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				S	S	S						M
CO2				S	S	S				M	M	M

1. **Structural Engineering :**
   Plane and space frames (steel and R.C.C), spread sheet development for design of R.C.C/ steel structural elements.
2. **Water Resources :**
   Circular Pipe analysis/ Trapezoidal Channel analysis, analysis of pipe network for water distribution.
3. **Geotechnical engineering**
   stability analysis of slopes, Computation of foundation settlement and stresses on layered soils, Geotechnical design of anchored and free retaining walls, Analysis and design of pile foundations.
4. **Environmental Engineering**
   Pipe network analysis
5. **Estimation and costing**
   Use spread sheet/ any standard software for estimation
6. **Project Management**
   PERT and CPM, project scheduling, managing and documentation Network analysis.

Note :

1. Students shall be encouraged to take up a term-project on any one of the above listed areas and complete it within the semester.
2. Atleast 4 of the above areas shall be covered.
3. Students are supposed to document each tutorial with drafting after each session.

Total hours : 45 Hrs

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U13CEP603 **INDUSTRIAL TRAINING**

L	T	P	C

COURSE OUTCOMES:

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

CO1: Have the knowledge on the practical applications of theoretical concepts studied in the class room.

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				M	M	S			M	S		M

Students have to undergo two-week practical training in Civil Engineering related organizations so that they become aware of the practical applications of theoretical concepts studied in the class rooms.

Students have to undergo two-week practical training in Civil Engineering related organizations of their choice but with the approval of the department. At the end of the training student will submit a report as per the prescribed format to the department.

Assessment Process:

This course is mandatory and a student has to pass the course to become eligible for the award of degree. The student shall make a presentation before a committee constituted by the department which will assess the student based on the report submitted and the presentation made. Marks will be awarded out of 100 and appropriate grades assigned as per the regulations.

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U13CEP604 **TECHNICAL SEMINAR**

L	T	P	C
0	0	2	1

COURSE OUTCOMES:

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

CO1: Gain confidence in technical presentation skills and to face the placement interviews

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									M	S	M	M

Course Contents :

It is mandatory that each student will give individually a seminar on exclusive topic. During the seminar session each student is expected to prepare and present a topic on engineering/ technology, for duration of not less than 30 minutes.

Also, the student has to submit a hard copy of the technical topic, in the form of a report consisting of a title page, Introduction, body chapters and a conclusion with references, running to not less than 20 pages; this will be evaluated by the faculty coordinator/guide.
In a session of three periods per week, 5 students are expected to present the seminar.

In 15 weeks all students of the class would have completed giving the seminar. For every 10 students or for different area of their branch specialization, a faculty guide is to be allotted and he / she will guide and monitor the progress of the student and maintain attendance also.

Students are encouraged to use various teaching aids such as over head projectors, power point presentation and demonstrative models.

Total : 30 Hrs

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U13GHP601 HUMAN EXCELLENCE - NATIONAL VALUES

L	T	P	C
0	0	2	1

COURSE OUTCOMES:

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

CO1: acquire knowledge on the enlightened citizenship
CO2: demonstrate skills required for Indian culture and it's greatness
CO3: behave as a responsible Great spiritual Leaders
CO4: Analyse national values identification practice

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								S				
CO2								S				
CO3								S				
CO4								S				

1. Citizenship- its significance-Enlightened citizenship.
2. Emerging India-it's glory today- Global perspective-other view about India.
3. Indian culture and it's greatness.
4. India and Peace.
5. India and Spirituality- Great spiritual leaders.
6. India's message to the world – it's role in global peace.
7. Service and sacrifice-Unity in diversity – case studies-live examples.
8. National values identification and practice.
9. Yogasanas -II
10. Meditation III [Nithyanandam& Nine Centre Meditation]

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SEVENTH SEMESTER

U13CET701 ESTMATION, COSTING AND VALUATION

L	T	P	C
3	0	0	3

COURSE OUTCOMES:

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

CO1: apply different types of estimates in different situations
CO2: carry out analysis of rates and bill preparation at different locations
CO3: demonstrate the concepts of specification writing
CO4: carry out valuation of assets.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S									M	M	M
CO2	S									M	M	M
CO3						M				M		M
CO4						M				M		M

ESTIMATE OF BUILDINGS **9**

Types of estimates – Units of measurements – Methods of estimates – Advantages. Quantity estimate for load bearing and framed structures - brick work and RCC works only, Steel requirement and Bar bending schedule - Calculation of quantities of earth work excavation, brickwork, PCC, RCC, Plastering, white washing, colour washing and painting/varnishing for shops and residential building with flat roof.

ESTIMATE OF OTHER STRUCTURES **9**

Estimating of septic tank, soak pit – sanitary and water supply installations – water supply pipe line – sewer line– estimate of bituminous and cement concrete roads.

ANALYSIS OF RATES AND SPECIFICATIONS **9**

Data – Schedule of rates – Analysis of rates – Specifications – sources – General and Detailed specifications.

VALUATION **9**

Necessity – Different methods of valuation of a building – capitalized value – Depreciation – Escalation – Value of building – Calculation of Standard rent - Mortgage - lease.

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REPORT PREPARATION **9**

Principles for report preparation – report on estimate of residential building –Roads – Water supply and sanitary installations.

Introduction to Value Engineering: Cash flow and cost control.

Total hours = 45

TEXT BOOK:

1. Dutta, B,N, "Estimating and Costing in Civil Engineering", UBS Publishers & Distributors Pvt. Ltd., 2003.
2. Chakraborti M, "Estimation, Costing, Specification and Valuation in Civil Engineering (including Computer estimation)", 2001.
3. Kohli, D.D and Kohli,R.C, "A text book of Estimating and Costing (Civil)", S.Chand & Company Ltd., 2004.
4. Rangwala S C, "Estimating, Costing and Valuation", Charotar Publishing House", 2001.
5. Jaganathan G "Getting more at less cost" Tata McGraw – Hill, New Delhi , 1992.

U13CET702 WATER RESOURCES AND IRRIGATION ENGINEERING

L	T	P	C
3	0	0	3

COURSE OUTCOMES:

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

CO1: able to conduct water resources planning and survey

CO2 : have knowledge and skills on planning, design, operation and management of reservoir system.

CO3 : gain knowledge on different methods of irrigation including canal irrigation.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		S		M								M
CO2	S					M			M			M
CO3	S					M			M			M

WATER RESOURCES 8

Water resources survey – Water resources of India and Tamilnadu- Description of water resources planning – Estimation of water requirements for irrigation and drinking- Single and multipurpose reservoir – Multi objective – Fixation of Storage capacity – Strategies for reservoir operation – Design flood – levees and flood walls.

WATER RESOURCE MANAGEMENT 10

Economics of water resources planning – National water policy – Consumptive and non-consumptive water use – Water quality – scope and aims of master plan – Concept of basin as a unit for development – Water budget – Conjunctive use of surface and ground water.

IRRIGATION ENGINEERING 10

Need – Merits and Demerits- Duty, Delta and Base period – Irrigation efficiencies – Crops and seasons- Crop water Requirement – Estimation of consumptive use of water.

CANAL IRRIGATION 10

Types of Impounding structures : Gravity dam – Diversion Head works- Canal drop – Cross drainage works – Canal regulations – Canal outlets – Canal lining – Kennady's and Lacey's Regime theory.

IRRIGATION METHODS AND MANAGEMENT 7

Lift irrigation – Tank irrigation - Well irrigation – irrigation methods: Surface and Sub-surface and Micro irrigation – Merits and demerits – Irrigation scheduling – Water distribution – Participatory irrigation management with a case study

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TEXT BOOK:

1. Linsley R.K. and Franzini J.B, " Water Resources Engineering", McGraw-Hill Inc, 2000.
2. Punmia B.C., et.al; Irrigation and water power Engineering", Laxmi Publications, 16th Edition, New Delhi, 2009.
3. Garg S.K., Irrigation Engineering and Hydraulic structures", Khanna Publishers, 23rd Revised Edition, New Delhi, 2009.
4. Duggal, K.N. and Soni, J.P., " Elements of Water Resources Engineering", New Age International Publishers, 2005.
5. Chaturvedi M.C., "Water Resources Systems Planning and Management", Tata McGraw-Hill Inc., New Delhi, 1997.
6. Michael A.M., " Irrigation Theory and Practice", 2nd Edition, Vikas Publishing House Pvt. Ltd., Noida, 2008.

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U13GST008 **PROFESSIONAL ETHICS**

L	T	P	C
3	0	0	3

COURSE OUTCOMES:

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

CO1 - Understand the ethical theories and concepts
CO2 - Understand an engineer's work in the context of its impact on society
CO3 - Understand and analyze the concepts of safety and risk
CO4 - Understand the professional responsibilities and rights of Engineers
CO5 - Understand the concepts of ethics in the global context

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								S				M
CO2			M					S				M
CO3		M						S				M
CO4								S				M
CO5								S				M

ENGINEERING ETHICS AND THEORIES **9**

Definition, Moral issues, Types of inquiry, Morality and issues of morality, Kohlberg and Gilligan's theories, consensus and controversy, Professional and professionalism, moral reasoning and ethical theories, virtues, professional responsibility, integrity, self respect, duty ethics, ethical rights, self interest, egos, moral obligations.

SOCIAL ETHICS AND ENGINEERING AS SOCIAL EXPERIMENTATION **9**

Engineering as social experimentation, codes of ethics, Legal aspects of social ethics, the challenger case study, Engineers duty to society and environment.

SAFETY **9**

Safety and risk – assessment of safety and risk – risk benefit analysis and reducing risk – the Three Mile Island and Chernobyl case studies. Bhopal gas tragedy.

RESPONSIBILITIES AND RIGHTS OF ENGINEERS **9**

Collegiality and loyalty – respect for authority – collective bargaining – confidentiality – conflicts of interest – occupational crime – professional rights – employee rights – Intellectual Property Rights (IPR) – discrimination.

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GLOBAL ISSUES AND ENGINEERS AS MANAGERS, CONSULTANTS AND LEADERS **9**

Multinational Corporations – Environmental ethics – computer ethics – weapons development – engineers as managers – consulting engineers – engineers as expert witnesses and advisors – moral leadership – Engineers as trend setters for global values.

TOTAL: 45 HOURS

TEXT BOOK:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering". (2005) McGraw-Hill, New York.
2. John R. Boatright, "Ethics and the Conduct of Business", (2003) Pearson Education, New Delhi.
3. Bhaskar S. "Professional Ethics and Human Values", (2005) Anuradha Agencies, Chennai.
4. Charles D. Fleddermann, "Engineering Ethics", 2004 (Indian Reprint) Pearson Education / Prentice Hall, New Jersey.
5. Charles E. Harris, Michael S. Protchard and Michael J Rabins, "Engineering Ethics – Concepts and cases", 2000 (Indian Reprint now available) Wadsworth Thompson Learning, United States.

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13CEP701 **DESIGN PROJECT**

L	T	P	C
0	0	3	1

COURSE OUTCOMES:

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

CO1 : Prepare the plan of a Civil engineering structure.
CO2 : Analyse and design the structure
CO3 : Prepare the detailed drawings for structural elements
CO4 : Prepare the consolidated project report for tender or any other purpose.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M					M				M		M
CO2		S				M						M
CO3					S	M						M
CO4						M				S		M

The design project involves the following:

1. Preparation of plan of a Civil engineering structure.
2. Analysis and design of the structure
3. Preparation of detailed drawings
4. Consolidated report preparation

Every Project Work shall have a Guide who is a member of the faculty of Civil Engineering of the college. The hours allotted for this course shall be utilized by the students to receive directions from the Guide, on library reading, laboratory work, computer analysis or field work and also to present in periodical seminars the progress made in the project.

EVALUATION PROCEDURE

The method of evaluation will be as follows:

1. Internal Marks : 20 marks
   (decided by conducting 3 reviews by the guide appointed by the Institution)
2. Evaluation of Project Report : 30 marks
   (Evaluated by the internal examiner appointed by the HOD with The approval of HOI.).
3. Viva voce examination : 50 marks
   (evaluated by the internal examiner appointed by the HOD with the approval of HOI.)

Total : 100 marks

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U13CEP702 DESIGN AND DRAWING (IRRIGATION AND ENVIRONMENTAL ENGINEERING)

L	T	P	C
0	0	3	1

COURSE OUTCOMES

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

CO1 : design the various irrigation strctures like Tank Surplus Weir,Tank Sluice (Tower Head), Canal Regulator, Canal drop and Canal Drainage Works (Aqueduct)

CO2 : prepare the general layout for water supply scheme and waste wter treatment process flow diagram.

CO3 : design various components of waste water treatment plants

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			M	S	M	S	M					M
CO2			S	S	M	S	M					M
CO3			S	S	M	S	M					M

PART- A

- Tank Surplus Weir
- Tank Sluice (Tower Head)
- Canal Regulator
- Canal drop
- Canal Drainage Works (Aqueduct) 25 Hours

PART – B

- General layout of a water supply scheme – wastewater treatment process flow diagram
- Sedimentation tanks
- Clariflocculators
- Rapid sand filters
- Septic Tank
- Activated sludge process
- Trickling filter 20 Hours

Total: 45 Hrs

QUESTION PAPER PATTERN

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Two questions will be set in each part and the students will be asked to write any one in each part. Each question in part – A carries 60 marks and each question in part – B carries 40 marks.

TEXT BOOK:

1. Sharma R.K ., "Irrigation Engineering and Hydraulic Structures," Oxford and IBH Publishing Co., 2002.
2. Santhosh Kumar Garg – "Irrigation engineering and hydraulic structures," Khanna Publishers, 2009.
3. Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999
4. Metcalf & Eddy, "Wastewater Engineering (Treatment and Reuse)," 4th Edition, Tata McGraw-Hill, New Delhi, 2003.

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U13GHP701 HUMAN EXCELLENCE GLOBAL VALUES

L	T	P	C
0	0	2	1

COURSE OUTCOMES:

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

CO1: acquire knowledge on the complex patterns involved in maintaining world's peace and ecological balance

CO2: demonstrate skills required for the emergency of monoculture at global level

CO3: Behave as a responsible human beings respecting the global values

CO4: learn about man is the cause and man is the solution

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1								S				
CO2								S				
CO3								S				
CO4								S				

1. Global values – understanding and identification – its importance.
2. Racial discrimination and solution – Ecological imbalance and solution.
3. Political upheavals and solution – Social inequality and solution – live case discussions and debate.
4. Cultural degradation and solution – live case discussions and debate.
5. Emergence of monoculture – solution.
6. Global terrorism – it's cause and effect – solution.
7. Economic marginalization and solution – it's impact in the globe.
8. Man is the cause and man is the solution.
9. All Meditations.
10. All Yogasanas.

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EIGHTH SEMESTER

U13CEP801 PROJECT WORK

L	T	P	C
0	0	12	6

COURSE OUTCOMES:

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

CO1 : take up any challenging practical problems and find solution by formulating proper methodology.

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	M	M	S	S	M		S	S	M	M

Course Objectives :

To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the Project Review committee of the department and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The Project Review committe may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Controller of Exams.

Total hours : 180

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KUMARAGURU COLLEGE OF TECHNOLOGY, COIMBATORE-49
(An Autonomous Institution Affiliated to Anna University, Chennai)
B.E CIVIL ENGINEERING

Elective Syllabus R2013

Elective -1

U13CETE11 ENVIRONMENTAL IMPACT ASSESSMENT OF CIVIL ENGINEERING PROJECTS

L	T	P	C
3	0	0	3

COURSE OUTCOMES

After successful completion of this course, the students should be able to ability to

CO1 - carry out scoping and screening of developmental projects for environmental and social assessments.
CO2 - explain different methodologies for environmental impact prediction and assessment
CO3 - plan environmental impact assessments and environmental management plans
CO4 - Evaluate environmental impact assessment reports.

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CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M					S			M		M
CO2		M					S					M
CO3		M					S				M	M
CO4		M					S			S		M

INTRODUCTION **5**

Impact of development projects under Civil Engineering on environment - Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) – EIA capability and limitations – Legal provisions on EIA.

METHODOLOGIES **5**

Methods of EIA –Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives – Case studies.

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PREDICTION AND ASSESSMENT **10**

Assessment of Impact on land, water and air, noise, social, cultural flora and fauna; Mathematical models; public participation – Rapid EIA.

ENVIRONMENTAL MANAGEMENT PLAN **10**

Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People – ISO 14000

CASE STUDIES **15**

EIA for infrastructure projects – Bridges – Stadium – Highways – Dams – Multi-storey Buildings – Water Supply and Drainage Projects

Total Hours = 45

TEXT BOOK:

1. Canter, R.L., "Environmental Impact Assessment", McGraw-Hill Inc., New Delhi, 1996.
2. Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992.
3. John G. Rau and David C Hooten (Ed)., "Environmental Impact Analysis Handbook", McGraw-Hill Book Company, 1990.
4. "Environmental Assessment Source book", Vol. I, II & III. The World Bank, Washington, D.C., 1991.
5. Judith Petts, "Handbook of Environmental Impact Assessment Vol. I & II", Blackwell Science, 1999.

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U13CETE12 MUNICIPAL SOLID WASTE MANAGEMENT

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1-understand the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management.

CO2 - ability to plan waste minimization and design storage, collection, transport, processing and disposal of municipal solid waste.

CO3 – conduct breakeven analysis for the location of transfer station.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M				S	S				M	M
CO2		M				S	S				M	M
CO3		M		S		M	M					M

SOURCES AND TYPES OF MUNICIPAL SOLID WASTES 9

Sources and types of solid wastes - Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization; Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects; Public awareness; Role of NGOs; Legislation.

ON-SITE STORAGE & PROCESSING 9

On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options.

COLLECTION AND TRANSFER 9

Methods of Collection – types of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, operation & maintenance; options under Indian conditions.

OFF-SITE PROCESSING 9

Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis - options under Indian conditions.

DISPOSAL 9

Dumping of solid waste; sanitary land fills – site selection, design and operation of sanitary landfills – Leachate collection & treatment

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Total Hours = 45

TEXT BOOK:

1. George Tchobanoglous et.al., "Integrated Solid Waste Management", McGraw-Hill Publishers, 1993.
2. B.Bilitewski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, "Waste Management", Springer, 1994.
3. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000
4. R.E.Landreth and P.A.Rebers, "Municipal Solid Wastes – problems and Solutions", Lewis Publishers, 1997.
5. Bhide A.D. and Sundaresan, B.B., "Solid Waste Management in Developing Countries", INSDOC, 1993.

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U13CETE13 AIR POLLUTION MANAGEMENT

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1-understand the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management

CO2-identify, formulate and solve air and noise pollution problems

CO3-design stacks and particulate air pollution control devices to meet applicable standards.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M				S	S				M	M
CO2		M				S	S				M	M
CO3		M	M			S	S				M	M

SOURCES AND EFFECTS OF AIR POLLUTANTS 9

Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

DISPERSION OF POLLUTANTS 9

Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate - Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.

AIR POLLUTION CONTROL 15

Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion – Pollution control for specific major industries.

AIR QUALITY MANAGEMENT 7

Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality

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NOISE POLLUTION **5**

Sources of noise pollution – Effects – Assessment - Standards – Control methods -Prevention

Total Hours = 45

TEXT BOOK: :

1. Anjaneyulu, D., "Air Pollution and Control Technologies", Allied Publishers, Mumbai, 2002.
2. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996.
3. Rao M.N., and Rao H. V. N., Air Pollution Control, Tata-McGraw-Hill, New Delhi, 1996.
4. W.L.Heumann, Industrial Air Pollution Control Systems, McGraw-Hill, New Yark, 1997.
5. Mahajan S.P., Pollution Control in Process Industries, Tata McGraw-Hill Publishing Company, New Delhi, 1991.
6. Peavy S.W., Rowe D.R. and Tchobanoglous G. Environmental Engineering, McGraw Hill, New Delhi, 1985.

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U13CETE14 INDUSTRIAL WASTE MANAGEMENT

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1- have an insight into the pollution from major industries including the sources and characteristics of pollutants.

CO2- plan minimization of industrial wastes

CO3- design facilities for the processing and declamation of industrial waste water

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M				S	S				M	M
CO2		M				S	S				M	M
CO3		M	M			S	S				M	M

INTRODUCTION **7**

Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

CLEANER PRODUCTION **8**

Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.

POLLUTION FROM MAJOR INDUSTRIES **10**

Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steel plants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts

TREATMENT TECHNOLOGIES **12**

Equalisation – Neutralisation – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption - Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management – Dewatering - Disposal

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HAZARDOUS WASTE MANAGEMENT **8**

Hazardous wastes - Physico chemical treatment – solidification – incineration – Secured land fills

Total hours = 45

TEXT BOOK: :

1. M.N.Rao & A.K.Dutta, "Wastewater Treatment", Oxford - IBH Publication, 1995.
2. W .W. Eckenfelder Jr., "Industrial Water Pollution Control", McGraw-Hill Book Company, New Delhi, 2000.
3. T.T.Shen, "Industrial Pollution Prevention", Springer, 1999.
4. R.L.Stephenson and J.B.Blackburn, Jr., "Industrial Wastewater Systems Hand book", Lewis Publisher, New Yark, 1998
5. H.M.Freeman, "Industrial Pollution Prevention Hand Book", McGraw-Hill Inc., New Delhi, 1995.
6. Bishop, P.L., "Pollution Prevention: Fundamental & Practice", McGraw-Hill, 2000.

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Elective-2

U13CETE21 WATER RESOURCES SYSTEMS ANALYSIS

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1-be exposed to the economical aspects and analysis of water resources systems by which they will get an idea of comprehensive and integrated planning of a water resources project.

CO2-have problem solving skills in operations research through LP,DP and Simulation techniques.

CO3-able to prepare comprehensive and integrated water resource project report

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M		S								M	M
CO2	M	M			M							M
CO3		M								S		M

SYSTEM APPROACH **9**

Philosophy of modeling – Goals and objectives – Basics of system analysis concept- scopes and steps in systems engineering.

PHYSICAL AND SOCIO ECONOMIC DATA **9**

Collection, evaluation and processing – project appraisal – public involvement, master Comprehensive and integrated planning of water resources project.

LINEAR PROGRAMMING **9**

Operation research – introduction – problem formulation – graphical solution – Simplex method – Sensitivity analysis – simple applications.

DYNAMIC PROGRAMMING **9**

Optimality criteria Stage coach problem- bellman's optimality criteria Problem formulation and solution – simple applications

SIMULATION **9**

Basic principles – methodology and Philosophy – Model development – input and outputs – Deterministic simulation- simple applications.

Total Hours = 45

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TEXT BOOK:

1. Vedula S., and Majumdar, P.P. " Water Resources Systems" – Modelling Techniques and Analysis, tata McGraw Hill, 5th reprint, New Delhi, 2010.
2. Hall Warren, A. and John A. Dracup., " Water Resources System Engineering", Tata McGraw Hill Publishing Company Ltd., New Delhi, 1998.
3. Chadurvedi M.C., "Water resource Systems Planning and Management", tata McGraw Hill inc., New Delhi, 1997.

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U13CETE22 GROUND WATER ENGINEERING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1-understand aquifer properties and its dynamics after the completion of the course.
CO2-design and solve practical problems related to ground water aquifers.
CO3-apply the concepts of artificial recharge and groundwater quality concepts.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M		M			M					M
CO2		S	S			M	M					M
CO3		M				M	M					M

HYDROGEOLOGICAL PARAMETERS 9

Introduction – water bearing Properties of Rock – Type of aquifers – Aquifer properties – Permeability, specific yield, transmissivity and storage coefficient – methods of Estimation – Ground water table fluctuation and its interpretations – ground water development and Potential in India – GEC norms.

WELL HYDRAULICS 9

Objectives of Ground water hydraulics – Darcy's Law – Ground water equation – steady state flow – Dupuit Forchheimer assumption – unsteady state flow – thesis method – Jacob method – Slug tests – Image well theory – Partial penetrations of wells.

GROUND WATER MANAGEMENT 9

Need for management model- Database for groundwater management – ground water balance study – Introduction to mathematical model – Conjuctive use – Collector well and infiltration gallery.

GROUNDWATER QUALITY 9

Groundwater chemistry – origin, movement and quality – water quality standards – health and aesthetic aspects of water quality – Saline intrusion – Environmental concern and regulatory requirements.

GROUNDWATER CONSERVATION 9

Artificial recharge techniques – Remediation of Saline Intrusion – Groundwater management studies – protection zone delineation , Contamination source inventory, remediation schemes- Ground water Pollution and legislation.

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Total Hours = 45

TEXT BOOK: :

1. Raghunath H.M., " Ground water Hydrology", New Age International (P) Ltd. New Delhi 2010.
2. Todd D.K., " Ground Water Hydrology", John Wiley and Sons, new York, 2000.
3. Fitts R Charles, " Groundwater Science", Elsevier, Academic Press, 2002.
4. Ramakrishnan, S, Ground water, K.J. Graph arts, Chennai 1998.

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U13CETE23 GEOGRAPHICAL INFORMATION SYSTEM (GIS) AND REMOTE SENSING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1:demonstrate the concepts of Electro Magnetic energy, spectrum and spectral signature curves

CO2:apply the concepts of satellite and sensor parameters and characteristics of different platforms

CO3:apply the concepts of DBMS in GIS

CO4:analyze raster and vector data and modeling in GIS

CO5:apply GIS in land use, disaster management, ITS and resource information system

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M			S							M
CO2	M	M			S							M
CO3		M			S							M
CO4		M			S							M
CO5		M			S							M

EMR AND ITS INTERACTION WITH ATMOSPHERE & EARTH MATERIAL 9

Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan- Boltzman and Wein's Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.

PLATFORMS AND SENSORS 9

Types of platforms – orbit types, Sun- synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Matereological satellites – Airborne and space borne TIR and microwave sensors.

IMAGE INTERPRETATION AND ANALYSIS 9

Types of Data Products – types of image interpretation- basic elements of image interpretation- visual interpretation keys – Digital image processing – Pre-processing – image enhancement techniques – multispectral image classification – supervised and unsupervised.

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GEOGRAPHIC INFORMATION SYSTEM **9**

Introduction – Maps- Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS software – data type – Spatial and non spatial (attribute) data – measurement scales- Data base Management Systems (DBMS).

DATA ENTRY, STORAGE AND ANALYSIS **9**

Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS highway-alignment studies – land Information system.

Total hours = 45

TEXT BOOK: :

1. Ian Heywood " An Introduction to GIS", Pearson Education, Asia, 2000.
2. Lo.C.P and A.K.W.Yeung, " Concepts and Techniques of Geographic Information Systems", Prentice Hall of India Pvt. Ltd., New Delhi, 2002.
3. Burrough P.A. and Rachel A. McDonell, Principles of Geographical Information Systems, Oxford Publication, 2004.
4. C.P.Lo and Albert K.W.Yeung, Concepts and Techniques of Geographical Information Systems, Prentice Hall India, 2006.
5. Thomas. M.. Lillesand and Ralph. W. Kiefer, Remote Sensing and Image Interpretation, John Wiley and Sons, 2003.

U13CETE24 **HYDROLOGY**

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1- gain the knowledge needed on hydrological cycle, hydro metrology and formation of precipitation.

CO2-to apply the various methods of field measurements and empirical formulae for estimating the various losses of precipitation, stream flow, flood and flood routing.

CO3-know the basics of ground water and hydraulics of subsurface flows.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M					M					M
CO2		S			M		M					M
CO3			S				M					M

PRECIPITATION **9**

Hydrologic cycle – Types of precipitation- Forms of precipitation- Measurement of Rainfall – Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, duration, frequency relationship- Probable maximum precipitation.

ABSTRACTION FROM PRECIPITATION **9**

Losses from precipitation – Evaporation process- reservoir evaporation- Infiltration process- Infiltration capacity – Measurement of infiltration- Infiltration indices- Effective rainfall.

HYDROGRAPHS **9**

Factors affecting Hydrograph – Base flow separation – Unit hydrograph – Derivation of unit hydrograph – S curve hydrograph – Unit hydrograph of different deviations – Synthetic Unit Hydrograph

FLOODS AND FLOOD ROUTING **9**

Flood frequency studies – Recurrence interval – Gumbel's method – Flood routing – Reservoir flood routing- Muskingum's Channel Routing – Flood control

GROUND WATER HYDROLOGY **9**

Types of aquifers- Darcy's law – Dupuit's assumptions – Confined Aquifer – Unconfined Aquifer- Recuperation test – Transmissibility – Specific capacity – Pumping Test – Steady flow analysis only.

Total hours = 45

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TEXT BOOK: :

1. Subramanya, K., " Engineering Hydrology", Tata McGraw-Hill Publishing Co., Ltd., 2000.
2. Raghunath, H.M., " Hydrology", Wiley Eastern Ltd., 2000.
3. Jayarami Reddy. P. Hydrology, tat McGraw Hill, 2008.
4. Madan Mohan das and Mimi Das Saikia, Hydrology, Prentice Hall of India, 2013.
5. Chow, V.T. and Maidment D.R., " Hydrology for Engineers", McGraw-Hill Inc., Ltd., 2000.
6. Singh, V.P., "Hydrology", McGraw Hill Inc., Ltd., 2000.

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Elective-3

U13CETE31 TRANSPORTATION PLANNING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 - apply the principles of the transportation planning process and demand estimation
CO2 - analyse the trip production and trip attraction models
CO3 - analyse the growth factor, gravity and opportunity models
CO4 - apply the mode choice behavior and mode split models.
CO5 - apply the shortest path models for route assignment.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M					S						M
CO2		M			M	M						M
CO3		S			M							M
CO4		S			M							M
CO5		S			M							M

TRANSPORTATION PLANNING **9**

Transportation planning Process and Concepts – Role of transportation – Transportation problems- Urban travel characteristics – Concept of travel demand – Demand function – demand estimation- sequential, recursive and simultaneous processes

TRIP GENERATION ANALYSIS **9**

Trip Generation Analysis – Zoning- Types and sources of data- Expansive factors – Accuracy checks – Trip generation models- Zonal models – Household models – Category analysis – Trip attractions of work centres.

TRIP DISTRIBUTION ANALYSIS **9**

Trip distribution analysis – Trip distribution models – Growth factor models- gravity models- Opportunity models.

MODE SPLIT ANALYSIS **9**

Mode Split analysis – Mode split models – Mode choice behavior, Competing modes, Mode split curves, Probabilistic models.

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TRAFFIC ASSIGNMENT **9**

Traffic Assignment- Route split analysis: Elements of transportation networks, Nodes and links- minimum path trees – all or nothing assignment – Multipath assignment – Capacity restraint.

Total hours = 45

TEXT BOOK: :

1. Hutchinson B.G., Principles of Urban Transportation System Planning, McGraw-Hill, 2007.
2. Bruton M.J., Introduction to Transportation Planning, Hutchinson, London, 1992.
3. C.Jotin Khisty, B. Kent lall, Transportation Engineering, Prentice Hall of India, 2002.

U13CETE32 TRAFFIC ENGINEERING AND MANAGEMENT

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1: Analyse traffic problems and plan for traffic systems for various uses
CO2: Design channels, intersections, signals and parking arrangements
CO3: develop Traffic Management Systems.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		S				M						M
CO2			S			M						M
CO3			S			M						M

TRAFFIC PLANNING AND CHARACTERISTICS 9

Road characteristics – Road User Characteristics-PIEV Theory – Vehicle -Performance characteristics – Fundamentals of Traffic flow – Urban Traffic problems in India- Integrated planning of town, country, regional and all urban infrastructure- Towards sustainable approach- land use & transport and modal integration.

TRAFFIC SURVEYS 9

Traffic surveys- Speed, journey time and delay surveys – Vehicles- Volume Survey including non-motorized transports – Methods and interpretation – Origin Destination Survey – Methods and presentation0- Parking Survey – Accident Analysis – Methods, interpretation and presentation- Statistical applications in traffic studies and traffic forecasting – Level of Service – Concept, applications and significance.

TRAFFIC DESIGN AND VISUAL AIDS 9

Intersection Design – channelization, Rotary intersection design – Signal design – Coordination of signals – Grade separation – Traffic signs including VMS and road markings- Significant roles of traffic control personnel – networking pedestrian facilities & cycle tracks.

TRAFFIC SAFETY AND ENVIRONMENT 9

Road accidents – causes, effect, prevention, and cost – Street lighting – traffic and environment hazards- Air and Noise Pollution, causes, abatement measures – promotion and integration of public transportation – Promotion of non-motorized transport.

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TRAFFIC MANAGEMENT **9**

Area Traffic Management System – Traffic System Management (TSM) with IRC standards –Traffic Regulatory Measures – travel Demand Management (TDM) - Direct and indirect methods – congestion and parking pricing – All segregation methods – coordination among different agencies- Intelligent Transport System for traffic management, enforcement education.

Total hours = 45

TEXT BOOK: :

1. Kadiyali. L.R " Traffic Engineering and Transport Planning", Khanna Publishers, Delhi, 2013.
2. Indian Roads Congress (IRC) Secifications : Guidelines and Special Publications on traffic Planning and Management.
3. Salter R.I and Hounsell N.B, " Highway Traffic Analysis and design", macmillan Press Ltd. 1996.
4. Fred L. Mannering, Scott S. Washbum and Walter P. Kilareski, Principles of Highway Engineering and Traffic Analysis, Wiley India Pvt.Ltd., new delhi, 2011.
5. Garber and Hoel, " principles of Traffic and Highway Engineering", CENGAGE Learning, New Delhi, 2010.

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U13CETE33 URBAN AND REGIONAL PLANNING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 - identify the stages of planning process and surveys in planning
CO2 - apply the principles of the regional, master, structural and detailed development plans
CO3 - apply the concepts of the garden city movement, linear city and neighborhood.
CO4 - demonstrate the functions of planning and financing agencies
CO5 - apply the town and country plan act and building by-laws.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M					M						M
CO2						S						M
CO3						S						M
CO4											M	S
CO5						S						M

PLANNING **9**

Definition and classification of urban areas – Trend of urbanization- Planning process – various stages of the planning process- Surveys in planning.

TYPES OF PLAN **9**

Plans- Delineation of planning areas- Regional plan, master plan, Structure plan, detailed development plan and Transportation plan.

PLANNING PRINCIPLES **9**

Planning principles of Ebenezer Howard (Garden City movement), Patrick Geddes, Dr.C.A.Doxiades, Soria Y Mata (Linear City) and Clarance, A Perry (the neighbourhood concept).

PLAN IMPLEMENTATION **9**

Plan implementation- Urban Planning agencies and their functions – Financing – Public, private, Non-governmental organizations – Public participation in planning.

REGULATIONS **9**

Development control regulations- Town and country planning act- Building bye-laws.

Total Hours = 45

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TEXT BOOK: :

1. Hutchinson, B.G., Principles of urban Transport Systems Planning, Scripta, McGraw-Hill, New York, 1974.
2. Clarie, Hand Book of Urban Planning, Van Nostrand Book Company 1974.
3. Gallian, B, Arthur and Simon Eisner, the Urban pattern- City Planning and Design, Affiliated Press Pvt.Ltd., New Delhi, 1985.
4. Margaret Roberts, An Introduction to Town Planning Techniques, Hutchinson, London, 1980.
5. Hiraskar, G.K., Fundamentals of Town Planning, Dhanpat Rai Publications, 1992.

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U13CETE34 TOWN PLANNING AND ARCHITECTURE

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 - architectural design of structures
CO2 - apply green building concepts
CO3 - Perform Landscape design

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S			M						M
CO2						S	S					M
CO3						S	S					M

ARCHITECTURAL DESIGN **6**

Architectural design – an analysis – Integration of function and aesthetics – Introduction to basis elements and principles of design.

SITE PLANNING **9**

Surveys – Site analysis – Development control – Zoning regulations - Layout Regulations – Urban Planning standards – Layout design concepts.

BUILDING TYPES **12**

Residential, institutional, commercial and Industrial – Planning concepts – Application of anthropometry and space standards – Inter relationships of functions – Safety standards – Building rules and regulations – Integration of building services – Interior planning

CLIMATE RESPONSIVE DESIGN **12**

Factors that determine climate – Characterestics of climate types – Design for various climate types – Passive and active energy controls – Green building concept

ENVIRONMENTAL DESIGN **6**

Urban renewal – Conservation – Principles of Landscape design – Case studies.

Total Hours = 45

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TEXT BOOK:

1. Francis D.K. Ching, “Architecture: Form, Space and order”, VNR, N.Y., 1999.
2. Givoni B., “Man Climate and architecture”, Applied Science, Barking ESSEX, 1982.
3. Edward D. Mills, “Planning the Architects Handbook”, Butterworth London, 1995.
4. Gallian B. Arthur and Simon Eisner, “The Urban Pattern – City Planning and Design”, Affiliated Press Pvt.Ltd, New Delhi, 1995.
5. Margaret Roberts, “An Introduction to Town Planning Techniques”, Hutchinson, London, 1990.

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U13CETE35 **PAVEMENT ENGINEERING**

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 - design flexible and rigid pavements based on IRC guidelines.
CO2 - implement various techniques to evaluate performance of pavements.
CO3 - understand various methods of soil stabilization including the use of geo-textiles

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S			S						M
CO2			S			S						M
CO3			M	M								M

TYPES OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM 9

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

DESIGN OF FLEXIBLE PAVEMENTS 9

Flexible pavement design factors influencing design of flexible pavement, Empirical – Semi empirical and theoretical methods – Design procedure as per IRC guidelines – design and specification of rural roads.

DESIGN OF RIGID PAVEMENTS 9

Cement concrete pavements factors influencing CC pavements- Modified Westergaard approach – design procedure as per IRC guidelines – Concrete roads and their scope in India.

PERFORMANCE EVALUATION AND MAINTENANCE 9

Pavement Evaluation – causes of distress in rigid and flexible pavements – Evaluation based on Surface Appearance, Cracks, patches and Pot holes, Undulations, Raveling, Roughness, Skid Resistance- Structural evaluation by Deflection Measurements- Pavement Serviceability index- pavement maintenance (IRC recommendations only).

STABILIZATION OF PAVEMENTS 9

Stabilization with special reference book to highway pavements – Choice of stabilizers – Testing and field control stabilization for rural roads in India – use of Geosynthetics in roads.

Total hours = 45

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TEXT BOOK:

1. Wright P.H. " Highway Engineers", John Wiley and Sons, Inc., New York, 1996.
2. Khanna , S.K., Justo C.E.G and veeraragavan . A., " Highway Engineering", Nem Chand and Brothers, 10th edition, Roorkee, 2014.
3. Kadiyali, L.R. " Principles and Practice of Highway Engineering", Khanna tech. Publications, New Delhi, 1989.
4. Yoder R.J. and Witchak M.W. " Principles of Pavement Design", John Wiley 2000.
5. Rajib B. Mallick, Tahar El-Korchi, " Pavement Engineering" Principles and Practice 2nd edition, CRC Press, 2013.

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Elective -4

U13CETE41 DISASTER MANAGEMENT AND MITIGATION

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 : gain knowledge on various natural and manmade disasters
CO2 : apply various geospatial technology for disaster mapping
CO3 : work on recovery & rehabilitation due to disasters.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M					M				M	M
CO2					S		M				M	M
CO3							M				M	M

NATURAL DISASTERS **9**

Cyclones, Floods, Drought and Desertification - Earthquake, Tsunami, Landslides and Avalanche.

MAN MADE DISASTERS **9**

Chemical industrial hazards, major power breakdowns, traffic accidents, Fire, War, Atom bombs, Nuclear disaster.- Forest Fire-Oil fire –accident in Mines.

GEOSPATIAL TECHNOLOGY **9**

Remote sensing, GIS and GPS applications in real time disaster monitoring, prevention and rehabilitation- disaster mapping.

RISK ASSESSMENT AND MITIGATION **9**

Hazards, Risks and Vulnerabilities. -Disasters in and India ,Assessment of Disaster Vulnerability of a location and vulnerable groups- Preparedness and Mitigation measures for various Disasters- Mitigation through capacity building -Preparation of Disaster Management Plans.

DISASTER MANAGEMENT **9**

Legislative responsibilities of disaster management- Disaster management act 2005- post disaster recovery & rehabilitation, Relief & Logistics Management; disaster related infrastructure development- Post Disaster, Emergency Support Functions and their coordination mechanism.

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Total hours = 45

TEXT BOOK: :

1. Khanna B K, "All You Wanted To Know About Disasters", New India Publishing Agency, New Delhi, 2005.
2. Ramana Murthy, "Disaster Management", Dominant, New Delhi, 2004.
3. Rajdeep Dasgupta, Disaster Management and Rehabilitation, Mittal Publishers, New Delhi, 2007.
4. Disaster Management in India- A Status Report- Published by the National Disaster Management Institute, Ministry of Home Affairs, Govt. of India.2004.
5. Murthy D B N, "Disaster Management: Text and Case Studies", Deep and Deep Publications (P) Ltd., New Delhi, 2007.
6. Sundar I and Sezhiyan T, "Disaster Management", Sarup and Sons, New Delhi, 2007.

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U13CETE42 MANAGEMENT CONCEPTS AND PRACTICES

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 : Demonstrate the nuances of management functions.
CO2 : Analyze the framework of a business organization
CO3 : Adopt an empirical approach toward business situations
CO4 : Apply various Project management techniques
CO5 : Implement roles of team players.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1											S	M
CO2											S	M
CO3	M										S	M
CO4									M		S	M
CO5									S		M	M

Introduction of management- evolution of Scientific and Modern management principles- Functions of management- types of Business Organization- managerial Roles – Levels of management. **9**

Decision Making, nature purpose and steps involved in Planning, Objectives – Strategies and Planning premises. Nature and purpose of organizing. Formal and informal organization. Span of control- delegation of Authority. **9**

Introduction to Human Resource Management. Creativity and innovation. Motivation theories (Hierarchy of needs by Maslow, Herzberg's two-factor theory)- Motivational Techniques- Monetary & Non-monetary, Job enrichment. **9**

Types of Leadership- Leadership Theories. Communication- Process of Communication – Barriers and Breakdown- Effective Communication. **9**

System and process of controlling – Requirements for effective control – The budget as control Technique. Globalization and Liberalization – International Management and Global Theory of Management, Corporate Social Responsibility. **9**

Total hours = 45

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TEXT BOOK: :

1. Harold Koritz & Heinz Weihrich " Essentials of management", Tata McGraw-Hill.
2. L.M.Prasad, Principles of Management, Sultan Chand & Sons, new delhi.
3. Sherlekar& Sherlekar, Principles of Management, Himalaya Publishing House, New Delhi.
4. Stephen Robbins, Organizational behavior, Pearson Education, New Delhi.

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U13CETE43 CONSTRUCTION PLANNING & SCHEDULING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 : develop construction plans and estimate the resource requirements
CO2 : do the cost control monitoring
CO3 : execute quality control and safety during execution

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				M		M					M	M
CO2											S	M
CO3				M		S					M	M

CONSTRUCTION PLANNING 5

Basic concepts in the development of construction plans-choice of Technology and Construction method-Defining Work Tasks- Definition- Precedence relationships among activities-Estimating Activity Durations-Estimating Resource Requirements for work activities-coding systems

SCHEDULING PROCEDURES AND TECHNIQUES 15

Relevance of construction schedules-Bar charts - The critical path method-Calculations for critical path scheduling-Activity float and schedules-Presenting project schedules-Critical path scheduling for Activity-on-node and with leads, Lags and Windows-Calculations for scheduling with leads, lags and windows-Resource oriented scheduling-Scheduling with resource constraints and precedences -Use of Advanced Scheduling Techniques-Scheduling with uncertain durations-Crashing and time/cost trade offs -Improving the Scheduling process – Introduction to application software

COST CONTROL MONITORING AND ACCOUNTING 15

The cost control problem-The project Budget-Forecasting for Activity cost control - financial accounting systems and cost accounts-Control of project cash flows-Schedule control-Schedule and Budget updates-Relating cost and schedule information

QUALITY CONTROL AND SAFETY DURING CONSTRUCTION 5

Quality and safety Concerns in Construction-Organizing for Quality and Safety-Work and Material Specifications-Total Quality control-Quality control by statistical methods -

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Statistical Quality control with Sampling by Attributes-Statistical Quality control by Sampling and Variables-Safety.

ORGANIZATION AND USE OF PROJECT INFORMATION 5

Types of project information-Accuracy and Use of Information-Computerized organization and use of Information -Organizing information in databases-relational model of Data bases-Other conceptual Models of Databases-Centralized database Management systems-Databases and application programs-Information transfer and Flow.

Total hours : 45

TEXT BOOK: :

1. Chitkara, K.K. "Construction Project Management Planning", Scheduling and Control, Tata McGraw-Hill Publishing Co., New Delhi, 1998.
2. Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamentals Concepts for Owners", Engineers, Architects and Builders, Prentice Hall, Pitsburgh, 2000.
3. Moder.J., C.Phillips and Davis, "Project Management with CPM", PERT and Precedence Diagramming, Van Nostrand Reinhold Co., Third Edition, 1983.
4. Willis., E.M., "Scheduling Construction projects", John Wiley and Sons 1986.
5. Halpin,D.W., "Financial and cost concepts for construction Management", John Wiley and Sons, New York, 1985.

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U13ECTE62 DIGITAL SIGNAL PROCESSING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 : Identify the different types of signals and systems and their properties.
CO2 : Compute impulse response of continuous time and discrete time systems.
CO3 : Apply Fourier techniques for analysis of continuous time and discrete time signals.
CO4 : Apply z-transform for analysis of discrete time systems.
CO5 : Apply FFT algorithms for computation of DFT of discrete time signals.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M				M							M
CO2	M				M							M
CO3		M			S							M
CO4		M			S							M
CO5		M			S							M

SIGNALS AND SYSTEMS **9**

Basic concepts of signals and systems - continuous and discrete - classification of signals - Transformation of independent variable: shifting, scaling and folding - Classification of systems – Properties of systems – Impulse response – convolution - sampling, quantization, aliasing effects - Fourier series and Fourier Transform for CT and DT signals – spectrum.

Z-TRANSFORM AND SYSTEM ANALYSIS **9**

Z transform – Forward Transform - Inverse Transform using Partial Fractions - Properties – Pole-Zero plot – Difference Equations - Transfer function - Analysis of Discrete Time systems using DTFT and Z Transform.

DISCRETE FOURIER TRANSFORM **9**

Introduction to DFT– Properties of DFT – Efficient computation of DFT – FFT algorithms – Radix-2 FFT – Decimation – in - Time and Decimation – in -Frequency algorithms – Butterfly diagram.

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DESIGN OF DIGITAL FILTERS **9**

FIR filter design: Linear phase characteristics - Windowing Technique –Rectangular, Hamming, Hanning windows – IIR filter design: Analog filter design - Butterworth and Chebyshev approximations – Impulse invariance and bilinear transformations - prewarping - FIR and IIR filter structures – Direct form I and II - cascade and parallel forms.

PROGRAMMABLE DSP CHIPS **9**

Introduction to DSP architecture – Von Neumann, Harvard, Modified Harvard architectures - Dedicated MAC unit – Multiple ALUs - Addressing modes, Pipelining - Architecture and features of TMS 320C54XX Processor - Development of simple programs - Case study : SOS-LIFE earthquake warning system –Seismic analysis of dams – Vibration analysis of structures.

Total Hours = 45

Learning Resource :

1. John G.Proakis and Dimitris G.Manolakis, **"Digital Signal Processing, Principles, Algorithms and Applications"**, PHI, 3rd Edition. 2000.
2. B. Venkataramani, M. Bhaskar, **"Digital Signal Processors, Architecture, Programming and Applications",** Tata McGraw Hill, New Delhi, 2003.
3. Johny R.Johnson, **"Introduction to Digital Signal Processing",** PHI, 2009.
4. Moman H. Hays**, "Digital Signal Processing"**, Schaum's Outline Series, Tata McGraw-Hill., 2007.
5. Steven W. Smith, **"The Scientists and Engineer's Guide to Digital Signal Processing"**, California Technical Publishing, 1997.
6. James H. McClellan, Ronald W. Schafer, Mark A. Yoder, **"Signal Processing First",** 2nd Edition.

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U13CSTE85 GRID AND CLOUD COMPUTING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1: Define and explain Grid computing

CO2: Utilize Grid Toolkits and apply to solve the real life problems

CO3: Apply web services for grid applications

CO4: Define and explain Cloud Computing.

CO5: Compare Grid and Cloud Computing.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					S							S
CO2					S							S
CO3					S							S
CO4					S							S
CO5					S							S

GRID COMPUTING TECHNOLOGY – AN OVERVIEW 9

Introduction – High-Performance Computing – Cluster Computing – Peer-to-Peer Computing – Internet Computing – Grid computing – Grid computing model – Grid Protocols – Types of Grids – Grid Networks – Grid Applications characteristics – Application Integration – Grid Computing and Public Policy

GRID COMPUTING AND GRID COMPUTING INITIATIVES 9

Early grid activities – Current Grid Activities – Grid Business areas – Grid applications – Grid Infrastructure - Grid Computing Organizations and their roles – Grid Computing anatomy – Grid Computing road map.

GRID COMPUTING APPLICATIONS AND TECHNOLOGIES 9

Merging the Grid Services Architecture with the Web Services Architecture - OGSA – Sample use cases – OGSA platform components – OGSI – OGSA Basic Services

GRID COMPUTING TOOL KITS 9

Globus GT 3 Toolkit – Architecture, Programming model, High level services – OGSI .Net middleware Solutions.

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CLOUD COMPUTING **9**

Understanding Cloud Computing – Cloud Computing for Everyone: Cloud computing for the family, community and corporation.

Total hours = 45

TEXT BOOK: :

1. Ahmar Abbas, "Grid Computing: A Practical Guide to technology and Applications", Firewall Media, 2008 Edition.
2. Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson Education, 2004.
3. Michael Miller, "Cloud Computing – Web-Based Applications that Change the way you work and collaborate Online", Pearson Education, 2009.

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GROUP-5

U13CETE51 GEOTEHNICAL EARTHQUAKE ENGINEERING

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 - Demonstrate the principles of earthquake loading
CO2 - Quantify earthquake intensity and ground motion
CO3 - Estimate seismic soil design parameters
CO4 - Analyze and design seismic resistant foundation for buildings
CO5 - Prepare soil risk and microzonation maps.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M				M	M					M
CO2		M				M	M					M
CO3		M	M			M	M					M
CO4		S				M	M					M
CO5		M			M		M			M		M

MECHANISM OF EARTHQUAKE **9**

Mechanism of Earthquakes- Causes of earthquake- earthquake Fault sources- Elastic Rebound theory – Seismic wave in Earthquake shaking – terminology- Locating an earthquake- Quantification of earthquakes. Strong Motion Records – Characteristics of ground motion- factors influencing Ground motion- Estimation of frequency content parameters.

SEISMIC SITE INVESTIGATIONS **9**

Seismic site investigations- Selected case studies- Evaluation of Dynamic soil properties- Codal provisions

GROUND MOTION **9**

Design Ground Motion – Developing Design Ground Motion- codal recommendations. Earthquake Resistant Design of foundation of Buildings- Design considerations

EARTHQUAKE RESPONSE OF SLOPES **9**

Earthquake Response of slopes- Evaluation of slope stability- Liquefaction- Susceptibility- Liquefaction Resistance- Codal recommendations.

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HAZARD ASSESSMENT **9**

Risk mappig- Hazard assessment- Mitigation measures- Seismic microzonation and its importance.

Total hours = 45

TEXT BOOK:

1. Kameswara Rao, N.S.V., Dynamics soil tests and applications, Wheeler Publishing- New Delhi, 2000.
2. Krammer S.L., Geotechnical Earthquake Engineering, Prentice Hall, International Series, Pearson Education (Singapore) Pvt.Ltd., 2004.
3. Kameswara Rao, Vibration Analysis and Foundation Dynamics, Wheeler
4. Robert W.day, geotechnical Earthquake Engineering Hand book, McGraw Hill, 2002.

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U13CETE52 GROUND IMPROVEMENT TECHNIQUES

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1-identify and evaluate the deficiencies if any in the deposits of a project area

CO2-provide alternate methods to improve its character suitable to the project so that the structures built will be stable and serve.

CO3-able to select appropriate ground improvement techniques for the given condition

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M		M			M					M
CO2			M				M					M
CO3		M		M		M	M					M

INTRODUCTION **9**

Role of ground improvement in foundation engineering - methods of ground improvement – Geotechnical problems in alluvial, laterite and black cotton soils -Selection of suitable ground improvement techniques based on soil condition.

DRAINAGE AND DEWATERING **9**

Drainage techniques - Well points - Vaccum and electroosmotic methods - Seepage analysis for two dimensional flow-fully and partially penetrating slots in homogenous deposits (Simple cases only).

INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS **9**

Insitu densification of cohesionless and consolidation of cohesive soils -Dynamic compaction and consolidation - Vibrofloation - Sand pile compaction - Preloading with sand drains and fabric drains – Stone columns – Lime piles - Installation techniques only - relative merits of various methods and their limitations.

EARTH REINFORCEMENT **9**

Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth – use of Geotextiles for filtration, drainage and separation in road and other works.

GROUT TECHNIQUES **9**

Types of grouts - Grouting equipment and machinery - Injection methods - Grout monitoring – Stabilisation with cement, lime and chemicals - Stabilisation of expansive soils.

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Total hours = 45

TEXT BOOK: :

1. Koerner R.M., "Construction and Geotechnical Methods in Foundation Engineering", McGraw-Hill, 1994.
2. Purushothama Raj, P. "Ground Improvement Techniques", Tata McGraw-Hill Publishing Company, New Delhi, 1995
3. Moseley M.P., Ground Improvement Blockie Academic and Professional, Chapman and Hall, Glassgow, 1993.
4. Jones J.E.P., Earth Reinforcement and Soil Structure, Butterworths, 1995.
5. Koerner, R.M., "Design with Geosynthetics", (3rd Edition) Prentice Hall, New Jersey, 2002
6. Jewell, R.A., "Soil Reinforcement with Geotextiles", CIRIA special publication, London, 1996
7. Das, B.M., "Principles of Foundation Engineering", Thomson Books / Cole, 2003.

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U13CETE53 REPAIR AND REHABILITATION OF STRUCTURES

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 -gain knowledge on quality of concrete, durability Aspects, causes of deterioration.
CO2 - assessment of distressed structures and demolition structures and repairing procedures
CO3 – understand the engineered demolition techniques

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		S				S						M
CO2	M					S						M
CO3					M	M	M					M

MAINTENANCE AND REPAIR STRATEGIES 8

Maintenance, repair and rehabilitation, Facets of Maintenance, importance of Maintenance various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

SERVICEABILITY AND DURABILITY OF CONCRETE 12

Quality assurance for concrete construction concrete properties – strength, permeability, thermal properties and cracking. – Effects due to climate, temperature, chemicals, corrosion – design and construction errors – Effects of cover thickness and cracking

MATERIALS AND TECHNIQUES FOR REPAIR 15

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, ferro cement, Fibre reinforced concrete. Rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and dry pack, vacuum concrete, Gunite and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coating and cathodic protection.

REPAIRS, REHABILITATION AND RETROFITTING OF STRUCTURES 6

Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

DEMOLITION TECHNIQUES 4

Engineered demolition techniques for Dilapildated structures – case studies

Total hours: 45

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TEXT BOOK: :

1. M.S.Shetty, Concrete Technology – Theory and Practice, S.Chand and Company, New Delhi, 2008.
2. Denison Campbell, Allen and Harold Roper, Concrete Structures, Materials, Maintenance and Repair, Longman Scientific and Technical UK, 1992.
3. R.T.Allen and S.C.Edwards, Repair of Concrete structures, Blakie and Sons, UK, 1993Santhakumar, A.R., Training Course notes on Damage Assessment and repairs in Low Cost Housing, "RHDC – NBO" Anna University, July 1992.

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U13CETE54 EARTHQUAKE RESISTANT STRUCTURES

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 :apply the basics of earthquake engineering
CO2 :demonstrate the dynamics of structural system under earthquake load
CO3 :analyze the influence of the structural/ geometrical design in building characteristics
CO4 :demonstrate the cyclic loading behavior of RC steel and pre-stressed concrete elements.
CO5 :apply codal provisions on different types of structures

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M				M	M					M
CO2		S				M	M					M
CO3		S				M	M					M
CO4		S		M		M	M					M
CO5				M		S						M

ELEMENTS OF ENGINEERING SEISMOLOGY **9**

Elements of Engineering Seismology- Theory of Vibrations- Indian Seismicity – earthquake history – behavior of structures in the past earthquakes.

SEISMIC DESIGN CONCEPTS **9**

Seismic Design Concepts – Cyclic loading behavior of RC, Steel and Prestressed Concrete elements- Response Spectrum – Design spectrum – capacity based design.

SHEAR WALLS AND BRACED FRAMES **9**

Provision of Seismic code frames, shear walls, Braced frames, Combinations- Torsion.

PERFORMANCE OF BUILDINGS **9**

Performance of Regular Buildings 3D Computer Analysis of Building systems (theory only) – design and Detailing of frames – Shear walls and frame walls.

BASE ISOLATION **9**

Seismic performance – irregular Buildings – Soil performance, modern concepts – Base Isolation – Adoptive systems – case studies.

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Total Hours = 45

TEXT BOOK: :

1. Pankaj Agarwal and manish Shrikhande, earthquake Resistant Design of Structures, Prentice Hall of India, New Delhi, 2003.
2. Bullen K.E., Introduction to the Theory of Seismology, Great Britain at the University Printing houses, Cambridge University press 1996.

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U13CETE55 PREFABRICATED STRUCTURES

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 - design some of the prefabricated elements
CO2 - Have the knowledge of the construction methods in using these elements
CO3 – design the prefabricated structural elements for abnormal loads.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			S			S						M
CO2						M						M
CO3			S			S						M

INTRODUCTION **9**

Need for prefabrication – Principles – Materials – Modular coordination – Standarization – Systems – Production – Transportation – Erection.

PREFABRICATED COMPONENTS **9**

Behaviour of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls

DESIGN PRINCIPLES **9**

Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.

JOINT IN STRUCTURAL MEMBERS **9**

Joints for different structural connections – Dimensions and detailing – Design of expansion joints

DESIGN FOR ABNORMAL LOADS **9**

Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.

Total hours = 45

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TEXT BOOK:

1. CBRI, Building materials and components, India, 1996
2. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994
3. Koncz T., Manual of precast concrete construction, Vols.I,II andIII, Bauverlag, GMBH, 1971.
4. B.Lewicki, Building wih large prefabricates, Elsevier Publishing Company Amserdam/London/Newyork.1966.
5. Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 1978.

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U13CETE56 PRESTRESSED CONCRETE STRUCTURES

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 : design prestressed concrete beam
CO2 : design design prestressed composite beams
CO3 : design prestressed concrete bridges

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		S	M	M		S						
CO2		S	M	M		S						
CO3		S	M	M		S						

INTRODUCTION – THEORY AND BEHAVIOUR 9

Basic concepts – Advantages – Materials required – Systems and methods of prestressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons – Effect of tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections - Losses of prestress – Estimation of crack width

DESIGN 9

Flexural strength – Simplified procedures as per codes – strain compatibility method – Basic concepts in selection of cross section for bending – stress distribution in end block, Design of anchorage zone reinforcement – Limit state design criteria – Partial prestressing – Applications.

CIRCULAR PRESTRESSING 9

Design of prestressed concrete tanks – Poles and sleepers

COMPOSITE CONSTRUCTION 9

Analysis for stresses – Estimate for deflections – Flexural and shear strength of composite members

PRE-STRESSED CONCRETE BRIDGES 9

General aspects – pretensioned prestressed bridge decks – Post tensioned prestressed bridge decks – Principles of design only.

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Total Hours : 45

TEXT BOOK:

1. Krishna Raju N., Prestressed concrete, Tata McGraw Hill Company, New Delhi, 2006
2. Mallic S.K. and Gupta A.P., Prestressed concrete, Oxford and IBH publishing Co. Pvt. Ltd. 2007.
3. Ramaswamy G.S., Modern prestressed concrete design, Arnold Heinimen, New Delhi, 2005.
4. Lin T.Y. Design of prestressed concrete structures, Asia Publishing House, Bombay 1995.
5. David A.Sheppard, William R. and Philips, Plant Cast precast and prestressed concrete – A design guide, McGraw Hill, New Delhi 1992.

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U13CETE57 **STRUCTURAL DYNAMICS**

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 : apply the concepts of dynamic systems
CO2 : identify, formulate and solve dynamic response of SDOF
CO3 : identify, formulate and solve dynamic response of MDOF
CO4 : analyze continuous systems subjected to different types of dynamic loads
CO5 : identify, formulate and solve free and forced vibrations response of structural systems.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S				W							
CO2		S		M								
CO3		S		M								
CO4		S		M								
CO5		S		M								

DYNAMIC ANALYSIS **9**

Dynamic analysis – Elements of vibratory systems and simple Harmonic Motion – Mathematical models of SDOF systems- Principle of Virtual displacements – Evaluation of damping resonance.

VIBRATION ANALYSIS **9**

Fourier series expression for loading – (blast or earthquake) – Duhamel's Integral- Numerical evaluation – Expression for generalized system properties – vibration analysis Rayleigh's method – Rayleigh – Ritz method.

FINITE ELEMENT METHOD **9**

Differential equation of motion – Beam flexure including shear deformation and rotary inertia- Vibration analysis using finite element method for beams and frames.

EIGEN VALUE PROBLEM **9**

Evaluation of structural property matrices – Natural vibration – Solution of the eigen value problem – Iteration due to Holzer and Stodola

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DESIGN OF EARTHQUAKE RESISTANT STRUCTURES **9**

Idealization of multi-storeyed frames- analysis to blast loading – Deterministic analysis of earthquake response – lumped SDOF system – Design of earthquake resistant structures.

Total hours : 45

TEXT BOOK: :

1. Mario Paz, Structural Dynamics, CBS, Publishers, 1987.
2. Roy R Craig, Jr., Structural Dynamics, John Wiley & Sons, 1981.
3. A.K. Chopra, " Dynamics of Structures- Theory and Applications of Earthquake Engineering", Pearson Education 2001.

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Elective-6

U13CETE61 MATRIX METHODS OF STRUCTURAL ANALYSIS

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 : apply the basic concepts of matrix methods in structural Analysis
CO2 : Develop stiffness and flexibility matrices
CO3 : analyze the structures using flexibility and stiffness method
CO4 : Transform stiffness coordinates to element coordinates
CO5 : determine the forces in various members due to lack of fit and thermal expansion.

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S										
CO2	S			M								
CO3		S		M								
CO4		S		M								
CO5		S		M								

CONSTRAINED MEASUREMENTS **9**

Generalized measurements- Degrees of freedom- constrained measurements- Behavior of structures- Principle of superposition, stiffness and flexibility matrices- Constrained measurements- stiffness and flexibility coefficients from virtual work.

STRAIN ENERGY **9**

Strain energy-stiffness and flexibility matrices from strain energy-symmetry and other properties of stiffness and flexibility matrices- Betti's law and its applications- Strain energy in systems and in elements.

TRANSFORMATION OF MATRICES **9**

Determinate and indeterminate structures- Transformation of element matrices to system matrices- Transformation of system vectors to element vectors- Normal coordinates and orthogonal transformations.

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FLEXIBILITY METHOD **9**

Flexibility method applied to statically determinate and indeterminate structures- Choice of redundant- Transformation of redundant- Internal forces due to thermal expansion and lack of fit.

THERMAL EXPANSION **9**

Development of the method – internal forces due to thermal expansion and lack of fit- Application of symmetrical structures- Comparison between stiffness and flexibility methods.

Total hours : 45

TEXT BOOK:

1. Moshe, F., Rubenstein, matrix Computer Analysis of Structures, Prentice Hall, New York, 1986.
2. Rajasekaran S, Computational Structural mechanics, prentice Hall of India, new delhi,2001.
3. Manickaselvam V.K., Elements of Matrix and Stability Analysis of Structures, Khanna Publishers, new Delhi, 1998

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U13CETE62 STEEL-CONCRETE COMPOSITE STRUCTURES

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 : Apply the concepts of composite construction in engineering

CO2: Analyze the behavior of shear connectors, degree of shear connection and their interaction.

CO3: Design composite beams under propped and un-propped condition

CO4: Design different types of composite deck slabs

CO5: Analyze the effects of temperature, shrinkage and creep and cyclic loading on composite sections

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S			M								
CO2		S		M								
CO3		S	M	M								
CO4		S	M	M								
CO5		S	M	M								

INTRODUCTION **9**

Introduction –types-advantages-comparison-limit states of composite sections- introduction to plastic analysis – mechanism of composite members

SHEAR CONNECTORS **9**

Shear connectors- types of shear connectors - degree of shear connection –partial and complete shear connections- strength of shear connectors- experimental evaluation of shear connectors.

DESIGN OF COMPOSITE BEAMS **9**

Analysis and design of composite beams without profile sheet-propped condition- un-propped condition- deflection – design of partial shear connection

COMPOSITE BEAM WITH PROFILE SHEET **9**

Design of composite beam with profile sheet- propped and un-propped condition – deflection of composite beams – design of partial shear connection

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COMPOSITE SLABS **9**

Introduction- Composite slabs- profiled sheeting-sheeting parallel to span-sheeting perpendicular to span- analysis and design of composite floor system.

Total Hours : 45

TEXT BOOK: :

1. Johnson R.P., " Composite Structures of Steel and Concrete" Volume-I, Black Well Scientific Publication, U.K., 1994.
2. Teaching Resources for " Structural Steel Design", Vol.2 of 3, Institute of Steel Development and Growth (INSDAG),2000.
3. Narayanan R., "Composite Steel Structures- Advances, design and construction, Elsvier, Applied Science, U.K., 1987.
4. Owens,G.W&Knowels,P., Steel Designers Manual", (fifth edition), Steel Concrete Institute (U.K), Oxford Blackwell Scientific Publication,1992.
5. IS 11384-1985 Indian Standard Code of Practice for Composite Construction in Structural Steel and Concrete, Bureau of Indian Standards, new Delhi.

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U13CETE63 FINITE ELEMENT METHOD

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 - demonstrate the differential equilibrium equations and their relationship
CO2 - apply numerical methods to FEM
CO3 - demonstrate the displacement models and load vectors
CO4 - compute the stiffness matrix for isoperimetric elements
CO5 - analyze plane stress and plane strain problems

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S			W								
CO2	S				M							
CO3	M											
CO4	S			M								
CO5		S		S								

INTRODUCTION **9**

Differential equilibrium equations – strain displacement relation – linear constitutive relation-special cases – Principle of stationary potential energy – application to finite element methods – Some numerical techniques in finite element Analysis.

DISPLACEMENT MATRIX **9**

Displacement models- convergence requirements. Natural coordinate systems – Shape function, Interpolation function , Linear and quadratic elements – Lagrange & Serendipity elements. Strain displacement matrix – element stiffness matrix and nodal load vector.

TYPES OF ELEMENTS **9**

Two dimensional isoparametric elements – Four noded quadrilateral elements- triangular elements . Computation of stiffness matrix for isoparametric elements- numerical integration (Gauss quadrature) Convergence criteria for isoparametric elements.

STIFFNESS MATRIX **9**

Assemblage of elements – Direct stiffness method. Special characteristics of stiffness matrix – Boundary condition & reaction – Gauss elimination and LDLT decomposition. Basic steps in finite element analysis.

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ANALYSIS OF FRAMED STRUCTURES **9**

Analysis of framed Structures : 2D – truss element – 2D - beam element. Analysis of plate bending – displacement functions – plate bending Elements. Plane stress and plane strain analysis : Triangular elements – Rectangular elements.

Total hours : 45

TEXT BOOK: :

1. Krishnamoorthy, C.S, Finite Element Analysis Theory & Programming, McGraw-Hill, 1995.
2. Desai C.S and Abel,, J.F., Introduction to Finite Element Method, affiliated East West Press Pvt Ltd, New Delhi, 2000.

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U13CETE64 **TALL BUILDINGS**

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 : understand various loads to be considered for tall building design
CO2 : analyse the behavior of tall buildings subjected to lateral loading.
CO3 : Design tall buildings as per the existing codes

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		M				S						M
CO2		S		M								
CO3		S		M		S						

DESIGN CRITERIA AND MATERIALS **9**

Development of High Rise Structures – general Planning Considerations- Design Philosophies- Materials used for construction – High Strength Concrete – High Performance Concrete- Self Compacting Concrete – Glass-High strength steel.

LOADING **9**

Gravity Loading-dead load- Live load- Live load reduction technique- Impact load- Construction load- Sequential Loading . lateral Loading – Wind Load – earthquake Load.

BEHAVIOUR OF VARIOUS STRUCTURAL SYSTEMS **9**

Factors affecting growth, height and Structural form. High rise behavior of various Structural systems – Rigid frames, braced frames, infilled frames, shear walls, coupled shear walls, wall-frames, tubular structures, cores, outrigger- braced and hybrid mega systems

ANALYSIS AND DESIGN **9**

Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of buildings as total structural system considering overall integrity and major subsystem interaction, Analysis for member forces, drift and twist, computerized general three dimensional analysis.

STABILITY OF TALL BUILDINGS **9**

Overall buckling analysis of frames, wall-frames, Approximate methods, second order effects of gravity of loading, P-delta analysis, simultaneous first-order and P-Delta analysis, translational Torsional instability, out of plumb effects, stiffness of member in stability, effect of foundation rotation.

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Total hours : 45

TEXT BOOK: :

1. Bryan Stafford Smith, Alex coull, " tall Building Structures, Analysis and Design", John Wiley and Sons, Inc, 1991.
2. Taranath B.S., " Structural Analysis and Design of Tall Buildings", McGraw-Hill, 2011.
3. Lin. T.Y, Stotes Burry. D, " Structural Concepts and Systems for Architects and Engineers", John Wiley, 1988.

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U13CETE65 STORAGE STRUCTURES

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 - design concrete and steel material storage structures like bunkers and silos
CO2 : design steel and RCC water tanks
CO3 : design prestressed concrete water tanks

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		S	M	S		S						M
CO2		S	M	S		S						M
CO3		S	M	S		S						M

STEEL WATER TANKS **15**

Design of rectangular riveted steel water tank – Tee covers – Plates – Stays –Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder – Design of staging and foundation.

CONCRETE WATER TANKS **15**

Design of Circular tanks – Hinged and fixed at the base – IS method of calculating shear forces and moments – Hoop tension – Design of intze tank – Dome – Ring girders – Conical dome – Staging – Bracings – Raft foundation – Design of rectangular tanks – Approximate methods and IS methods – Design of under ground tanks – Design of base slab and side wall – Check for uplift.

STEEL BUNKERS AND SILOS **5**

Design of square bunker – Jansen's and Airy's theories – IS Codal provisions – Design of side plates – Stiffeners – Hooper – Longitudinal beams – Design of cylindrical silo – Side plates – Ring girder – stiffeners.

CONCRETE BUNKERS AND SILOS **5**

Design of square bunker – Side Walls – Hopper bottom – Top and bottom edge beams – Design of cylindrical silo – Wall portion – Design of conical hopper – Ring beam at junction.

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PRESTRESSED CONCRETE WATER TANKS **5**

Principles of circular prestressing – Design of prestressed concrete circular water tanks.

Total hours = 45

TEXT BOOK:

1. Punmia B.C., Ashok Kumar Jain, Arun K.Jain, R.C.C Designs Reinforced Concrete Structures", Laxmi Publications Pvt. Ltd, New Delhi, 2006.
2. Gambhir M.L., "Design of Reinforced Concrete Structures", Prentice Hall of India Private Limited, 2012.
3. Rajagopalan K., Storage Structures, Tata McGraw-Hill, New Delhi, 1998.
4. Krishna Raju N., Advanced Reinforced Concrete Design, CBS Publishers and Distributors, New Delhi, 1998.

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U13CETE66 **BRIDGE STRUCTURES**

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 : perform proportioning and design of bridges in terms of aesthetics, geographical location and functionality.

CO2 : understand the load flow mechanism and identify loads on bridges

CO3 : carry out a design of bridge starting from conceptual design, selecting suitable bridge, geometry to sizing of its elements.

CO4 : design prestressed concrete bridges

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S		S	M		S						M
CO2	M					S						M
CO3	M		S			S						M
CO4		S	S	M		S						M

INTRODUCTION **9**

Design of through type steel highway bridges for IRC loading - Design of stringers, cross girders and main girders - Design of deck type steel highway bridges for IRC loading - Design of main girders

STEEL BRIDGES **9**

Design of pratt type truss girder highway bridges - Design of top chord, bottom chord, web members - Effect of repeated loading - Design of plate girder railway bridges for railway loading - Wind effects - Design of web and flange plates - Vertical and horizontal stiffeners.

REINFORCED CONCRETE SLAB BRIDGES **9**

Design of solid slab bridges for IRC loading - Design of kerb - Design of tee beam bridges - Design of panel and cantilever for IRC loading

REINFORCED CONCRETE GIRDER BRIDGES **9**

Design of tee beam - Courbon's theory - Pigeaud's curves - Design of balanced cantilever bridges - Deck slab - Main girder - Design of cantilever - Design of articulation.

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PRESTRESSED CONCRETE BRIDGES **9**

Design of prestressed concrete bridges - Preliminary dimensions - Flexural and torsional parameters - Courbon's theory - Distribution coefficient by exact analysis - Design of girder section - Maximum and minimum prestressing forces - Eccentricity - Live load and dead load shear forces - cable zone in girder –Check for stresses at various sections - Check for diagonal tension - Diaphragms - End block - Short term and long term deflections.

Total hours = 45

TEXT BOOK: :

1. Johnson Victor D., "Essentials of Bridge Engineering", Oxford and IBH Publishing Co., New Delhi, 1990.
2. Ponnuswamy S., "Bridge Engineering", Tata McGraw-Hill, New Delhi, 1996.
3. Phatak D.R., "Bridge Engineering", Satya Prakashan, New Delhi, 1990.

U13CETE67 INDUSTRIAL STRUCTURES

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 : plan and prepare the layout for industrial buildings
CO2 : design for functional requirements
CO3 : design industrial structures like chimneys, silos and folded plates;
CO4 : design prestressed precast concrete units.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S				M	S						M
CO2	S		S			S						
CO3	S		S			S						M
CO4	S		S			S						M

PLANNING **9**

Classification of Industries and Industrial structures – General requirements for industries like cement, chemical and steel plants – Planning and layout of buildings and components.

FUNCTIONAL REQUIREMENTS **9**

Lighting – Ventilation – Accounts – Fire safety – Guidelines from factories act.

DESIGN OF STEEL STRUCTURES **9**

Industrial roofs – Crane girders – Mill buildings – Design of Bunkers and Silos

DESIGN OF R.C. STRUCTURES **9**

Silos and bunkers – Chimneys – Principles of folded plates and shell roofs

PREFABRICATION **9**

Principles of prefabrication – Prestressed precast roof trusses- Functional requirements for Precast concrete units

Total hours = 45

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TEXT BOOK:

1. Ramamrutham .S., " design of reinforced Concrete Structures", Dhanpat Rai Publishing Company, 2007.
2. Varghese P.C., " Limit State Design of Reinforced Concrete", Prentice Hall of India Eastern Economy Editions, 2nd Edition, 2003.
3. Bhavikatti S.S., " Design of Steel Structures", J.K. International Publishing House Pvt. Ltd., 2009.

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U13CETE68 COMPUTER AIDED DESIGN OF STRUCTURES

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1: implement ideas of computer aided design with advantages and demerits.

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M			M	S							M

INTRODUCTION **9**

Fundamentals of CAD - Hardware and software requirements -Design process - Applications and benefits.

COMPUTER GRAPHICS **9**

Graphic primitives - Transformations -Wire frame modeling and solid modeling -Graphic standards –Drafting packages

STRUCTURAL ANALYSIS **9**

Fundamentals of finite element analysis - Principles of structural analysis -Analysis packages and applications.

DESIGN AND OPTIMISATION **9**

Principles of design of steel and RC Structures -Applications to simple design problems – Optimisation techniques - Algorithms - Linear Programming – Simplex method

EXPERT SYSTEMS **9**

Introduction to artificial intelligence - Knowledge based expert systems -Rules and decision tables –Inference mechanisms - Simple applications.

Total hours = 45

TEXT BOOK:

1. Groover M.P. and Zimmers E.W. Jr., “CAD/CAM, Computer Aided Design and Manufacturing”, Prentice Hall of India Ltd, New Delhi, 1993.
2. Krishnamoorthy C.S.Rajeev S., “Computer Aided Design”, Narosa Publishing House, New Delhi, 1993.
3. Harrison H.B., “Structural Analysis and Design”, Part I and II Pergamon Press, Oxford, 1990.

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4. Rao S.S., “Optimisation Theory and Applications”, Wiley Eastern Limited, New Delhi, 1977.
5. Richard Forsyth (Ed), “Expert System Principles and Case Studies”, Chapman and Hall, London, 1989.

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Elective -7

U13GST002 TOTAL QUALITY MANAGEMENT

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1 - Understand quality concepts and philosophies of TQM
CO2 - Apply TQM principles and concepts of continuous improvement
CO3 - Apply and analyze the quality tools, management tools and statistical fundamentals to improve quality
CO4 - Understand the TQM tools as a means to improve quality
CO5 - Remember and understand the quality systems and procedures adopted

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M									W	S	M
CO2	M										S	M
CO3		S		M							S	M
CO4											S	M
CO5									M		S	

INTRODUCTION **9**

Definition of Quality, Dimensions of Quality, Quality costs, Top Management Commitment, Quality Council, Quality Statements, Barriers to TQM Implementation, Contributions of Deming, Juran and Crosby, Team Balancing

TQM PRINCIPLES **9**

Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Continuous Process Improvement,5S, Kaizen, Just-In-Time and TPS

STATISTICAL PROCESS CONTROL **9**

The seven tools of quality, New seven Management tools, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Concept of six sigma.

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TQM TOOLS **9**

Quality Policy Deployment (QPD), Quality Function Deployment (QFD), Benchmarking, Taguchi Quality Loss Function, Total Productive Maintenance (TPM), FMEA

QUALITY SYSTEMS **9**

Need for ISO 9000 and Other Quality Systems, ISO 9001:2008 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, ISO 14001:2004

Total hours = 45

Learning Resources:

1. Dale H.Besterfiled, "Total Quality Management", Pearson Education
2. James R.Evans & William M.Lidsay, "The Management and Control of Quality", South-Western (Thomson Learning), 2008.
3. Feigenbaum.A.V. "Total Quality Management", McGraw Hill
4. Oakland.J.S. "Total Quality Management", Butterworth – Hcinemann Ltd., Oxford
5. Narayana V. and Sreenivasan, N.S. "Quality Management – Concepts and Tasks", New Age International 2007.
6. Zeiri. "Total Quality Management for Engineers", Wood Head Publishers.

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U13GST003 **PRINCIPLES OF MANAGEMENT**

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1:Understand the concepts of management, administration and the evolution of management thoughts.

CO2:Understand and apply the planning concepts.

CO3:Analyze the different organizational structures and understand the staffing process.

CO4:Analyze the various motivational and leadership theories and understand the communication and controlling processes.

CO5:Understand the various international approaches to management

CO/PO MAPPING

CO/PO Mapping (S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									M		S	M
CO2									M		S	M
CO3									M		S	M
CO4									M		S	M
CO5									M		S	M

MANAGEMENT CONTEXT **9**

Management – Definition – Importance – Functions – Skills required for managers - Roles and functions of managers – Science and Art of Management –Management and Administration. Evolution of Classical, Behavioral and Contemporary management thoughts.

PLANNING **9**

Nature & Purpose – Steps involved in Planning – Forms of Planning – Types of plans – Plans at Individual, Department and Organization level - Managing by Objectives. Forecasting – Purpose – Steps and techniques. Decision-making – Steps in decision making.

ORGANISING **9**

Nature and Purpose of Organizing - Types of Business Organization - Formal and informal organization – Organization Chart – Structure and Process – Strategies of Departmentation– Line and Staff authority – Benefits and Limitations. Centralization Vs De-Centralization and Delegation of Authority. Staffing – Manpower Planning – Recruitment – Selection – Placement – Induction.

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DIRECTING & CONTROLLING **9**

Nature & Purpose – Manager Vs. Leader - Motivation - Theories and Techniques of Motivation.
Leadership – Styles and theories of Leadership.
Communication – Process – Types – Barriers – Improving effectiveness in Communication.
Controlling – Nature – Significance – Tools and Techniques.

CONTEMPORARY ISSUES IN MANAGEMENT **9**

Corporate Governance Social responsibilities – Ethics in business – Recent issues.
American approach to Management, Japanese approach to Management, Chinese approach to Management and Indian approach to Management.

Total hours = 45

TEXT BOOK: :

1. Tripathy PC And Reddy PN, "Principles of Management", Tata McGraw-Hill, 4th Edition, 2008.
2. Dinkar Pagare, "Principles of Management", Sultan Chand & Sons, 2000.
3. Kanagasapapathi. P (2008) Indian Models of Economy, Business and Management, Prentice Hall of India, New Delhi, ISBN: 978-81-203-3423-6.
4. G.K.Vijayaraghavan and M.Sivakumar, "Principles of Management", Lakshmi Publications, 5th Edition, 2009.
5. Harold Koontz & Heinz Weihrich, "Essentials of Management – An International perspective", 8th edition. Tata McGraw-Hill, 2009.
6. Charles W.L. Hill and Steven L McShane – Principles of Management, Tata Mc Graw-Hill, 2009.

U13GST004 **OPERATIONS RESEARCH**

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1- Apply linear programming model and assignment model to domain specific situations

CO2- Analyze the various methods under transportation model and apply the model for testing the closeness of their results to optimal results

CO3 - Apply the concepts of PERT and CPM for decision making and optimally managing projects

CO4 - Analyze the various replacement and sequencing models and apply them for arriving at optimal decisions

CO5- Analyze the inventory and queuing theories and apply them in domain specific situations.

CO/PO MAPPING

CO/PO Mapping

(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak

Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1					S						M	M
CO2					S						M	M
CO3					S						M	M
CO4					S						M	M
CO5					S						M	M

LINEAR MODEL **9**

The phases of OR study – formation of an L.P model – graphical solution – simplex algorithm – artificial variables technique (Big M method, two phase method), duality in simplex.

TRANSPORTATION AND ASSIGNMENT MODELS **9**

Transportation model – Initial solution by North West corner method – least cost method – VAM. Optimality test – MODI method and stepping stone method.

Assignment model – formulation – balanced and unbalanced assignment problems.

PROJECT MANAGEMENT BY PERT & CPM **9**

Basic terminologies – Constructing a project network – Scheduling computations – PERT - CPM – Resource smoothening, Resource leveling, PERT cost.

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REPLACEMENT AND SEQUENCING MODELS **9**

Replacement policies - Replacement of items that deteriorate with time (value of money not changing with time) – Replacement of items that deteriorate with time (Value of money changing with time) – Replacement of items that fail suddenly (individual and group replacement policies).

Sequencing models- n job on 2 machines – n jobs on 3 machines – n jobs on m machines, Traveling salesman problem.

INVENTORY AND QUEUING THEORY **9**

Variables in inventory problems, EOQ, deterministic inventory models, order quantity with price break, techniques in inventory management.

Queuing system and its structure – Kendall's notation – Common queuing models - M/M/1: FCFS/∞/∞ - M/M/1: FCFS/n/∞ - M/M/C: FCFS/∞/∞ - M/M/1: FCFS/n/m

Total hours = 45

TEXT BOOK:

1. Taha H.A., "Operation Research", Pearson Education
2. Hira and Gupta "Introduction to Operations Research", S.Chand and Co.2002
3. Hira and Gupta "Problems in Operations Research", S.Chand and Co.2008
4. Wagner, "Operations Research", Prentice Hall of India, 2000
5. S.Bhaskar, "Operations Research", Anuradha Agencies, Second Edition, 2004

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U13GST006 PRODUCT DESIGN AND DEVELOPMENT

L	T	P	C
3	0	0	3

COURSE OUTCOMES

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

CO1-Understand the process to plan and develop products

CO2-Understand the process of collecting information and developing product specifications

CO3-Understand the concept generation, selection and testing processes

CO4-Understand the concepts of product architecture, industrial design and design for manufacture

CO5-Understand the basics of prototyping, economic analysis and project planning and execution processes

CO/PO MAPPING

CO/PO Mapping												
(S/M/W indicates strength of correlation) S-Strong, M-Medium, W-Weak												
Cos	Programme Outcomes(POs)											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1									M		M	M
CO2									M		M	M
CO3									M		M	M
CO4									M		M	M
CO5									M		M	M

INTRODUCTION - DEVELOPMENT PROCESSES AND ORGANIZATIONS - PRODUCT PLANNING 9

Characteristics of successful product development to Design and develop products, duration and cost of product development, the challenges of product development.

A generic development process, concept development: the front-end process, adapting the generic product development process, the AMF development process, product development organizations, the AMF organization.

The product planning process, identify opportunities. Evaluate and prioritize projects, allocate resources and plan timing, complete pre project planning, reflect all the results and the process.

IDENTIFYING CUSTOMER NEEDS - PRODUCT SPECIFICATIONS 9

Gathering raw data from customers, interpreting raw data in terms of customer needs, organizing the needs into a hierarchy, establishing the relative importance of the needs and reflecting on the results and the process.

Specifications, establish specifications, establishing target specifications setting the final specifications.

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CONCEPT GENERATION - CONCEPT SELECTION - CONCEPT TESTING 9

The activity of concept generation clarify the problem search externally, search internally, explore systematically, reflect on the results and the process.

Overview of methodology, concept screening, concept scoring, caveats.

Purpose of concept test, choosing a survey population and a survey format, communicate the concept, measuring customer response, interpreting the result, reflecting on the results and the process.

PRODUCT ARCHITECTURE - INDUSTRIAL DESIGN - DESIGN FOR MANUFACTURING 9

Meaning of product architecture, implications of the architecture, establishing the architecture, variety and supply chain considerations, platform planning, related system level design issues.

Assessing the need for industrial design, the impact of industrial design, industrial design process, managing the industrial design process, is assessing the quality of industrial design.

Definition, estimation of manufacturing cost, reducing the cost of components, assembly, supporting production, impact of DFM on other factors.

PROTOTYPING - PRODUCT DEVELOPMENT ECONOMICS - MANAGING PROJECTS 9

Prototyping basics, principles of prototyping, technologies, planning for prototypes.

Elements of economic analysis, base case financial mode,. Sensitive analysis, project trade-offs, influence of qualitative factors on project success, qualitative analysis.

Understanding and representing task, baseline project planning, accelerating projects, project execution, postmortem project evaluation.

Total hours = 45

TEXT BOOK: :

1. Product Design and Development: Karl. T. Ulrich, Steven D Eppinger,. Irwin McGrawHill.
2. Product Design and Manufacturing: A C Chitale and R C Gupta, PHI
3. New Product Development: Timjones. Butterworth Heinmann,, Oxford. UCI.
4. Product Design for Manufacture and Assembly: Geoffery Boothroyd, Peter Dewhurst and Winston Knight.

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