KUMARAGURUCOLLEGE OF TECHNOLOGY

(An Autonomous Institution Affiliated to Anna University, Chennai)

COIMBATORE – 641049

REGULATIONS 2014

CURRICULUM AND SYLLABUS

III - VIII Semesters

BE CIVIL ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING

Signature of the Chairman BOS/Civil Engineering

REGULATIONS2014

B.E./B.Tech Programmes

CREDITBASED SYSTEM (CBS)

These regulationsareapplicabletostudentsadmittedintoB.E./B.TechProgrammesfromtheacademicyear 2014 –2015.

Preamble

India has become a permanent member of Washington Accord. As an educational institution we are adopting the "Outcome Based Education (OBE) Process" to ensure that the required outcomes (knowledge, skills and attitude / behavior) are acquired by the learners of a programme. With the OBE process in mind, our educational system has been framed to provide the needful scope for the learners through the CBS that will pave the path to strengthen their knowledge, skills and attitude / behavior.

TheCBSoffersflexibilitytolearnerswhichincludelargenumberofelectives,flexiblepaceforearningcredits and auditcourses.

TheObjectives of CBS

- To offer the right blend of Core, General, Engineering Sciences & Technical Arts and Basic Science courses to facilitate the learners to acquire the needful outcomes.
- To facilitate students to earn extra credits.
- To elevate the level of knowledge, skills and attitude/behavior on par with the students across the globe.
- To offer Programmes in an academic environment with purpose, the needful foundations, breadth (exposure for optimal learning) and professionalism.

Signature of the Chairman BOS/Civil Engineering

1.DefinitionsandNomenclature

1.1University

Universitymeans the affiliating university, ANNAUNIVERSITY, CHENNAI

1.2Institution

Institution means KUMARAGURU COLLEGE OF TECHNOLOGY, Coimbatore,anautonomous institution affiliated toAnnaUniversity, Chennai

1.3HeadoftheInstitution

HeadoftheInstitutionmeansthePrincipalofthe institution who is responsibleforall academicactivitiesandforthe implementationofrelevant rulesofthis regulation.

1.4Programme

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

1.5Branch

Branch meansspecialization or discipline of B.E / B. Tech Degree Programme, such as CivilEngineering, Textile Technology,etc.

1.6Course

Everypaper / subject of study offered by variousdepartments iscalledacourse.(E.g.Operations Research)

1.7Curriculum

Thevarious components / subjects / papers studied in each programmethatprovidesappropriate outcomes (knowledge, skills and attitude/behavior)inthechosen branchiscalledcurriculum.

Signature of the Chairman BOS/Civil Engineering

1.8Credits

Coursework is measured in units called credit hours orsimply credits.Thenumberofperiodsorhoursofacourseperweek isthenumberofcreditsforthat course.

Thedetail of credit allocation isgivenin Table 1.

Table 1

NatureoftheCourse	HoursperWeek	Credits
Theory	3	3
	3+1 (Theory+ Tutorial)	4
Laboratory	2or3	1
SpecialLaboratory	4to6	2
Theory+Laboratory	2(Theory)+2 or 3(Laboratory)	3
Theory+Laboratory	3 (Theory)+2(Laboratory)	4
ProjectWork(Eighth Semester)	18 (Minimum)	6

1.9 Totalcredits

Thetotal number of credits a student earns during thecourse ofstudyperiodiscalledthetotalcredits.AStudentmustearn **185 – 190** credits (varies with the branch) for successful completionoftheB.E./B.Techregular programme(**Eight** semesters)and**138-140**creditsforlateralentry(**Six**semesters).

2. Admission

2.1 FirstYearB.E./B.TechandLateralEntry

The norms for admission, eligibility criteria such as marks, numberofattempts,physicalfitnessandmode ofadmission willbeasprescribedbytheUniversity.

Signature of the Chairman BOS/Civil Engineering

2.2 For studentsreadmittedfrom**2009**Regulations and **2013** Regulations (due to discontinuation for different reasons) **to 2014** regulation, a normalization(equivalent) coursecommitteewillbeconstitutedbythePrincipaltodecide theCoursesexemptedandadditionalCoursestobeappeared bytheconcernedstudent.

3. BranchesofStudy

ThefollowingbranchesofstudyapprovedbytheUniversityareoffered bythe institution.

B.E.DegreeProgrammes

- Aeronautical Engineering
- Automobile Engineering
- Civil Engineering
- ComputerScienceandEngineering
- ElectronicsandCommunicationEngineering
- ElectricalandElectronicsEngineering
- ElectronicsandInstrumentationEngineering
- MechanicalEngineering
- MechatronicsEngineering

B.Tech Degree Programmes

- Biotechnology
- InformationTechnology
- TextileTechnology
- FashionTechnology

4. Curriculum Structure

4.1 According to the National Board of Accreditation (NBA), India, for each undergraduate (UG) Programme, the curriculum has to be evolved after finalizing the Programme Educational Objectives (PEOs) and the corresponding Programme Outcomes (POs). The POs are to be specifically evolved by

Signature of the Chairman BOS/Civil Engineering

referring to the twelve Graduate Attributes (GAs) listed by NBA for undergraduate programmes. The curriculum that evolves should broadly ensure the achievement of the POs and thus the PEOs of the programme.

4.2 All India Council for Technical Education (AICTE), New Delhi in its "Model scheme of instructions and syllabus for UG engineering degree programmes" published during October 2012 has prescribed the following curriculum structure for UG E&T degree programmes.

S.No	**Course Work – Subject Area**	**Range of Total Credits (%)**		**Suggested Breakdown of Credits (for total = 176) (No.)**
		Minimum	Maximum	
1.	Humanities and Social Sciences (HS) including Management;	5	10	14
2.	Basic Sciences (BS) including Mathematics, Physics, Chemistry, Biology;	15	20	30
3.	Engineering Sciences (ES), including Materials, Workshop, Drawing, Basics of Electrical/Electronics/Mechanical/Computer Engineering, Instrumentation;	15	20	30
4.	Professional Subjects-Core (PC), relevant to the chosen specialization/branch; (May be split into Hard (no choice) and Soft (with choice), if required ;)	30	40	50
5.	Professional Subjects – Electives (PE), relevant to the chosen specialization / branch;	10	15	20
6.	Open Subjects – Electives (OE), from other technical and / or emerging subject areas;	5	10	12
7.	Project Work, Seminar and/or Internship in Industry or elsewhere	10	15	20
8.	Mandatory Courses (MC);	Limited to less than 5% of the maximum		8

Signature of the Chairman
BOS/Civil Engineering

		permissible courses / credit load	

The suggested Course Work (=176 Credits, at 22/Semester on an average with built-in flexibility of +/- 20% as indicated earlier) in previous table needs to be completed successfully by a student to qualify for the award of the UG E&T Degree from the concerned University/Institution. A widely accepted plan for sequencing the Course Work can be as in following table.

Typical Sequencing Plan for Courses at UG E&T Degree Programmes

Semesters	Subject Area Coverage
I – II	HS, BS and ES Courses common for all Branches; Mandatory Courses;
III-IV	HS, BS and ES Courses common for all Branches (to be continued); Also, Mandatory Courses (to be continued, if required); PC (Hard/Soft) Courses in two/three groups (likeElectrical, Non-Electrical); area wise Orientation; Add-On Courses;
V-VII	PC (Hard/Soft), PE and OE Courses; Branch-wise Orientation; Add-On Courses; Seminar;
VIII	PE and OE Courses; Project work and Dissertation, Internship, Seminar: Add-On Courses; Final wrap-up of Programme;

The mandatory courses for all the programmes prescribed by AICTE are shown in the following table.

Mandatory Courses (MC)

S.No	Course No.	Course Title	Hrs/Wk L: T: P	Units	Preferred Semester
1.	MC 01	Technical English	3: 0: 0	3	I/II
2.	MC 02	Value Education, Human Rights and Legislative Procedures	3: 0: 0	3	I/II
3.	MC 03	Environmental Studies	3: 0: 0	3	III/IV
4.	MC 04	Energy Studies	3: 0: 0	3	III/IV
5.	MC 05	Technical Communication & Soft Skills	3: 0: 0	3	V/VI
6.	MC 06	Foreign Language	3: 0: 0	3	V/VI

Signature of the Chairman
BOS/Civil Engineering

NOTE: As and when AICTE brings in a new version of the "Model scheme of instructions and syllabus for UG engineering degree programmes", the existing version will be superseded by the new one.

4.3SemesterCurriculum

Thecurriculum of each semester shall normally be ablendof theory courses not exceeding **7** and practical courses not exceeding**4.**Thetotalnumberofcoursespersemestershall notexceed**10**.

4.4 MediumofInstruction

Themediumofinstructionforlectures,examinationsandprojectworkisEnglish,exceptforlanguagecoursesotherthanEnglish.

5. DurationoftheProgramme

5.1 EachacademicyearwillconsistofTwosemestersof**90**working dayseach

5.2 Thenormalandmaximumpermissiblenumberof semesters foreachprogrammeisas given in**Table 2**.

Table2

Category	NumberofSemesters	
	Normal	**MaximumPermissible**
Regular	8	14
LateralEntry	6	12

6. Class advisor and WardCounselor (Mentor)

6.1 Class advisor

HeadoftheDepartment willallot one faculty member to be the class advisor for a particular batch of students throughouttheirperiodof study. The role of class advisors is as follows: i) To motivate and closely monitor the performance of the students. ii) To build a strong alumni base for the institution by maintaining a meaningful rapport with students and parents. iii) To maintain all important documents of

Signature of the Chairman BOS/Civil Engineering

the students for reference/inspection by all committees. iv) To work closely with the ward counselors on matters related to students attached to the ward counselors and update the green cards (overall data base) of the students of the class.

6.2 WardCounselor (Mentor)

By guiding and counseling students, teachers can create a greater sense of belongingness amongst our student community. Tohelp the students in planning their courses and forgeneral guidanceontheacademicprogramme,theHeadoftheDepartment willallotacertainnumberofstudentstoateacherofthedepartment who shallfunctionaswardcounselorthroughouttheirperiodof study.

The ward counselor will monitor the courses undertakenby the students, check attendance and progressofthestudentsandcounselthem periodically. The ward counselors should ensure that each student is made aware of the various options for growth, students are monitored and guided to become overall performers and students select and work for career choices of their interest. Theward counselors shall update and maintain the ward counselor record of each student attached to them. Theward counselors shall also help the class advisors to update the green card of students attached to them.

Theward counselormayalsodiscusswiththe classadvisorandHoDand parentsabouttheprogressof thestudents.

7. ClassCommittee

7.1 Everyclasswillhaveaclasscommitteeconstitutedbythe HoD. Themembersoftheclasscommitteewillbeasfollows:-

1. Chairperson(ateacherwhoisnotnormallyteachingany courseforthe class)

2. Allteachershandlingcoursesfortheclass

3. Students(aminimumof 6 consistingof 3 boysand 3 girls onpro-ratabasis)

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

7.2.1 Clarify theregulationsoftheprogrammeandthedetails ofrulestherein.

7.2.2 Informthestudentrepresentatives,theacademicscheduleincludingthedatesofassessmentsandthesyllab

Signature of the Chairman BOS/Civil Engineering

us coverageforeachassessment.

7.2.3 Inform the student representativesthedetailsofRegulations regarding weightage used for each assessment.Inthecaseofpracticalcourses(laboratory/drawing/projectwork/seminaretc.)the breakup of marksforeachexperiment/exercise/moduleofwork, should beclearlydiscussed intheclasscommittee meetingandinformedto the students.

7.2.4 Analyze the performanceof the students of the class aftereachtestandinitiatestepsfor improvement.

7.2.5 Identifyslowlearners,ifany,andrequestthe teachers concernedtoprovideadditionalhelp/guidance/coaching tosuchstudents.

7.2.6 Discussandsortoutproblemsexperiencedbystudents intheclassroomandinthe laboratories.

7.3 Theclasscommitteeshallbeconstitutedwithinthefirstweek ofcommencement ofanysemester.

7.4 Thechairpersonoftheclasscommitteemayinvitethe class advisor/wardcounselorandthe HeadoftheDepartmentto themeetingoftheclasscommittee

7.5 ThePrincipalmayparticipateinanyclasscommitteemeeting.

7.6 Thechairpersonisrequiredtopreparetheminutesofeverymeeting,submitthesamethroughtheHeadoftheDepartmenttothePrincipalwithintwodaysofthemeetingandarrangetocirculatethesameamongthestudentsandteachersconcerned. Pointsrequiringactionbythemanagementshallbebroughtto thenoticeof the managementbythePrincipal.

7.7 The class committee meetings are to be conducted as scheduled below.

Meeting 1	Within one week from the date of commencement of the semester
Meeting 2	One week before the 2nd internal test
Meeting 3	One week before the 3rd internal test

During thefirstmeetingoftheclasscommittee, thestudents are to be informed aboutthenatureandweightageof assessmentsaspertheframeworkoftheRegulations.During these meetings the student representativesshallmeaningfullyinteractandexpressopinions andsuggestionsof thestudentsof

Signature of the Chairman BOS/Civil Engineering

theclasstoimprovethe effectiveness of the teaching-learning process.

8. CourseCommitteeforCommonCourses

Each common theorycourseofferedtomorethanoneclass/ branchshall have a Course Committee comprising all the teachers teaching the common course with one of them nominatedas Course Coordinator.

Sl.No	Nature of common course	Person responsible for forming course committee and nominating course coordinator
1.	For common course / course handled in a particular department	Respective HoD
2.	For common courses handled in more than one department	Controller of Examinations (CoE) to put up the course committee details to the Principal, get the same approved and intimate the concerned faculty

Thecoursecommitteewill ensurethatacommonquestion paperispreparedforthetests/ examsanduniformevaluationiscarriedout.TheCoursecommittee willmeeta minimumof3timesineachsemester.

The course committee should meet at-least 3 times in each semester The schedule for the course committee to meet is as follows.

Meeting 1	Before one week of the start of the semester
Meeting 2	One week before internal test 2
Meeting 3	One week after 3rd internal test

9. RequirementsforCompletionofaSemester

9.1 Astudentwhohasfulfilledthefollowingconditions shallbedeemedtohavesatisfiedtherequirementsfor completionof asemester.

Signature of the Chairman BOS/Civil Engineering

9.1.1 Students should have earned a minimum of **80%** overall attendance in theory and laboratory courses. If a student fails to secure the minimum overall attendance of **80%**, he/she will not be permitted to appear for the current end semester examination and also 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, NCC activities, co-curricular and extra-curricular activities.

Note: Faculty members have to mark attendance as ***'present'*** only for those students who are ***physically present*** in the class.

9.1.2 A maximum of **10%** concession in the overall attendance can be considered for students on medical reasons.

9.1.3 The need to award On Duty (OD) is eliminated as the student shall benefit from the 20% margin in attendance to take part in co-curricular and extra-curricular activities.

Apart from 20% margin in attendance, an additional 5% relaxation in attendance shall be provided after being recommended by a central committee constituting the Class Advisor, an ASP/AP from the Department and two Professors nominated by the Principal for the following categories.

i) NCC, NSS

ii) Sports (in the beginning of the year the Physical Director should give the list of students who are in the institution team and who will represent the institution in sports events)

iii) Design competitions-state level and above

A student shall not benefit from the above privilege if the student has been recommended for disciplinary action due to inappropriate or disruptive behavior. Minimum 80% overall attendance will be the only attendance eligibility to appear for end semester exams for such students.

9.1.4 The days of suspension of a student on disciplinary grounds will be considered as days of absence for calculating the overall percentage of attendance.

10. Requirements for Appearing for End Semester Examination

Signature of the Chairman BOS/Civil Engineering

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.9

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 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.

10.3. There will be no minimum CAM requirement in a course from 2014 regulation onwards to register for the end semester examinations. CAM will be earned by a student as follows:

Theory Courses:

Internal marks will be awarded by conducting Three Internal Tests and assignments for all theory courses.

Practical Courses:

Internal marks will be awarded by:

i) "Continuous assessment" of the performance of the student in each lab exercise/experiment.

ii) Conducting one model practical exam for every practical course.

Note: The students will be provided with a laboratory workbook and this will be the only document the student will maintain / get assessed periodically.

Retests:

A student who has not appeared for any one of the three internal tests (theory courses) shall be permitted to appear for a Retest (only one retest is permitted) only under the following two cases:

Case 1: Automatic exemption: Participation in NCC, NSS, Sports (in the beginning of the year the Physical Director should give the list of students who are in the institution team and who will represent the institution in sports events) or demise of immediate family members.

Signature of the Chairman BOS/Civil Engineering

Case 2: Any other reasons: A committee constituting 1 professor, 1 ASP/AP and Class Advisor will scrutinize the case and submit their recommendations to the HoD, who in turn will forward the proposal to the Principal, get the approval and conduct retest. In case the retest is required by more than 10% of the students of a section, a review by a central committee and approval is required.

10.5 If a student is prevented to register in the end semester examinationsforwantof minimum overall attendance , the studentisrequired torepeattheincompletesemesterinthe subsequent academicyear.

10.5.1 If a student fails to clear a course in four attempts in a particular course through supplementary/end semester exams, the CAM of that course is nullified in the fifth attempt and the student will be allowed to appear for end semester examination and based on the student's performance in the end semester exam alone the result will be declared (that is, the student has to score a minimum of 50 out of 100 in the end semester exam for being declared to have passed in that course).

11. ProvisionforWithdrawalfromExamination

Astudent may, for valid reasons (medically unfit / unexpectedfamily situations),begrantedpermissiontowithdraw (after registering for theexaminations)fromappearingforanycourseorcourses in the endsemester examination. This facility can be availed only once during theentiredurationofthedegree programme. Withdrawal of applicationwillbevalidonlyifthestudentis,otherwise, eligibleto writetheexaminationandtheapplicationfor withdrawalismade priortotheexaminationinthe concerned courseorcourses.The applicationfor withdrawalshouldberecommendedbytheHeadof the DepartmentandapprovedbythePrincipal.Withdrawalwill not beconsideredasappearanceforthepurposeof classificationof degreeunder**Clause19.**

12. SystemofEvaluation

12.1 General Guidelines

Thetotalmarksforeachcourse(TheoryandPractical)willbe 100,comprising two components as given below.

Signature of the Chairman BOS/Civil Engineering

a) ContinuousAssessmentMarks(CAM)–50 Marks

b) EndSemesterExam (ESM)–50Marks

12.2 Marks distribution

12.2.1Procedure for award of Continuous Assessment

Marks(CAM)isas follows:

i. Theorycourses

The distribution of marks for theory courses is given in**Tables3 and 4**.

Table3

S. No.	Components for CAM	Syllabus Coverage for the test	Duration of the test in Hrs.	Marks (max.)	Question Paper Pattern (Three patterns have been listed. The selection of the pattern to be decided by the faculty handling the course)
01.	Internal Test - I	First 30 to 40 % of the syllabus	2	40 (equal weightage for all the three tests)	**PATTERN – 1** **Part A** - 10x1 = 10 Marks Q.No.-1 to 10 Multiple choice questions (multiple choice, multiple selection, sequencing type, match the following, assertion – reason type) **Part B** - 05x2 = 10 Marks Q.No.-11 to 15 (Short Answer) **Part C** - 03x10 = 30 Marks Q.No.-16 - compulsory Q.No.-17, 18,19 (any two to be answered) **Case studies, analytical questions, design or evaluation or analysis or application oriented questions to be given in part C** **Total = 50 Marks** ---------- **PATTERN - 2**
02.	Internal Test - II	Next 30 to 40 % of the syllabus	2		
03.	Internal Test - III	Last 30 to 40 % of the syllabus	2		
04.	Retest (only one)	First 15 to 20 % and Last 15 to 20 % of the syllabus	2	Same weightage as **one** internal test	

Signature of the Chairman
BOS/Civil Engineering

					Multiple choice questionsonly 50x1 = 50 Marks Q.No.-1 to 50 (multiple choice, multiple selection, sequencing type, match the following, assertion – reason type) **Total = 50 Marks** --- **PATTERN – 3** **Part A** - 20x1 = 20 Marks Q.No.-1 to 20 Multiple choice questions (multiple choice, multiple selection, sequencing type, match the following, assertion – reason type) **Part B** - 2x15 = 30 Marks Q.No.-21- Compulsory Q.No.-22 and 23 (any one to be answered) **Case studies, analytical questions, design or evaluation or analysis or application oriented questions to be given in part B** **Total = 50 Marks** --- **Note:** *HOTS* of Bloom's taxonomy to be followed where applicable in all the patterns
05.	Assignment	-	-	10	Process for awarding marks for assignments shall be based on ***any one*** of the following: 2 Assignments 1 Assignment + 1 presentation 1 Assignment + 2 Written Objective test 1 mini project
06.	Attendance (Refer clause-12.2.1(iv))	Attendance will not contribute to CAM of a course	**--**		
Total				**50**	

Pattern for end semester examination:

Table4

Signature of the Chairman BOS/Civil Engineering

S. No.	Exam	Syllabus Coverage for the exam	Duration of the exam in Hrs.	Marks (max.)	Question Paper Pattern
01.	End Semester Exam	Full Syllabus	3	50	**Part A** - 10x1 = 10 Marks Q.No.-1 to 10 Multiple choice questions (multiple choice, multiple selection, sequencing type, match the following, assertion – reason type) **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 26 (any four to be answered) **Case studies, analytical questions, design or evaluation or analysis or application oriented questions to be given in part C** **Note:** *HOTS* of Bloom's taxonomy to be followed where applicable **Total = 100 Marks**
Total				**50**	

ii. PracticalCourses

Everypractical exercise / experiment in all practical courseswill be evaluated based on the conduct of exercise/ experiment andrecordsmaintainedbythestudents.Therewillbe one modelpractical examination.

Signature of the Chairman BOS/Civil Engineering

Thecriteriaforawardingmarksforinternalassessmentisgivenin **Table 5** .

Table 5

Items	Marks(Maximum)
Continuous assessment #	30
Model practical exams	20
Attendance{Refer-12.1(iv)}	-
Total	**50**

Continuous assessment norms (for each exercise/experiment):

Parameter	Range
1.Preparation	10 to 20%
2.Conduct of the exercise/experiment	20 to 30%
3.Observations made (data collection)	10 to 30%
4.Calculations, inferences, result	10 to 30%
5. Viva-voce	10 to 20%
Total	**100**

iii) (a) ProjectWork

The project will be carried out in two phases as follows: Phase-I in 7th semester and Phase-II in 8th semester. Separate project reports are to be submitted for phase-I and phase-II. Phase-I will purely be assessed internally.

The evaluation of the project work done by the student willbecarriedoutbyacommitteeconstituted bythe

Signature of the Chairman BOS/Civil Engineering

Principal on the recommendation of HoD. For eachprogramme onesuchreviewcommittee will be constituted.Therewillbe3assessments(eachfor100mark maximum) during the semesterbythereviewcommittee. Thestudentshallmakeapresentationonthe progressmadebyhim/herbeforethe committee. Therewillbeequalweightageforall the threeassessments.

iii) (b) TechnicalSeminar&MiniProject:

Thesecourseswillbeevaluatedinternally

iv)Attendanceand assessment record

Every teacher is required to maintain an 'ATTENDANCEANDASSESSMENT RECORD' foreachcoursehandled, whichconsistsofstudentsattendancein eachlecture/practical/ projectworkclass,thetest marksandtherecordofclasswork(topicscovered).ThisshouldbesubmittedtotheHeadof theDepartmentperiodically (at least three times in a semester) for checking the syllabus coverage and therecords 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 submitted to the Principal for verification. After such verification, these records will be kept in safe custody by the respective HoD for five years.

Minimum overall attendance of 80% will be an eligibility criterion to take up end semester examinations and attendance will not contribute to CAM of a course.

12.2.2End Semester Examination

(a) Theory Courses

TheEndSemesterExaminationfortheory courses will beconductedwiththe pattern ofQuestionPaper anddurationas stated in Table 3(b) under clause 12.2. The evaluationwillbefor100**marks**. However, thequestion paper pattern for courses in engineeringgraphicsandmachinedrawingwillbedesigneddifferently tosuitthespecificneedofthe courses.

(b) Practical Courses

Endsemesterexaminationforpracticalcourses willbe conducted jointly by one internal examiner and oneexternal examiner appointed by the Controller of Examinations withtheapprovalofthePrincipal.

Theevaluation will be for **100**marksandtheweightage forEndSemesterPracticalCoursewill be**50.**

Signature of the Chairman BOS/Civil Engineering

(C) Question Paper setting (ESM)

50% oftheory courses in a semester will be randomly selected for setting question papers by External Examiners with sound knowledge in Revised Bloom's Taxonomy 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.

12.3Malpractice

Ifa student indulges in malpractice in any internal test /endsemesterexamination,he/ sheshallbe liableforpunitiveactionasprescribed by the University.

12.4Supplementary Examination

The arrear course (practical / theory) examinations of ODD semesters will be conducted soon after the publication of ODD semester regular exam (Nov / Dec) results. Similarly the arrear course examinations of EVEN semesters will be conducted soon after the publication of EVEN semester regular exam (April / May) results. Failed candidates in regular examinations **should compulsorily register**for all thepractical / theorycourses in the supplementaryexaminations.

The institution will conduct only the exams for the odd semester courses (one regular exam + one supplementary exam for arrears of the odd semesters) during November / December and will conduct only the exams for the even semester courses (one regular exam + one supplementary exam for arrears of the even semesters) during April / May of an academic year.

Students who have completed the eighth semester will be eligible for attending the **special supplementary exam** for all semester arrear papers (from 1^{st} to 8^{th} semesters) in the even semester examination session soon after their eighth semester regular examination results. Students who have **more than six arrears are not eligible** to appear for the special supplementary exam.

Signature of the Chairman BOS/Civil Engineering

ControllerofExamination(CoE)willpublishaschedule ofsupplementary examinations after the last date ofregistering fortheexaminations. Thepatternofevaluation willbethesameasthatofend semesterexaminations.

The revaluation of answer script will not be applicable for supplementary exam. However challenge of evaluation of answer script is allowed. The Arrear examination will be termed as supplementary examinations and such appearance in supplementary exam will be treated as another attempt and will be reflected in the grade sheet

Note: Refer clause 14 for procedure for re-totaling / revaluation / challenge of evaluation

12.5 A student whohasappearedandpassedanycourse isnot permittedtore-enroll/reappearinthecourse/ examforthe purposeofimprovementofthegrades.

13. PassMinimum

13.1 Pass minimum for each theory, practical courses and project workis

- **50%** intheend semesterexaminations
- **minimum 50%** of the grand total of continuousassessment marks and

end semesterexaminations marks put together

13.2 Forstudentsscoringlessthanthepassingminimummarksin the end semester examinations, the term "**RA**" against the concernedcoursewillbeindicated in thegradesheet. The student hastoreappearinthesubsequent examinationsforthe concernedcourseasarrears.

Fora student who is absent for theory / practical / projectviva- voce,theterm **"AB"** willbeindicatedagainstthecorresponding course. Thestudentshouldreappear fortheendsemester examination ofthatcourseasarrearinthesubsequent semester.

Theletter grade **"W"**will be indicated for the courses forwhich the studenthasbeengrantedauthorizedwithdrawal(**refer clause11**).

14. MethodsforRedressal ofGrievancesinEvaluation

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

Signature of the Chairman BOS/Civil Engineering

Table6

Note: All applications to be made to CoE along with the payment of the prescribed fee.

Sl.No.	RedressalSought	Methodology	
		Regular exam	**Arrear exam**
1.	Re totaling	Apply for photo copy of answer book / Then apply for re totaling	Apply for photo copy of answer book / Then apply for re totaling
		(within 5daysofdeclaration ofresult)	
2.	Revaluation	Apply for photo copy of answer book / Then apply for revaluation after course expert recommendation	**Not permitted**
		(within 5daysofdeclaration ofresult)	
3.	Challenge of evaluation	Apply for photo copy of answer book / Then apply for revaluation after course expert recommendation / Next apply for challenge of evaluation	Apply for photo copy of answer book / Then apply for challenge of evaluation after course expert recommendation
		(within 3daysof publication of revaluation results)	

Theseareapplicableonlyfortheorycoursesinregularand arrearendsemesterexaminations.

14.1 Challengeof Evaluation

a) AstudentcanmakeanappealtotheCoEforthereview ofanswerscriptsafterpayingthe prescribedfee.

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

c) Thefacultywhohadhandledthesubjectwillevaluatethe scriptandHoDwillrecommend.

d) ACommitteeconsistingof2expertsappointedbyCoE willreviewanddeclaretheresult.

Signature of the Chairman BOS/Civil Engineering

e) Iftheresultisinfavourofthestudent,thefeecollectedwill berefundedtothestudent.

h) ThefinalmarkwillbeannouncedbyCoE.

15. ClassificationofPerformance

Classification of performance of students in the examinations pertainingtothecoursesinaprogrammeis doneonthebasisof numericalvalueofCumulativeGrade PointAverage**(CGPA).**The conceptof**CGPA**isbasedon Marks,Credits,GradeandGrade pointsassignedfordifferentmarkranges.**Table7**showstherelation between the rangeofmarks,GradesandGradepointsassigned against each course.

Table 7

RangeofMarks	Grade	GradePoints (GP)
100-90	S–Outstanding	10
89-80	A–Excellent	9
79-70	B- VeryGood	8
69-60	C- Good	7
59-55	D–Fair	6
54–50	E–Average	5
<50	RA	0
Withdrawal from examination	W	-
Absent	AB	-

15.1 SemesterGradePointAverage(SGPA)

On completion of a semester, each student is assigned a SemesterGradePointAveragewhichis computedasbelowforallcoursesregisteredbythestudentduringthatsemester.

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_i istheGradePointearnedbythestudentforthat course.

Signature of the Chairman BOS/Civil Engineering

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)** upto that point of time.

Cumulative Grade Point Average = $\sum(C_i \mathbf{x}\ GP_i) / \sum C_I$

Where C_i is the credit for each course in each of the completed semesters at that stage and GP_i 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 No separate grade sheet for supplementary examination/special supplementary examination will be issued to the students by the COE after the publication of supplementary examination/special supplementary examination result.

The result of the supplementary examination will get reflected in the subsequent semester grade sheet. The result of the special supplementary examination will get reflected only in the consolidated statement of grade (that is, consolidated grade sheet).

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 a semester/year for valid reasons (such as accident or hospitalization due to prolonged ill health) and wishes 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.

Signature of the Chairman BOS/Civil Engineering

Theapplicationshallbesubmittednotlaterthanthelastdateforregisteringforthesemesterexaminationsinthatconcerned semester. Breakofstudyispermittedonlyonce duringtheentireperiodofthedegreeprogramme.

17.2 Thestudentpermittedtorejointheprogrammeafterthebreakshallbegovernedbytherulesandregulationsinforceatthe time of rejoining.

17.3 The duration specified for passing all the courses for thepurposeofclassificationofdegree(vide Clause**19**)shallbeincreasedbytheperiodof such breakofstudypermitted.

17.4 Ifastudentisdetainedforwantofrequisiteattendance,progressandgoodconduct,theperiodspentinthatsemester shall not be considered as permitted Break of Study and Clause 17.3isnotapplicableforthiscase.

18. EligibilityfortheAwardofDegree

A studentshall be declared to be eligible for the award oftheB.E./ B. Tech. Degree provided the student has successfullycompleted the course requirements and has passed all theprescribedexaminationsinallthe Eightsemesters**(Six**semesterforlateralentry)withina maximumperiodof**7**years(**6**yearsforlateral entry) reckoned from the commencement of the first semesterto whichthecandidatewasadmitted.

19. ClassificationofDegree

The degree awarded to eligible students will be classified asgiveninTable8.

Table8

S.No.	ClassAwarded	Criteria
01.	Firstclasswith distinction	a)Passingoftheexaminations ofallthe coursesinall Eightsemesters(forregular)andall Sixsemesters (forlateralentry)inthefirstappearance. b)CGPA>8.5

Signature of the Chairman
BOS/Civil Engineering

02.	Firstclass	a)Passingoftheexaminations ofallthecoursesinallEightsemesters(forregular)andallSixsemesters(forlaterale ntrystudent) withinamaximumofTensemesters forregularandamaximum ofEightsemestersforlateralentrystudents. b)CGPA>6.5
		a)Allotherstudents(notcoveredinclausesatS.No.1&2underClause19)whoqualif yfortheaward of thedegree(videclause18)shall bedeclaredtohavepassedthe examinationinSecondClass.

Note: A student who is absent for the end semester examination in a course / project work Viva Voce after having registered for the same will beconsidered to have appeared for that examination for the purpose of classification.

20. AwardofDegree

TheawardofDegree to all eligible students willbeapprovedbytheAcademicCouncilof the institution. The degreewillbeissuedbyAnnaUniversity Chennai. The consolidated Grade Sheet will be issued byinstitution.

21.IndustrialVisit

Everystudentisexpectedtoundertakeone local Industrialvisit during the 2nd, 3rd and 4th year of theprogramme.TheFaculty AdvisorinconsultationwiththeHeadoftheDepartmentwillorganize thevisit.Faculty shouldaccompany thestudentsduringIndustrial visits.

22. PersonalityandCharacterDevelopment

Allstudents shall enroll, on admission, in any one of thepersonality andcharacterdevelopmentprogrammes(NCC/NSS/NSO/YRC)

Signature of the Chairman BOS/Civil Engineering

andundergotrainingforabout80hoursandattendacampofabout tendays.Thetrainingshallincludeclassesonhygieneandhealth awarenessandalso training infirst-aid.

- NationalCadetCorps(NCC)willhaveabout20parades.
- NationalServiceScheme(NSS)willhavesocialservice activitiesinandaroundtheinstitution.
- National SportsOrganization(NSO) willhaveSports, Games,DrillsandPhysicalexercises.
- Youth RedCross(YRC)willhaveactivities relatedto socialservicesinandaroundinstitution.However,YRCwill nothavespecialcampsof10 days.Whilethetraining activitieswillnormallybe duringweekends,thecamps willnormallybe duringvacationperiod.

Every studentshallputinaminimumof**75%** attendance inthe training and attend the camp (except YRC) compulsorily. The training andcamp(exceptYRC)shallbecompletedduringthefirstyearof theprogramme.However,forvalidreasons,thePrincipalmaypermit astudentto completethisrequirementinthesecondyear.

23. Discipline

Every studentisrequiredtobedisciplinedandmaintain decorum bothinsideandoutsidetheinstitution campus.Theyshouldnotindulge inanyactivitywhichcanbringdownthereputationoftheUniversity or institution.ThePrincipalshall refer any act of indiscipline by students to the discipline and welfare committee.

24. SpecialProvisions

24.1 OptionforElective Courses

Astudentcanhavetheoptionoftaking2electivecoursesfrom otherdepartments (maximum of one per semester)

24.2 FastTrack Programme

Students whomaintainaCGPA of greater than or equal to 8.5 at the end of 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. Studentscanoptfor thefasttrackprogrammefromtheFifthSemester. Thethree electivecoursesofthe eighth

Signature of the Chairman BOS/Civil Engineering

semestercanbetakeninthe earliersemesters(maximumonepersemester)bythestudents. Thiswillenable the students to be completely free from theorycourses in the Eighth Semester. Students can pursue internship /industrial projects on a full time basis.

24.3 One credit courses

One Credit Courses: Students can also opt for one credit industry oriented courses for a minimum of 15 hours duration, which will be offered by experts from industry on specialized topics apart from the prescribed courses of study of the programme. Students can complete such one credit courses during the semesters 5 to 7 as and when these courses are offered by any of the departments. There is no limit on the number of one credit courses a student can register and successfully complete during the above period.

Steps involved in designing and assessment of one credit courses:

Step1: The HOD and industry expert shall decide name and syllabi of the one credit course.

Step2: The concerned HOD collects the name list of the students those are interested in attending the above course. Each batch consists of 10 to 30 students.

Step3: The course shall be taught by industry experts as a course teacher.

Step4: The course teacher shall give assignments and conduct internal test 1&2 and viva voce.

Step5: The Course end examination shall be conducted and the evaluation will be done by the same industry expert.

Signature of the Chairman BOS/Civil Engineering

EVALUATION PROCEDURE FOR ONE CREDIT COURSES

Total 50 Marks

Only one course end examination (for one and a half hours)	50 Marks
Proposed frame work for question paper and marks distribution	
Objective type questions (20 x 1 mark)	20 Marks
Application oriented questions (3 x 10 marks)	30 marks
Total	50 marks

The exam is to be conducted at the end of the course. Passing criteria is 50% (that is, 25 marks out of 50 marks). If the student passes the course, it will be indicated in the grade sheet. If the student fails to pass the course, the one credit course will not get reflected in the grade sheet. There is no arrear exam for one credit courses. The one credit courses will not be considered for computing CGPA.

25. Human excellence courses

Four human excellence courses (with one credit for each of the courses – minimum 15 hours duration) will be offered from the first to forth semesters (one course per semester). Credits will be indicated for these courses in the grade sheet and will be considered for computing CGPA.

EVALUATION PROCEDURE FOR HUMAN EXCELLENCE COURSES

Total 50 Marks

Only one course end examination (for one and a half hours)	50 Marks
Proposed frame work for question paper and marks distribution	
Objective type questions (20 x 1 mark)	20 Marks
Application oriented questions (3 x 10 marks)	30 marks
Total	50 marks

Signature of the Chairman BOS/Civil Engineering

The exam is to be conducted at the end of the course. Passing criteria is 50% (that is, 25 marks out of 50 marks). If the student passes the course, it will be indicated in the grade sheet. There will be arrear exam for human excellence courses.

26. RevisionofRegulationandCurriculum

The institutionmayfromtimetotimerevise,amendor changethe Regulations, scheme of examinations and syllabi, if found necessary. Academic CouncilassistedbyBoardofStudiesandStanding Committeewillmakesuch revisions/changes.

Note: Any ambiguity in interpretation of this regulation is to be put up to the Standing Committee, whose decision will be final.

Signature of the Chairman BOS/Civil Engineering

DEPARTMENT OF CIVIL ENGINEERING

Vision

Department of Civil Engineering is striving to become as 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 the state – of –art 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.

Signature of the Chairman BOS/Civil Engineering

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.

Signature of the Chairman BOS/Civil Engineering

KUMARAGURU COLLEGE OF TECHNOLOGY

COIMBATORE – 641 049

DEPARTMENT OF CIVIL ENGINEERING

REGULATIONS 2014

BE CIVIL ENGINEERING

CURRICULUM

SEMESTER III

Code No.	Course Title	L	T	P	C
Theory					
U14MAT304	Partial Differential Equations And Fourier Analysis	3	1	0	4
U14CET301	Fluid Mechanics	3	1	0	4
U14CET302	Surveying	3	0	0	3
U14CET303	Strength Of Materials I	3	1	0	4
U14CET304	Building Construction	3	0	0	3
U14CET305	Concrete Technology	3	0	0	3
Practical					
U14CEP301	Surveying Practical I	0	0	2	1
U14CEP302	Concrete And Highway Laboratory	0	0	2	1
U14CEP303	Strengthofmaterials Laboratory	0	0	2	1
U14GHP301	Social Values	1	0	1	1
				Total Credits : 25	

SEMESTER IV

Code No.	Course Title	L	T	P	C
Theory					
U14MAT401	Numerical Methods	3	1	0	4
U14GST 001	Environmental Science And Engineering	3	0	0	3
U14CET401	Advanced Surveying	3	0	0	3
U14CET402	Strength Of Materials II	3	1	0	4
U14CET403	Applied Hydraulics And Hydraulic Machinery	3	1	0	4
U14CET404	Geotechnical Engineering I	3	0	0	3

Signature of the Chairman
BOS/Civil Engineering

Practical					
U14CEP401	Surveying Practical II	0	0	2	1
U14CEP402	Fluid Mechanics Laboratory	0	0	2	1
U14CEP403	Building Planning And Drawing	0	0	2	1
U14GHP401	National And Global Values	1	0	1	1
					Total Credits : 25

SEMESTER V

Code No.	Course Title	L	T	P	C
Theory					
U14CET501	Structural Analysis I	3	1	0	4
U14CET502	Design Of Reinforced Concrete Elements	3	1	0	4
U14CET503	Water Supply Engineering	3	0	0	3
U14CET504	Design Of Steel Structures	3	1	0	4
U14CET505	Geotechnical Engineering II	3	0	0	3
U14CET506	Highway Engineering	3	0	0	3
Practical					
U14CEP501	Soil Mechanics Lab	0	0	2	1
U14CEP502	Environmental Engineering Laboratory	0	0	2	1
U14ENP501	Communication Skills Laboratory	0	0	2	1
U14CEP503	Survey Camp	0	0	2	1
					Total Credits : 25

SEMESTER VI

Code No.	Course Title	L	T	P	C
Theory					
U14CET601	Structural Analysis II	3	1	0	4
U14CET602	Design Of Masonry And Reinforced Concrete Structures	3	1	0	4
U14CET603	Waste Water Engineering	3	0	0	3
U14CET604	Railways, Airports And Harbour Engineering	3	0	0	3
U14GST005	Engineering Economics And Financial Management	3	0	0	3
E1	Elective I	3	0	0	3

Signature of the Chairman
BOS/Civil Engineering

Practical					
U14CEP601	Computer Aided Design And Drawing (RCC& Steel)	2	0	2	3
U14CEP602	Computer Applications Laboratory	0	0	2	1
U14CEP603	Industrial Training	0	0	0	1
U14CEP604	Technical Seminar	0	0	2	1
				Total Credits : 26	

SEMESTER VII

Code No.	Course Title	L	T	P	C
Theory					
U14CET701	Estimation, Costing And Valuation	3	0	2	4
U14CET702	Water Resources And Irrigation Engineering	3	0	0	3
U14GST007	Professional Ethics	3	0	0	3
E2	Elective II	3	0	0	3
E3	Elective III	3	0	0	3
E4	Elective IV	3	0	0	3
Practical					
U14CEP701	Project Work (Phase - I)	0	0	6	2
U14CEP702	Design And Drawing (Irrigation And Environmental Engineering)	2	0	2	3
				Total Credits : 24	

SEMESTER VIII

Code No.	Course Title	L	T	P	C
Theory					
E5	Elective V	3	0	0	3
E6	Elective VI	3	0	0	3
E7	Elective VII	3	0	0	3
Practical					
U14CEP801	Project Work (Phase - II)	0	0	18	6
				Total Credits : 15	
				Overall Total Credits : 188	

Signature of the Chairman
BOS/Civil Engineering

ELECTIVES FOR FIFTH SEMESTER

Code No.	Course Title	L	T	P	C
Elective I					
U14CETE11	Transportation Planning	3	0	0	3
U14CETE12	Traffic Engineering And Management	3	0	0	3
U14CETE13	Urban And Regional Planning	3	0	0	3
U14CETE14	Town Planning And Architecture	3	0	0	3
U14CETE15	Pavement Engineering	3	0	0	3

ELECTIVES FOR SIXTH SEMESTER

Code No.	Course Title	L	T	P	C
Elective II					
U14CETE21	Water Resources Systems Analysis	3	0	0	3
U14CETE22	Ground Water Engineering	3	0	0	3
U14CETE23	Geographical Information System (GIS) And Remote Sensing	3	0	0	3
U14CETE24	Hydrology	3	0	0	3

ELECTIVES FOR SEVENTH SEMESTER

Code No.	Course Title	L	T	P	C
Elective III					
U14CETE31	Matrix Methods Of Structural Analysis	3	0	0	3
U14CETE32	Steel-Concrete Composite Structures	3	0	0	3
U14CETE33	Finite Element Method	3	0	0	3
U14CETE34	Tall Buildings	3	0	0	3
U14CETE35	Storage Structures	3	0	0	3
U14CETE36	Bridge Structures	3	0	0	3
U14CETE37	Industrial Structures	3	0	0	3
U14CETE38	Computer Aided Design Of Structures	3	0	0	3
U14CETE39	Prestressed Concrete Structures	3	0	0	3

Signature of the Chairman
BOS/Civil Engineering

Elective IV					
U14CETE41	Geotechnical Earthquake Engineering	3	0	0	3
U14CETE42	Ground Improvement Techniques	3	0	0	3
U14CETE43	Repair And Rehabilitation Of Structures	3	0	0	3
U14CETE44	Earthquake Resistant Structures	3	0	0	3
U14CETE45	Structural Dynamics	3	0	0	3

ELECTIVES FOR EIGHTH SEMESTER

Code No.	Course Title	L	T	P	C
Elective V					
U14CETE51	Environmental Impact Assessment Of Civil Engineering Projects	3	0	0	3
U14CETE52	Municipal Solid Waste Management	3	0	0	3
U14CETE53	Air Pollution Management	3	0	0	3
U14CETE54	Industrial Waste Management	3	0	0	3
Elective VI					
U14CETE61	Disaster Management And Mitigation	3	0	0	3
U14CETE62	Management Concepts And Practices	3	0	0	3
U14CETE63	Construction Planning & Scheduling	3	0	0	3
U14CETE64	Prefabricated Structures	3	0	0	3
Elective VII					
U14GST002	Total Quality Management	3	0	0	3
U14GST003	Principles Of Management	3	0	0	3
U14GST004	Operations Research	3	0	0	3
U14GST006	Product Design And Development	3	0	0	3

ONE CREDIT COURSES

Code No	Course Title	Industry that will offer the course
U14CEIN01	Total Station Survey	Construction Industry
U14CEIN02	Tender Document Preparation	Construction Industry
U14CEIN03	Building Bye-Laws And Approval Drawing	Construction Industry

Signature of the Chairman
BOS/Civil Engineering

	Preparation	
U14CEIN04	Construction Planning Using Software	Construction Industry
U14CEIN05	Green Building Audit	Construction Industry
U14CEIN06	Environmental Quality Modelling	Construction Industry
U14CEIN07	Application Of Remote Sensing And GIS In Civil Engineering	Construction Industry
U14CEIN08	Introduction To Indian Traditional Architecture	Construction Industry

Signature of the Chairman
BOS/Civil Engineering

SEMESTER III

Signature of the Chairman BOS/Civil Engineering

U14MAT304 PARTIAL DIFFERENTIAL EQUATIONS AND FOURIER ANALYSIS

L	T	P	C
3	1	0	4

Course Outcomes

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

CO1: solve partial differential equations which are used analysis of civil structures.

CO2 :apply the principles and techniques to form Fourier Series and half range Fourier series of a function and find fourier series of numerical data using harmonic analysis.

CO3: solve one dimensional wave equation, one dimensional heat equation and two dimensional heat equation in steady state using Fourier Series.

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

Pre-requisites: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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

PARTIAL DIFFERENTIAL EQUATION **9+3Hours**

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

Signature of the Chairman
BOS/Civil Engineering

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.

9+3 Hours

FOURIER SERIES

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

9+3Hours

BOUNDARY VALUE PROBLEMS – ONE DIMENSIONAL EQUATIONS

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

9+3Hours

BOUNDARY VALUE PROBLEMS – TWO DIMENSIONAL EQUATIONS

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.

9+3Hours

FOURIER TRANSFORM

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

Theory:45Hrs **Tutorial: 15Hrs** **Total: 60Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CET301 **FLUID MECHANICS**

L	T	P	C
3	1	0	4

Course Outcomes

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

CO1: measure the pressure of a fluid and fluid pressure on a plane and curved surface.
CO2: apply inter-relationship of various properties of fluid in practical problems.
CO3:analyze the stability of floating or submerged bodies
CO4: apply the working concepts of various devices used to measure the velocity and Dischargeof fluid.
CO5:design the pipe line for required discharge

Pre-requisites:
1.U14MAT304Partial differential equations and Fourier analysis
2. U14MAT401 Numerical methods

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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			
CO4	M			S					M			
CO5	S		S						M			

Signature of the Chairman
BOS/Civil Engineering

PROPERTIES OF FLUID **4+1Hours**

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

5+2Hours

FLUID STATICS

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+2Hours**

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 +2 Hours**

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

KINEMATICS OF FLUID **8+2Hours**

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; path line; Streak line; Equation for acceleration; Continuity equation; Velocity potential and stream function; flow net; Vortex flow-Free vortex and forced vertex flow.

DIMENSIONAL ANALYSIS AND FLUID FLOW **9+3 Hours**

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

FLOW OVER NOTCHES AND WEIRS **4 +1 Hours**

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

FLOW MEASUREMENTS IN PIPES **5+2Hours**

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

Theory:45HrsTutorial: 15Hrs **Total : 60 Hrs**

Signature of the Chairman BOS/Civil Engineering

REFERENCES

1. P.N. Modi & S.M. Seth, "Hydraulics and fluid mechanics including hydraulic machines," Standard book house, New Delhi, 2008
2. R.K. Bansal, "Fluid mechanics and hydraulic machines," Laxmi Publications (P) Ltd, 2012.
3. K.L. Kumar , "Engineering fluid mechanics," Eurasia publishing house, 1995,Fox and mcdonalds.

Signature of the Chairman BOS/Civil Engineering

U14CET302 **SURVEYING**

L	T	P	C
3	0	0	3

Course Outcomes

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

CO1:conduct surveying using various conventional instruments.
CO2:perform angular measurement and measure the elevation of an object.
CO3:perform tachometric surveying for distance and height measurements
CO4: prepare contour map using tachometric surveying
CO5: set out the curves of given size on the field

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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	PO 12
CO1	M			S								
CO2	S			S	M							
CO3	S			S	M							
CO4	S			S	S							
CO5	S			S	M							

Signature of the Chairman
BOS/Civil Engineering

CHAIN AND COMPASS SURVEYING **9Hours**

Definition - Principles - Classification - Field and office work - Scales - Conventional signs - Survey instruments, their care and adjustment - Ranging and chaining - Reciprocal ranging – Offset- Prismatic compass - Surveyor's compass - Bearing - Systems and conversions - Local attraction - Magnetic declination - Dip - Traversing – Included angle - Plotting - Adjustment of errors

LEVELLING AND APPLICATIONS **9Hours**

Levels and Staves - Bench marks - Temporary and permanent adjustments - Fly check and reciprocal levelling - level Reduction - Curvature and refraction - Longitudinal and cross sections . Contouring - Methods - Characteristics and uses of contours - Plotting - Calculation of areas and volumes. Capacity of reservoirs.

THEODOLITE SURVEYING **9Hours**

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

TACHEOMETRIC SURVEYING **9Hours**

Tacheometric systems - Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Anallactic lens.

CURVES **9Hours**

Lay out - Setting out works - Curve ranging –Types of curves - Functions and requirements- Setting with chain and theodolite

Theory:45HrsTotal:45Hrs

REFERENCES

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. AlakDe , "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.

Signature of the Chairman
BOS/Civil Engineering

U14CET303 **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: apply the fundamental concepts of stress and strain in the design of various structural components and machines.

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

CO3:determine the bending, shear stresses and deflection produced in a beam subjected to system of loads

CO4: analyze and design springs used in vehicles and structures.

CO5:analyze and design shafts to transmit required power

Pre-requisite:

1. U14MET201 Engineering Mechanics

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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											
CO2	M	S										
CO3	M	S										
CO4	M	S										
CO5	M	S										

Signature of the Chairman
BOS/Civil Engineering

STRESS AND STRAIN **9+3Hours**

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- 2 D State of stress -Principal stresses and principal planes Mohr's circle.

SHEAR AND BENDING IN BEAMS **9+3Hours**

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 **6+2Hours**

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 **7+2Hours**

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

TORSION **9+3Hours**

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 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.

PLANE TRUSSES **5+2Hours**

Plane trusses- Truss analysis - method of joints – method of sections

Theory:45HrsTutorial: 15Hrs **Total : 60Hrs**

REFERENCES

1. Rajput, R. K, "A Textbook of Strength of Materials", S. Chand Publications, 2007.
2. Subramanian R., "Strength of Materials", Oxford University Press, New Delhi 2005.
3. Premalatha J. Mechanics of solids, Vignesh Publications, Coimbatore 2008.
4. R.K. Bansal Strength of materials, Laxmi Publications, New Delhi, 2010.
5. William A.Nash, Theory and Problems of Strength of materials, Schaum's Outline series, Tata McGraw-Hill publishing co., New Delhi, 2007.
6. Popov, E.P, "Engineering Mechanics of Solids", Prentice-Hall of India, New Delhi, 1998.

Signature of the Chairman
BOS/Civil Engineering

U14CET304 **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: suggest a suitable type of foundation for a given building and soil condition
CO2: supervise for the quality construction of brick and stone masonry works
CO3: select suitable type of floors and roof as per the field condition
CO4: apply the various construction practices in the field
CO5: select construction equipment for various construction activities

Pre-requisites:

1. U14CET201 Construction Materials
2.U14CEP201Construction Materials laboratory

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

\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			M			S	M					M
CO4					M	S	M	M	M			M
CO5					S	M						M

Signature of the Chairman
BOS/Civil Engineering

FOUNDATIONS **4Hours**

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

BRICK MASONRY **4Hours**

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

STONE MASONRY **2Hours**

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

WALLS **1Hour**

Classification of walls.

DAMPNESS AND DAMP PROOFING **3Hours**

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

FLOORS **3Hours**

Technical terms; Types of flooring; Repair of floors.

ROOFS 3Hours

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

SCAFFOLDING, SHORING, UNDERPINNING AND FORM WORK 7Hours

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

CONSTRUCTION PRACTICES **9Hours**

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 **9Hours**

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.

Theory:45Hrs Total: 45Hrs

Signature of the Chairman BOS/Civil Engineering

REFERENCES

1. B.C.Punmia, "Building Construction" Laxmi Publications, New Delhi. 2012.
2. G.S.Birdie, T.D.Ahuja, "Building Construction and construction materials", Dhanpat rai publishing company, New Delhi 2002.
3. Varghese. P.C. "Building Construction", Prentice hall of India Pvt.Ltd. New Delhi, 2007.
4. William H.Severns and Julian R.Fellows, "Air-conditioning and refrigeration", john Wiley and Sons, London, 1998.
5. Sharma S.C. "Construction equipment and Management" Khanna Publishers, New Delhi. 2002.

Signature of the Chairman BOS/Civil Engineering

U14CET305 **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:test the properties of various Ingredients of concrete
CO2:suggest suitable admixture for concrete with special properties
CO3:conduct tests for material properties & quality control of concrete
CO4:design the concrete mix for the required strength
CO5:assess the durability and other properties of concrete under various environments

Pre-requisites:
1. U14CET201 Construction Materials
2.U14CEP201Construction Materials laboratory

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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

INGREDIENTS OF CONCRETE **9Hours**

Cement :
Hydration process - Bougue's compounds - Effects

Signature of the Chairman BOS/Civil Engineering

Aggregates:
General classification of aggregates, particle shape and texture - bond between aggregates - strength of aggregate - other mechanical properties , 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- specific gravity, moisture content, bulk density- Selection of aggregates.

Water
Quality of water – Permissible limits- Suitability of sea water for concreting.

CONCRETE ADMIXTURES **9Hours**

Chemical admixtures: Accelerators - catalysts - retarders - corrosion inhibitors - air entraining agent - workability agent – viscosity modifying agent - Information regarding commercially available admixtures (Plastizers) - water repelling materials

Mineral admixtures: fly ash, GGBS, Copper Slag, Silica fume.

PROPERTIES OF FRESH AND HARDENED CONCRETE **9Hours**

Workability test – Vee Bee consistometer - Segregation and bleeding - Curing of concrete - Different methods.Shrinkage of concrete - creep - thermal expansion - permeability - water tightness and crack control - 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.

SPECIAL CONCRETES AND CONCRETING TECHNIQUES **9Hours**

Self Compacting Concrete(Preparation,Properties , Tests & Applications)- Bacterial Concrete, Geopolymer Concrete, High Strength Concrete , High Performance Concrete, Fibre Reinforced Concrete, Polymer Concrete, Ferrocement-– Shotcrete – Grouting – Guniting – Field Practices

CONCRETE MIX DESIGN **3Hours**

ACI method- Road note 4 method – Mix design for high strength concrete.

DURABILITY AND RESISTANCE OF CONCRETE TO DETERIORATION **6Hours**

Corrosion of reinforcement – reaction between aggregate and cement – reaction of chemicals in aggregate – 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

Theory:45Hrs **Total: 45Hrs**

Signature of the Chairman BOS/Civil Engineering

REFERENCES

1. Shetty M.S., “Concrete Technology”, S.Chandand Company, 2005.
2. Gambhir,M.L., “Concrete Technology”, Tata McGraw Hill, Publishing CompanyLimited, New Delhi 2004.
3. A.M.Neville,” Properties of Concrete”, 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.

Signature of the Chairman BOS/Civil Engineering

U14CEP301 **SURVEYING PRACTICAL I**

L	T	P	C
0	0	2	1

Course Outcomes

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

CO1:conduct surveying using various survey instruments in the field works.
CO2: set out curves and marking of buildings on the site
CO3:prepare LS , CS for the road works and contour map for the given area

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Lab exercise 2. Model exam 3. Observation	4. Course End survey

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							M
CO3	M			S	M							M

1. Aligning, Ranging and Chaining
2. Chain and compass Traversing
3. Fly levelling
4. Check levelling
5. LS and CS
6. Contouring
7. Measurement of horizontal angles by reiteration and repetition and vertical angles
8. Heights and distances - Triangulation - Single plane method.
9. Tacheometry - Tangential system - Stadia system - Subtense system.
10. Setting out works - Foundation marking - Simple curve (right/left-handed) - Transition curve.

Experiments beyond the syllabus should be conducted.

Practical :45Hrs **Total: 45Hrs**

Signature of the Chairman
BOS/Civil Engineering

U14CEP302 **CONCRETE AND HIGHWAY LABORATORY**

L	T	P	C
0	0	2	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: design the mix proportion for the required concrete strength
CO3: assess the quality of bitumen through laboratory tests.

Pre-requisite :
1.U14CEP201 Construction materials lab

Course Assessment methods:

Direct	Indirect
1. Lab exercise 2. Model exam 3. Observation	1. Course End survey

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							M
CO3	M			S	M							M

1. To determine the grade of ordinary Portland cement.
2. Concrete mix design
3. Tests on fresh concrete
   (i)Slump cone test &
   (ii)Compaction factor test to determine the workability of concrete.
   (iii)Flow table test
   (iv)Self Compacting Concrete
4. TEST ON HARDENED CONCRETE
   (i) compressive strength and
   (ii) split tensile strength
   (iii) modulus of rupture

Signature of the Chairman
BOS/Civil Engineering

5. Determination of softening point of bitumen
6. Penetration value of bitumen
7. Determinationofflashpointandfirepointofbitumen
8. Determinationofductilityofbitumen

Experiments beyond the syllabus should be conducted.

Practical:45Hrs **Total : 45Hrs**

Signature of the Chairman BOS/Civil Engineering

U14CEP303 **STRENGTHOFMATERIALS LABORATORY**

L	T	P	C
0	0	2	1

Course Outcomes

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

CO1:test the mechanical properties of various materials like Concrete, steel and wood.

CO2 :determine the stiffness of the helical springs

CO3 : find the modulus of elasticity and poisson's ratio of concrete

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Lab exercise 2. Model exam 3. Observation	1. Course End survey

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							M
CO3	M			S	M							M

1. Tension teston mild steel
2. Torsion test on mild steel
3. Verification of Maxwell Reciprocal Theorem
4. Tests on helical spring (close coiled and open coiled)
5. Hardness tests (Brinell hardness, Rockwell hardness and Vickers hardness)
6. Doubleshear test
7. Test for impact resistance (Izod and Charpy tests)
8. Compressiontestonwood(paralleltograinsandperpendiculartograin)
9. Flexure testonwoodenbeam
10. Young's modulus and poisson's ratio of concrete

Experiments beyond the syllabus should be conducted.

Practical:45HrsTotal : 45Hrs

Signature of the Chairman
BOS/Civil Engineering

U14GHP301 **SOCIAL VALUES**

L	T	P	C
1	0	1	1

Course Outcomes

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

CO1:adopt and practice social values as his regular duties.
CO2: take over the social responsibilities
CO3: give solutions and to manage the challenging social issues.
CO4:voluntarily participate and organize social welfare programmes
CO5:explore his ideology of techno social issues and provide the best solution.

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1.Continuous Assessment 2. End Semester Examination	1. Attitude 2. Behavior

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				
CO5								S				

ORGIN OF SOCIETY **5Hours**

Evolution of universe: Creation theory,Big bang theory, Evolution theory, Permanence theory - Mithya, Maya – Evolution of living being - Evolution of Man – Formation of society and social values.

Practical: Group Discussion on Evolution of Man and formation of society, Panel discussion on Social values - PanchaBhoodhaNavagraha Meditation.

Signature of the Chairman
BOS/Civil Engineering

SELF AND SOCIETY **2Hours**

Duty to self, family, society and world –Realization of Duties and Responsibilitiesof individuals in the society (Five fold cultures) – impact of social media on present day youth and correction measures.

Practical: Case study – interaction with different professionals.

EDUCATION& SOCIETY **3Hours**

Education: Ancient and Modern Models.

Practical: Making Short film on impact of education in social transformation.

DISPARITY AMONG HUMAN BEINGS **3 Hours**

Wealth's for humans, Factors leading to disparity in human beings and Remedies.

Practical: Debate on disparity and social values.

CONTRIBUTION OF SELF TO SOCIAL WELFARE **3 Hours**

Participation in Social welfare – Related programmes– Recognized association – Activities for social awareness – Programme by Government and NGOs – Benefits of social service – Balancing the family and social life.

Practical: In campus, off campus projects.

GENERAL PRACTICAL **14Hours**

Ashtanga Yoga: Pathanjali maharishi & Yoga – Involvement – Rules of Asanas - Suryanamaskara (12 Steps)- Meditation.

Standing : PadaHastasana, ArdhaCakrasana, Trikonasana, Virukchsana (Eka Padaasana)

Sitting : Padmasana, Vakrasana, Ustrasana, Paschimatanasana.

Prone : Uthanapathasana, Sarvangasana, Halasana, Cakrasana,

Supine : Salabhasana, Bhujangasana, Dhanurasana, Navukasana.

Theory:16HrsPractical: 14Hrs **Total :30Hrs**

REFERENCES

1. Steven , Weinberg, "The First Three Minutes" : A Modern View of the Origin of the Universe (English), Perseus books group,1977.
2. Vethathiri's Maharishi's, "Vethathirian Principles of Life" The World Community Service Centre, Vethathiri Publications, 2003.
3. Vethathiri's Maharishi's, "Karma Yoga: The Holistic Unity" The World Community Service Centre, Vethathiri Publications, 1994.
4. Vethathiri's Maharishi's, "Prosperity of India" The World Community Service Centre, Vethathiri Publications, 1983.
5. Swami Vivekananda, "The Cultural Heritage of India" 1st edition, TheRamakirshna

Signature of the Chairman BOS/Civil Engineering

Mission Institute of Culture, 1937.
6. Vivekananda Kendra Prakashan Trust, "YOGA", Vivekanandha Kendra PrakashanTrust,Chennai, 1977.

Signature of the Chairman BOS/Civil Engineering

SEMESTER IV

Signature of the Chairman BOS/Civil Engineering

U14MAT401 **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 behaviour through solution of ODEs modeling the system

CO5 : solve PDE models representing spatial and temporal variations in physical systems through numerical methods and have the necessary proficiency of using MATLAB for obtaining the above solutions.

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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	S	M									

Signature of the Chairman
BOS/Civil Engineering

INTRODUCTION **3Hours**

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

NUMERICAL SOLUTION OF ALGEBRAIC EQUATIONS **7+3Hours**

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 method - Gauss Jordanmethod - Gauss Seidel method.

CURVE FITTING AND INTERPOLATION **7+3Hours**

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

NUMERICAL DIFFERENTIATION AND INTEGRATION **7+3 Hours**

Numerical differentiation by using Newton's forward, backward and divided differences – Numerical integration by Trapezoidal and Simpson's $1/3^{rd}$ and $3/8$ thrules – Numerical double integration.

NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS **10+3 Hours**

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

NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS **11+3Hours**

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.

Theory:45HrsTutorial: 15Hrs **Total : 60Hrs**

REFERENCES

1. Steven C.Chapra and Raymond P. Canale, " Numerical Methods for Engineers with

Signature of the Chairman BOS/Civil Engineering

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.

Signature of the Chairman
BOS/Civil Engineering

U14GST001 **ENVIRONMENTAL SCIENCE AND ENGINEERING**

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 :analyze 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

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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					
CO2		M				S	S					
CO3		M					M					S
CO4		M	M			W	S	W				
CO5	M	M					M					
CO6		M				M	W					M

Signature of the Chairman
BOS/Civil Engineering

INTRODUCTION TO ENVIRONMENTAL STUDIES AND NATURAL RESOURCES — 10 Hours

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.

ECOSYSTEMS AND BIODIVERSITY — 14 Hours

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 Hours

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 Hours

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

Signature of the Chairman BOS/Civil Engineering

(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 Hours**

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.,

Theory:45Hrs **Total : 45Hrs**

REFERENCES

1. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co., 2013
2. Masters G.M., and Ela W.P., Introduction to Environmental Engineering and Science, Pearson Education Pvt., Ltd., Second Edition.
3. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad India., 2002
4. Trivedi R.K and Goel P.K., "Introduction to Air pollution" Techno-science Pubications. 2003
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 E., 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. Syed Shabudeen, P.S., Environmental chemistry, Inder Publishers, Coimbatore. 2013

Signature of the Chairman
BOS/Civil Engineering

U14CET401 **ADVANCED SURVEYING**

L	T	P	C
3	0	0	3

Course Outcomes

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

CO1:take measurements using special instruments
CO2:conduct hydrographic and astronomical survey
CO3:adjust the survey errors using various methods
CO4:conduct survey works using total station and GPS

Pre-requisites:
1. U14CET302 Surveying
2. U14CEP301Surveying practical -I

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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	S											M
CO4	S				S							M

SPECIAL INSTRUMENTS **4 Hours**

Survey using Autolevel - Electronic theodolite – Electronic distances measurement (EDM) – Clinometer- Ghat tracer – Box sextant – Planimeter – Abney level.

HYDROGRAPHIC AND ASTRONOMICAL SURVEYING **5 Hours**

Signature of the Chairman
BOS/Civil Engineering

Introduction to hydrographic surveying- Tides-MSL- Sounding methods- Three-point problem- Strength of fix-Sextants and station pointer- Introduction to Astronomical Surveying

CONTROL SURVEYING **9 Hours**

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

SURVEY ADJUSTMENTS **9 Hours**

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 – Method of Correlates - Adjustment of simple triangulation networks.

TOTAL STATION SURVEYING **9 Hours**

Basic Principle-classifications- Infrared and Laser total station instruments. Microwave system, measuring principle, working principle, sources of Error, Microwave Total station instruments,. Care and maintenance of Total Station instruments. Modern positioning systems-Traversing and Trilateration.

GPS SURVEYING **9 Hours**

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. fundamentals of Photogrammetry and Remote sensing.

Theory:45Hrs **Total : 45Hrs**

REFERENCES

1. Dr.B.CPunmia, Ashok K.Jain ,ArunK.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. SatheeshGopi, 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. SatheeshGopi. Rasathishkumar, N.madhu, “Advanced Surveying, Total Station GPS and Remote Sensing”, Pearson Education 2007.

Signature of the Chairman
BOS/Civil Engineering

U14CET402 **STRENGTH OF MATERIALSII**

L	T	P	C
3	1	0	4

Course Outcomes

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

CO1:find the deflection in beams and frames using Energy theorems.
CO2:analyze indeterminate beams like continuous beams and fixed beams
CO3:analyze the long and short columns and determine the design loads.
CO4: assess the state of stress in three dimensions
CO5: solve problems involving unsymmetrical bending in structural members.

Pre-requisites:
1. U14CET303 – Strength of material - I
2. U14CEP303 – Strength of materials laboratory

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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	M	S	M									
CO5	M	S	M									

Signature of the Chairman
BOS/Civil Engineering

ENERGY PRINCIPLES **9+3Hours**

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+3Hours**

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+3Hours**

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.

STATE OF STRESS IN THREE DIMENSIONS **9+3Hours**

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+3Hours**

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

Theory:45HrsTutorial: 15Hrs **Total :60Hrs**

REFERENCES

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 kumarJain ,Arunkumar Jain " Theory of structures", Lakshmi publications (P) Ltd, New Delhi, 2007.
6. R.K.Rajput, "Strength of materials", S.Chand(2006).

Signature of the Chairman
BOS/Civil Engineering

U14CET403 **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: design most economical section for an open channel.
CO2:analyze critical flow condition in channels
CO3: determine GVF profiles under non-uniform flow
CO4: choose appropriate type of turbines for the given conditions
CO5: suggest the type of pumps required for specific purpose.

Pre-requisite:
1. U14CET301 Fluid mechanics

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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								M	
CO5			S								M	

UNIFORM OPEN CHANNEL FLOW **9+3 Hours**

Types and regimes of open channel flow – Velocity distribution in open channel – Wide open

Signature of the Chairman
BOS/Civil Engineering

channels – Chezy's& Manning's uniform flow equations – Determination of normal depth – Most economical section

CRITICAL FLOW **9+3 Hours**

Specific energy – Specific energy diagram – Alternate depths – Critical flow condition in rectangular, triangular, trapezoidal, and circular channels

NON-UNIFORM FLOW **9+3 Hours**

Dynamic equation of gradually varied flow – Determination of GVF profiles – Direct and standard step methods – Hydraulic jump – Sequent depths - Flow through transitions (local bed rise and width contraction)– Introduction to positive and negative surge. Case study : computer application

TURBINES **9+3 Hours**

Impact of jet on flat and curved plates, stationary and moving – Classification of turbines – Pelton wheel turbine – Francis turbine – Kaplan turbine – Draft tubes – – Case study : computer application

ROTODYNAMIC AND POSITIVE DISPLACEMENT PUMPS **9+3 Hours**

Classification of pumps based on field applications - Centrifugal pump – Single and Multi stage pumps – Reciprocating pump – Indicator diagram - Air vessels –Cavitation — Case study : computer application

Theory:45HrsTutorial: 15Hrs **Total : 60Hrs**

REFERENCES

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

Signature of the Chairman
BOS/Civil Engineering

U14CET404 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.

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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										M
CO4	M	M				M						
CO5		S		M		M						

CLASSIFICATION OF SOIL 8 Hours

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

Signature of the Chairman
BOS/Civil Engineering

PERMEABILITY OF SOIL 7 Hours

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.

STRESS DISTRIBUTION 5 Hours

Vertical stress distribution in soil – Boussinesq and Westergaard's equation- Newmark'sinfluence chart – principle and application - equivalent point load and other approximate methods- pressure bulb.

COMPRESSIBILITY AND CONSOLIDATION 10 Hours

Compaction, 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.

SHEAR STRENGTH 9 Hours

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.

SLOPE STABILITY 9 Hours

Slope failure mechanisms- finite slopes and infinite slopes- Swedish circle method- Friction circle method- Stability number problems.

Theory:45Hrs **Total :45Hrs**

REFERENCES

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

Signature of the Chairman
BOS/Civil Engineering

U14CEP401 **SURVEYING PRACTICAL II**

L	T	P	C
0	0	2	1

Course Outcomes

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

CO1:take angular and linear measurements using total station

CO2 :prepare contour maps for the given area

CO3:conduct astronomical survey.

Pre-requisites:

1. U14CET302 Surveying
2. U14CEP301 Surveying practical I

Course Assessment methods:

Direct	Indirect
1. Lab exercise 2. Model exam 3. Observation	1. Course End survey

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
CO2				S	S							M
CO3	M			S	S							M

1. Study on precise theodolite (microtheodolites)
2. Demonstration of total station
3. Longitudinal and cross section by using total station
4. Measurements of vertical angle by using total station
5. Demonstration of EDM.
6. Double plane method by using total station
7. Contouring by using total station
8. Field observation and calculation of azimuth

Experiments beyond the syllabus should be conducted.

Practical:45Hrs **Total : 45Hrs**

Signature of the Chairman
BOS/Civil Engineering

U14CEP402 FLUID MECHANICS LABORATORY

L	T	P	C
0	0	2	1

Course Outcomes

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

CO1: measure theoretical discharge in pipes, Venturimeter, orificemeter and notches

CO2: demonstrate and conduct experiment to find characteristic curves of various pumps

CO3: demonstrate and conduct experiment to find characteristic curves of various turbines

Pre-requisite:

1. U14CET301 Fluid mechanics

Course Assessment methods:

Direct	Indirect
1. Lab exercise 2. Model exam 3. Observation	1. Course End survey

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

1. Verification Of Bernoulli's Theorem
2. Study Of Friction Losses In Pipes
3. Determination Of Co-Efficient Of Discharge Of Venturimeter
4. Determination Of Co-Efficient Of Discharge Of Orificemeter
5. Determination Of Co-Efficient Of Discharge Of Notches (Rectangular/ Triangular Notch)
6. Impact Of Jet On Flat Plate (Normal / Inclined)
7. Performance Characteristics Of Centrifugal Pump (Constant Speed/ Variable Speed)
8. Performance Characteristics Of Submersible Pump
9. Performance Characteristics Of Reciprocating Pump/ Gear-Oil Pump
10. Performance Characteristics Of Pelton Wheel Turbine
11. Performance Characteristics Of Francis Turbine/ Turgo Wheel Impulse Turbine

Signature of the Chairman
BOS/Civil Engineering

12. Performance Characteristics Of Kaplan Turbine
13. Performance Characteristics Of Rotometer

Experiments beyond the syllabus should be conducted.

Practical: 45Hrs **Total : 45Hrs**

Signature of the Chairman BOS/Civil Engineering

U14CEP403 BUILDING PLANNING AND DRAWING

L	T	P	C
0	0	2	1

Course Outcomes

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

CO1:prepare the building plans satisfying the principles of planning and byelaws.

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

CO3: prepare detailed working drawings of doors, windows, roof trusses and staircases.

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Lab exercise 2. Model exam 3. Observation	1. Course End survey

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

Plan, section and elevation of

Residential buildings (Flat and sloping roof), Single-storey factory buildings with trusses. Detailed working drawings of the component parts- Doors and windows- Roof trusses- staircases. Drawing preparation for approval from nodal agencies.

Practical:45Hrs **Total : 45Hrs**

References:

1. Shah M.G. Kalec M. &Palki SY Building Drawing ,TataMcgraw 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.

Signature of the Chairman
BOS/Civil Engineering

4. AutoCAD Manual – Autodesk Inc., California, USA 2010.
5. NBC, local town planning authority rules and regulations.

Signature of the Chairman BOS/Civil Engineering

U14GHP401 NATIONAL AND GLOBAL VALUES

L	T	P	C
1	0	1	1

Course Outcomes

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

CO1: act as a good and responsible citizen.

CO2:conserve and protect eco cycle.

CO3: voluntarily work with global welfare organization and provide solution for global peace.

CO4: invent his Technical design by considering humanity and nature.

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. 2. Etc,.	1. 2. Etc,.

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	S				
CO3								S				
CO4								S				

ROLE OF A RESPONSIBLE CITIZEN **4 Hours**

Citizen - its significance–National and Global perspectives.

Practical: Group discussion on National and Global values.

GREATNESS OF INDIAN CULTURE **2 Hours**

Emerging India – past and present, about Culture, Morality and spirituality– Beauty of Unity in diversity - Impact of western culture in India and Indian culture over other countries.

Practical: Demonstration and impact measurements of simple and good actions.

GLOBAL WELFARE ORGANISATIONS **2Hours**

Education – Health – Nature – Peace

Practical: Organizing an event linking with one of the Organizations In campus /off campus.

Signature of the Chairman
BOS/Civil Engineering

PRESERVING NATURE **2Hours**

Appreciating the flora and fauna on Earth - Importance ofEcological balance – Conservation.

Practical: Trekking, field visit.

GLOBAL PEACE **4Hours**

One World and One Humanity - Global Peace.

Global personalities: Thiruvalluvar, Vallalar, Vivekanadar, Mahatma Gandhi,Vethathiri Maharishi – Plans for world peace.

Practical: Group discussion on individual plans for world peace.

GENERAL PRACTICAL **16Hours**

Simplified physical Exercise – Kayakalpa practice (Follow up practice) – Meditatyion - Theory & Practice

Pranayama :Bhastrika, KapalaBhati, Nadisuddhi, Sikari, Sitali.

Mudhra : Chin Mudhra, Vayu Mudhra, ShunyaMudhra, PrithviMudhra, Surya Mudhra, VarunaMudhra, PranaMudhra, ApanaMudhra, Apana Vayu Mudhra, LingaMudhra, AdhiMudhra, AswiniMudhra.

Theory:14Hrs Practical: 16Hrs **Total : 30Hrs**

REFERENCES

1. Drunvalo Melchizedek, "The Ancient Secret of the Flower of Life", Vol. 1, Light Technology Publishing; First Edition edition (April 1, 1999)
2. Dr.M. B. Gurusamy, "Globalisation – Gandhian Approach" Kumarappa Research Institution, 2001.
3. Vethathiri's Maharishi's, "Karma Yoga: The Holistic Unity" The World Community Service Centre, Vethathiri Publications, 1994.
4. Vethathiri's Maharishi's, "World peace" The World Community Service Centre, Vethathiri Publications,1957.
5. Vethathiri's Maharishi's, "Atomic Poison" The World Community Service Centre, Vethathiri Publications, 1983.
6. Vethathiri's Maharishi's, "The World Order Of Holistic Unity" The World Community Service Centre, Vethathiri Publications, 2003.
7. Swami Vivekananda, "What Religion Is" 41th edition, The Ramakirshna Mission Institute of Culture, 2009.

Signature of the Chairman
BOS/Civil Engineering

SEMESTER V

Signature of the Chairman BOS/Civil Engineering

U14CET501 **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.

Pre-requisite :

1. U14MAT301 Partial differential equations and flourier analysis
2. U14CET402 Strength of materials II

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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									

Signature of the Chairman
BOS/Civil Engineering

PINJOINTED FRAMES **9+3Hours**

Types of estimates Introduction – Degrees of freedom- General criteria for determining Static indeterminacy – Calculation of indeterminacy by formulae analysis of indeterminate pin-jointed frames- (Degree of indeterminacy up to two) –consistent deformation method.

SLOPE DEFLECTION METHOD **9+3Hours**

Analysis of continuous beams - sinking of supports - single storey portal frames (with and without sway).

MOMENT DISTRIBUTION METHOD **9+3Hours**

Distribution and carryover of moments – Stiffness and carry over factors - Analysis of continuous beams - sinking of supports - single storey portal frames (with and without sway).

MOVING LOADS AND INFLUENCE LINES **9+3Hours**

Introduction – Moving loads for statically determinate structures - Construction of Influence lines for reaction, SF and BM for rolling loads for simply supported and overhanging beams with single point load, Two point loads,several points loads and uniformly distributed loads - Computation of load positions for maximum bending moment and maximum shear force - absolute maximum bending moment. Influence lines for member forces in pin-jointed frames. Muller-Breslau's principle, Construction of ILD for continuous beams.

ARCHES **9+3Hours**

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

Theory:45HrsTutorial: 15Hrs **Total : 60Hrs**

REFERENCES

1. Punmia B.C, Ashok Kumar Jain and Arun Kumar Jain, "Theory of structures", Laxmi Publications Pvt. Ltd., New Delhi, 2004.
2. Sujit Kumar Roy, SubrataChakrabarty, " Fundamentals of Structural Analysis", S. Chand & Company Ltd. New Delh, 2013.
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.2011
5. Vaidyanadhan R and Perumal, P, "Comprehensive Structural Analysis-Vol.1 &Vol.2", Laxmi Publications Pvt.Ltd, New Delhi, 2014
6. Bhavikatti.S.S, "Structural Analysis-Vol.1 & Vol.2", Vikas Publishing Pvt Ltd., New Delhi. 2014

Signature of the Chairman
BOS/Civil Engineering

U14CET502 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: design RC concrete structural elements using various methods.

CO2 : design reinforced concrete slabs and beams by WSD for flexure

CO3 : design various basic elements of reinforced concrete structures like slabs, beams, columns and footings by LSD

CO4 : design reinforced concrete slabs and beams for shear and torsion by LSD

CO5 : design reinforced concrete staircase

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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							M
CO2	M	M	S		M							M
CO3	M	M	S									M
CO4	M	M	S									M
CO5	M	M	S									M

Signature of the Chairman
BOS/Civil Engineering

METHODS OF DESIGN OF CONCRETE STRUCTURES 9+3Hours

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.

DESIGN FOR FLEXURE 9+3Hours

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.-design of staircase

DESIGN FOR BOND, ANCHORAGE, SHEAR & TORSION 9+3Hours

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

DESIGN OF COLUMNS 9+3Hours

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

DESIGN OF FOOTING 9+3Hours

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

Theory:45HrsTutorial: 15Hrs Total : 60Hrs

REFERENCES

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.
6. I.C.Syal and A.K.Goel, "Reinforced Concrete Structures", S.Chand and Company Ltd, New Delhi, 2012.

Signature of the Chairman
BOS/Civil Engineering

U14CET503 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:plan water supply system for developing area
CO2 : design the various treatment plant in water supply system
CO3 : treat the drinking water using advanced techniques
CO4 : design the water distribution systems

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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						
CO2		M	S	M	M	S						
CO3		M	S									M
CO4		M	S			M						M

PLANNING FOR WATER SUPPLY SYSTEM 9Hours

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 9Hours

Signature of the Chairman
BOS/Civil Engineering

Water supply intake structures – Functions and drawings- pipes and conduits for water- Pipe materials– transmission main design – laying, jointing and testing of pipes –Network layout

WATER TREATMENT **6Hours**

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

UNIT OPERATION IN WATER TREATMENT **3Hours**

Principles and functions of aeration – Iron and manganese removal, Defluoridation and demineralization

ADVANCED WATER TREATMENT **9Hours**

Water softening – Desalination - membrane Systems – Reverse osmosis , UV – Biofilter, Activated carbon filter, Treatment for heavy metals

WATER DISTRIBUTION AND SUPPLY TO BUILDINGS **9Hours**

Requirements of water distribution – Components – Service reservoirs – Functions and drawings – Network design —– Analysis of distribution networks- Economics - computer applications – 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.

Theory:45Hrs **Total : 45Hrs**

REFERENCES

1. Mike Garg, S.K., "Environmental Engineering", Vol.1 Khanna Publishers, New Delhi, 2010.
2. Modi, P.N. "Water Supply Engineering", Vol.I Standard Book House, New Delhi, 2012.
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.

Signature of the Chairman
BOS/Civil Engineering

U14CET504 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 bolt and welded connections for steel structures
CO2: design light gauge steel elements
CO3 :design compression and tension members using rolled steel sections
CO4 :design steel beams and plate girders
CO5: design roof trusses and gantry girders.

Pre-requisites:
1. U14CET303 Strength of materials I
2. U14CET402 Strength of materials II

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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	W	M	S									M
CO2	W	M	S									M
CO3	W	M	S									M
CO4	W		S	M								M
CO5	W		S	M								M

Signature of the Chairman
BOS/Civil Engineering

INTRODUCTION **6+2Hours**

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+2Hours**

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+2Hours**

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+3Hours**

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+3Hours**

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.

ROOF TRUSSES AND INDUSTRIAL STRUCTURES **9+3Hours**

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

Theory:45HrsTutorial: 15Hrs Total :60Hrs

REFERENCES

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. Duggal. S.K, "Limit State Design of Steel Structures", Tata McGraw Hill Publishing Company, 2005.

OTHER REFERENCES

1. IS 800:2007, General Construction in Steel-Code of Practice, (Third Revision), Bureau of

Signature of the Chairman
BOS/Civil Engineering

Indian Standards, New Delhi, 2007.
2. Narayanan.R.et.al. “Teaching Resource on structural Steel design”, INSDAG, Ministry of Steel Publications, 2002.

Signature of the Chairman BOS/Civil Engineering

U14CET505 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: determine the settlement of the foundation on different types of soil

CO3: find the dimensions of the foundation for isolated footing , combined footing and floating foundation

CO4: analyze the group of piles for their load capacity

CO5: carry out stability analysis of retaining walls.

Pre-requisite :

1. U14CET404 Geotechnical Engineering - I

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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									
CO2		S	S			M						
CO3	M	S	S			M						
CO4		S	S			M						
CO5		S	S									

Signature of the Chairman
BOS/Civil Engineering

SITE INVESTIGATION AND SELECTION OF FOUNDATION 8Hours

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–- Bore log report –data interpretation- strength parameters and liquefaction potential – Selection of foundation based on soil condition.

BEARING CAPACITY AND SETTLEMENT 9Hours

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 and SCPT) Allowable bearing pressure – Seismic considerations in bearing capacity evaluation. Determination of Settlement of foundations on granular and clay deposits – Total and differential settlement

SHALLOW FOUNDATION 7Hours

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

PILE FOUNDATION 9Hours

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 – 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 – Under reamed piles

RETAINING WALLS 8Hours

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

GROUND IMPROVEMENT TECHNIQUES 4Hours

Geotextiles- uses, underpinning, stone column, vibroflotation, sand drains - Case study.

Theory:45HrsTotal: 45Hrs

REFERENCES

1. Gambhir. Venkatramiah C., Geotechnical Engineering, New Age International (P) Ltd , Publishers, New Delhi, 2008.

Signature of the Chairman BOS/Civil Engineering

2. Murthy V.N.S., " Soil Mechanics and Foundation Engineering", CBS Publishers and Distributers Ltd., New Delhi, 2011.
3. Gopal Ranjan and rao A.S.R. "basic and applied soil mechanics", New Age International Pvt.Ltd, New Delhi, 2014.
4. PurushothamaRaj.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, 2013.
6. Arora K.R. "Soil Mechanics and Foundation Engineering" , Standard Publishers and Distributors, New Delhi, 2014.

Signature of the Chairman
BOS/Civil Engineering

U14CET506 **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: prepare the plan for highways as per IRC standards.
CO2 : perform geometric design of urban and rural roads
CO3 : design flexible and rigid pavements using IRC methods
CO4: suggest modern materials and methods of highway construction.
CO5:evaluate, carry out maintenance and strengthening of existing pavements.

Pre-requisite :
1. U14CEP302 Concrete and Highway laboratory

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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						
CO3		S	S			S						M
CO4		M	M			M						M
CO5		M	S			M						M

HIGHWAY PLANNING AND ALIGNMENT 9Hours

Significance of highway planning – Modal limitations towards sustainability – History of road

Signature of the Chairman BOS/Civil Engineering

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 9Hours

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 9Hours

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

HIGHWAY CONSTRUCTION MATERIALS AND PRACTICE 9Hours

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 9Hours

Pavement distress in flexible and rigid pavements – Pavement management systems – pavement evaluation,roughnesss, present serviceability index, skid resistance, structural evaluation, and evaluation by deflection measurements – Strengthening of pavements – Types of maintenance – Highway Project formulation.

Theory:45Hrs **Total : 45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CEP501 **SOIL MECHANICS LAB**

L	T	P	C
0	0	2	1

Course Outcomes

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

CO1: determine the index properties of soil
CO2: determine the insitu density and compaction characteristics of soil
CO3: determine the engineering properties of soil

Pre-requisite :
1. U14CET404 Geotechnical engineering - I

Course Assessment methods:

Direct	Indirect
1. Lab exercise 2. Model exam 3. Observation	1. Course End survey

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				S	M	S						
CO3				S	M	S						

DETERMINATION OF INDEX PROPERTIES

1. Specific gravity of soil solids
2. Grain size distribution – Sieve analysis
3. Grain size distribution Hydrometer analysis
4. Liquid limit and plastic limit tests
5. Shrinkage limit and Differential free swell tests.

DETERMINATION OF INSITU DENSITY AND COMPACTION CHARACTERISTICS

1. Field density Test (Sand replacement method)
2. Determination of moisture – density relationship using standard Proctor Compaction

Signature of the Chairman
BOS/Civil Engineering

test.

DETERMINATION OF ENGINEERING PROPERTIES

1. Permeability determination (constant head and falling head methods)
2. One dimensional consolidation test (Determination of co-efficient of consolidation only)
3. Direct shear test in cohesionless soil
4. Unconfined compression test in cohesive soil
5. Laboratory vane shear test in cohesive soil
6. Tri-axial compression test in cohesion-less soil (Demonstration)
7. California Bearing Ratio Test

Experiments beyond the syllabus should be conducted.

Practical:45Hrs **Total : 45Hrs**

Signature of the Chairman BOS/Civil Engineering

U14CEP502 **ENVIRONMENTAL ENGINEERING LABORATORY**

L	T	P	C
0	0	2	1

Course Outcomes

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

CO1:conduct various quality tests on water and waste water
CO2:assess the suitability of water for drinking and irrigation purpose
CO3:assess the suitability of water for concreting works

Pre-requisite : Nil.

Course Assessment methods:

Direct	Indirect
1. Lab exercise 2. Model exam 3. Observation	1. Course End survey

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						
CO2			M	S	M	S						M
CO3			M	S	M	S						

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 Sulphate

Signature of the Chairman
BOS/Civil Engineering

12. Determination of available Chlorine
13. Determination OF C.O.D
14. Estimation of Acidity & Alkalinity
15. Determination of BOD
16. Heavy metal analysis using AAS

STUDY EXPERIMENTS

1. Sampling and preservation methods and signification of characterization of water and Wastewater.
2. Use Of Gas Chromatograph for the Air and Gas Composition analysis
3. Introduction to Bacteriological Analysis (Demonstration only)

Experiments beyond the syllabus should be conducted.

Practical:45Hrs **Total : 45Hrs**

Signature of the Chairman BOS/Civil Engineering

U14ENP501 **COMMUNICATION SKILLS LABORATORY**

L	T	P	C
0	0	2	1

Course Outcomes

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

CO1: Imparting the role of communicative ability as one of the softskills needed for placement
CO2: Developing communicative ability and softskills needed for placement
CO3: Making students Industry-Ready through inculcating team-playing capacity

Pre-requisites:

1. U14ENT101 / Functional English I
2. U14EN*T*201 / Functional English II

Course Assessment methods:

Direct	Indirect
1. Presentation, Role Play, Mock interview, GD etc.	1. Course End survey

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
CO2				W					S	S		S
CO3				S					S	M		S

GRAMMAR IN COMMUNICATION **9Hours**

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 **9Hours**

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

CORPORATE COMMUNICATION **9Hours**

Signature of the Chairman
BOS/Civil Engineering

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

PUBLIC SPEAKING **9Hours**

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 **9Hours**

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.

Practical: 45Hrs **Total :45Hrs**

REFERENCES

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

Signature of the Chairman
BOS/Civil Engineering

U14CEP503 **SURVEY CAMP**

L	T	P	C
0	0	2	1

Course Outcomes

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

CO1: conduct various types of survey in the field as per the requirements
CO2 : conduct survey using advanced instruments
CO3 : Prepare contour map for the given area

Pre-requisites:

1. U14CEP301 Surveying practical I
2. U14CEP401 Surveying practical II

Course Assessment methods:

Direct	Indirect
1. Survey report 2. Viva voice examination	1. Course end survey

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			M			M
CO2				S	S	M			M			M
CO3				S	S	M			M			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

Signature of the Chairman
BOS/Civil Engineering

(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

Practical:30Hrs **Total :30Hrs**

Signature of the Chairman BOS/Civil Engineering

SEMESTER VI

Signature of the Chairman BOS/Civil Engineering

U14CET601 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

Pre-requisites :

1. U14CET501 Structural analysis
2. U14MAT401 Numerical methods

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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									

Signature of the Chairman
BOS/Civil Engineering

SPACE AND CABLE STRUCTURES **9+3Hours**

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+3Hours**

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+3Hours**

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+3 Hours**

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, continuous beams and rigid frames (with redundancy limited to two)

INTRODUCTION TO FINITE ELEMENT ANALYSIS **9+3Hours**

Introduction- Steps involved in FEA – Displacement functions – truss element – beam element – plane stress and plane strain – Triangular elements.

Theory:45 HrsTutorial: 15Hrs **Total : 60Hrs**

REFERENCES

1. Punmia,B.C., Ashok Kumar and Arun Kumar Jain, " Theory of Structures", Laxmi Publications, 2005.
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, New Delhi, 2004

Signature of the Chairman
BOS/Civil Engineering

U14CET602	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:design masonry walls for axial and eccentrical loads
CO2 :design counterfort and cantilever retaining walls
CO3 :design underground and overhead water tanks
CO4 : design Slab using yield line theory
CO5: design bridges and flat slab

Pre-requisite:

1. U14CET502 Design of reinforced concrete elements

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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									
CO3		M	S									
CO4		M	S									
CO5		M	S									

Signature of the Chairman
BOS/Civil Engineering

MASONRY **9+3Hours**

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 **9+3Hours**

Design of Cantilever and Counterfort Retaining walls

WATER TANK **9+3Hours**

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+3Hours**

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

BRIDGESAND FLAT SLAB **9+3Hours**

Types of bridges – IRC loading – design of single span slab bridge for class A loading. Flat slab – Types – design methods , IS code recommendations – Shear- Reinforcement details

Theory:45HrsTutorial: 15Hrs **Total :60Hrs**

REFERENCES

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. I.C.Syal and A.K.Goel, "Reinforced Concrete Structures", S.Chand and Company Ltd, New Delhi, 2012.

Signature of the Chairman
BOS/Civil Engineering

U14CET603 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 : design sewerage systems
CO2 : choose suitable pumps for discharge of sewage
CO3: design the various unit operations for waste water treatment
CO4: design the sludge treatment and disposal methods
CO5: perform quality analysis of sewage the characteristics and composition of sewage, self Purification of streams.

Pre-requisite:
1. U14CEP502 Environmental Engineering lab

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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						
CO2	M					S						M
CO3	M		S			S						M
CO4	M		S			S						M
CO5	M	S		S	M	S						M

PLANNING FOR SEWERAGE SYSTEMS **9Hours**

Sources of waste water generation – Effects – Estimation of sanitary sewage flow – Estimation

Signature of the Chairman
BOS/Civil Engineering

of storm runoff – factors affecting Characteristics and composition of sewage and their significance – Effluent standards – Legislation requirements.

SEWER DESIGN **9Hours**

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 **9Hours**

Objective – Selection of treatment processes – Principles, Functions, Design and Drawing of Unit operations – 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 **9Hours**

Objective – Selection of Treatment Methods – Principles, Functions, Design and Drawing of Unit operations – 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.

DISPOSAL OF SEWAGE AND SLUDGE MANAGEMENT **9Hours**

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.

Theory:45 Hrs **Total : 45Hrs**

REFERENCES

1. Garg S.K., "Environmental Engineering" Vol II, Khanna Publishers, New Delhi, 2005.
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.

Signature of the Chairman
BOS/Civil Engineering

U14CET604 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 : perform geometric design of permanent way
CO2 : plan for location of railway station , yards and other amenities
CO3 :prepare layout for airport and classify the airport
CO4:perform the geometric design of airport components
CO5:prepare the plan for various harbour structures

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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			S			S						M
CO4			S			S						M
CO5	M		S			S						M

RAILWAY PLANNING **9Hours**

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

Signature of the Chairman
BOS/Civil Engineering

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 **9Hours**

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 **9Hours**

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 **9Hours**

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

HARBOUR ENGINEERNG **9Hours**

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.

Theory:45Hrs **Total : 45Hrs**

REFERENCES

1. SaxenaSubhash C and Satyapalarora, " 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.

Signature of the Chairman BOS/Civil Engineering

U14GST005 **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

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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	W		M								S	
CO2						S					S	
CO3						S					S	
CO4											S	
CO5											S	

Signature of the Chairman
BOS/Civil Engineering

ECONOMICS, COST AND PRICING CONCEPTS 9Hours

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 9Hours

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

NATIONAL INCOME, MONEY AND BANKING, ECONOMIC ENVIRONMENT 9Hours

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

CONCEPTS OF FINANCIAL MANAGEMENT 9Hours

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 9Hours

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

Theory:45Hrs **Total: 45Hrs**

REFERENCES

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

Signature of the Chairman BOS/Civil Engineering

U14CEP601 **COMPUTER AIDED DESIGN AND DRAWING (RCC & 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 using computer software

CO2:design steel structures like foot bridge, plate girder, gantry girder using computer software

CO3:design framed connections for steel structures using computer software

Pre-requisite :

1. U14CEP403 Building planning and drawing

Course Assessment methods:

Direct	Indirect
1. Lab exercise 2. Model exam 3. Observation	1. Course End survey

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	S	S						M
CO2	M	M	S	S	S	S						M
CO3	M	M	S	S	S	S						M

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

Signature of the Chairman
BOS/Civil Engineering

Theory:20Hrs **Practicals: 20Hrs** **Total : 45Hrs**

References:

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

Signature of the Chairman BOS/Civil Engineering

U14CEP602 **COMPUTER APPLICATIONS LABORATORY**

L	T	P	C
0	0	2	1

Course Outcomes

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

CO1 : prepare spread sheet for steel and RC structures using suitable Software in the Civil Engineering field.

CO2:analyze the pipe network for water distribution.

CO3:estimate the Quantity of works involved in the construction project using software.

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Lab exercise 2. Model exam 3. Observation	1. Course End survey

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	S	S		S	M	M					M
CO3	M		S		S	S						M

LIST OF EXPERIMENTS

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

Signature of the Chairman
BOS/Civil Engineering

6. **Project Management** – PERT and CPM, project scheduling, managing and documentation Network analysis.

Experiments beyond the syllabus should be conducted.

Practical :45Hrs **Total : 45Hrs**

Signature of the Chairman BOS/Civil Engineering

U14CEP603 **INDUSTRIAL TRAINING**

L	T	P	C
0	0	0	1

Course Outcomes

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

CO1: handle and execute the civil engineering projects in the field.

Pre-requisites:

1. U14CET305 Concrete technology
2. U14CET502 Design of reinforced concrete elements
3. U14CET504 Design of steel structures
4. U14CEP403 Building planning and drawing

Course Assessment methods:

Direct	Indirect
1. Report presentation	1. Course end survey

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	M	M	M	M	M	M

Course objectives:

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.

Signature of the Chairman
BOS/Civil Engineering

U14CEP604 **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: present the technical presentation confidentially
CO2: able to prepare the presentation contents for tender or contracts
CO3: communicate with the clients fluently

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Seminar	1. Course end survey

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										S		M

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 overhead projectors, power point presentation and demonstrative models.

Practical :30Hrs **Total : 30Hrs**

Signature of the Chairman
BOS/Civil Engineering

SEMESTER VII

Signature of the Chairman BOS/Civil Engineering

U14CET701 **ESTMATION, COSTING AND VALUATION**

L	T	P	C
3	0	2	4

Course Outcomes

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

CO1: prepare various types of estimation and find out the quantity of works involved.
CO2: carry out analysis of rates and bill preparation.
CO3: prepare specifications for various items of construction works
CO4: estimate the quantity of works involved in road works, water supply and sanitary works
CO5: estimate the value of buildings.

Pre-requisites:

1. U14CEP403 Building planning and drawing
2. U14CEP601 Computer aided design and drawing (RCC & steel)

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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						M
CO2	M	S	M			M						M
CO3	M	S	M			M						M
CO4	M	S	M			M						M
CO5	M	S	M			M						M

Signature of the Chairman
BOS/Civil Engineering

ESTIMATE OF BUILDINGS **9+3Hours**

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+3Hours**

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+3Hours**

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

VALUATION **9+3Hours**

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

REPORT PREPARATION **9+3Hours**

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.

Theory:45HrsPractical: 15Hrs **Total :60Hrs**

REFERENCES

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

Signature of the Chairman
BOS/Civil Engineering

U14CET702 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 : estimate water requirements for irrigation and drinking
CO2: perform water resources and prepare water budget.
CO3 : estimate consumptive use of water for irrigation
CO4 :design cross drainage works
CO5: prepare irrigation scheduling and water distribution for various crops.

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. Tutorial 6. End semester exam	1. Course End survey

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										
CO3	M	S										
CO4	M	S	S									M
CO5	M	S										M

WATER RESOURCES **8Hours**

Water resources of India and Tamilnadu- Description of water resources planning – Estimation of water requirements for irrigation and drinking-reservoir operation - Single reservoir -

Signature of the Chairman
BOS/Civil Engineering

Fixation of Storage capacity- multipurpose reservoir —– Strategies for reservoir operation- single and Multi objective – Design flood – levees and flood walls.

WATER RESOURCE MANAGEMENT 10Hours

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 10Hours

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 10Hours

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 7Hours

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

Theory:45Hrs **Total : 45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14GST007 **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 : understanding 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

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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	

ENGINEERING ETHICS AND THEORIES 9Hours

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.

Signature of the Chairman
BOS/Civil Engineering

SOCIAL ETHICS AND ENGINEERING AS SOCIAL EXPERIMENTATION 9Hours

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

SAFETY 9Hours

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 9Hours

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

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

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.

Theory:45Hrs **Total : 45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CEP701 **PROJECT WORK (PHASE - I)**

L	T	P	C
0	0	6	2

Course Outcomes

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

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

Pre-requisites:

1.U14CET502 Design of Reinforced Concrete Elements,
2. U14CET504 Design of Steel Structures
3. U14CET501 Structural Analysis I
4. U14CET601 Structural Analysis II

Course Assessment methods:

Direct	Indirect
1. Project report 2. Oral presentation	1. Course end survey

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				M	S	S	
CO2	M	M	M		M				M	S	S	
CO3	M	M	M		M				M	S	S	
CO4	M	M	M		M				M	S	S	

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

Signature of the Chairman
BOS/Civil Engineering

the college where the student is registered. 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.

Total : 90Hrs

Signature of the Chairman
BOS/Civil Engineering

U14CEP702 DESIGN AND DRAWING (IRRIGATION AND ENVIRONMENTAL ENGINEERING)

L	T	P	C
2	0	2	3

Course Outcomes

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

CO1: design the various irrigation structures

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

CO3 : design various components of water and wastewater treatment plants

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Lab exercise 2. Model exam 3. Observation	1. Course End survey

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		M		M	S		M
CO2	M	M	M		M		M		M	S		M
CO3	M	M	M		M		M		M	S		M
CO4	M	M	M		M		M		M	S		M

PART- A **25Hours**

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

PART – B **20Hours**

- General layout of a water supply scheme – wastewater treatment process flow diagram
- Sedimentation tanks
- Clariflocculators

Signature of the Chairman
BOS/Civil Engineering

- Rapid sand filters
- Septic Tank
- Activated sludge process
- Trickling filter

QUESTION PAPER PATTERN

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.

Theory:20Hrs **Practical : 25Hrs** **Total : 45Hrs**

REFERENCES

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.

Signature of the Chairman BOS/Civil Engineering

SEMESTER VIII

Signature of the Chairman BOS/Civil Engineering

U14CEP801 **PROJECT WORK (PHASE - II)**

L	T	P	C
0	0	18	6

Course Outcomes

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

CO1: Identify the real world problems
CO2: Develop design methodologies & its implementation
CO3: Utilize advanced software techniques / skills
CO4: Prepare Technicalreports

Pre-requisites:

1.U14CET502 Design of Reinforced Concrete Elements,
2.U14CET504 Design of Steel Structures
3.U14CET305 Concrete Technology

Course Assessment methods:

Direct	Indirect
1. Project report 2. Oral presentation	1. Course end survey

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	S	S	S	S	S	M
CO2	M	M	M	M	S	M		S	S	S	M	M
CO3	M	M	M	M	S	M						M
CO4				S	S	M			S	S		M

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: 270Hrs

Signature of the Chairman
BOS/Civil Engineering

ELECTIVE I

Signature of the Chairman BOS/Civil Engineering

U14CETE11 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:analyze the trip production and trip attraction models
CO3:analyze 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.

Pre-requisite :
1. U14CET506 Highway Engineering

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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	PO 12
CO1		S				M						
CO2		S			M							
CO3		S			M							
CO4		S			M							
CO5		S			M							

TRANSPORTATION PLANNING **9Hours**

Transportation planning Process and Concepts – Role of transportation – Transportation

Signature of the Chairman
BOS/Civil Engineering

problems- Urban travel characteristics – Concept of travel demand – Demand function – demand estimation- sequential, recursive and simultaneous processes

TRIP GENERATION ANALYSIS **9Hours**

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 **9Hours**

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

MODE SPLIT ANALYSIS **9Hours**

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

TRAFFIC ASSIGNMENT **9Hours**

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

Theory: 45Hr **Total : 45Hrs**

REFERENCES

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.JotinKhisty, B. Kent lall, Transportation Engineering, Prentice Hall of India, 2002.

Signature of the Chairman
BOS/Civil Engineering

U14CETE12 **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:analyze traffic problems and plan for traffic systems for various uses.
CO2: conduct traffic survey.
CO3:design channels, intersections, signals and parking arrangements.
CO4:plan for integration of public transport system.
CO5:develop Traffic Management Systems.

Pre-requisite :
1. U14CET506 Highway Engineering

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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	PO 12
CO1		S				S						
CO2		S				S						
CO3			M	S								
CO4		S	S									
CO5			S		M	M						

TRAFFIC PLANNING AND CHARACTERISTICS **9Hours**

Road characteristics – Road User Characteristics-PIEV Theory – Vehicle -Performance characteristics – Fundamentals of Traffic flow – Urban Traffic problems in India- Integrated

Signature of the Chairman
BOS/Civil Engineering

planning of town, country, regional and all urban infrastructure- Towards sustainable approach-land use & transport and modal integration

TRAFFIC SURVEYS **9Hours**

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 **9Hours**

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 **9Hours**

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.

TRAFFIC MANAGEMENT **9Hours**

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.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman BOS/Civil Engineering

U14CETE13 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 neighbourhood.
CO4:identify the financing agenciesand its functions
CO5: apply the town and country plan act and building by-laws.

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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	PO 12
CO1		S				M						
CO2		S				M						
CO3		S				M						
CO4		S				M					M	
CO5		S				S						M

PLANNING

9Hours

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

Signature of the Chairman
BOS/Civil Engineering

TYPES OF PLAN 9Hours

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

PLANNING PRINCIPLES 9Hours

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 9Hours

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

REGULATIONS 9Hours

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

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE14 **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: perform architectural design of structures
CO2:suggest the land requirement as per the zoning regulations
CO3:apply anthropometry and space standards
CO4:apply green building concepts
CO5: perform Land scape design

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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	PO 12
CO1			S			M						
CO2			S			M						
CO3	M					S						
CO4						M	S					
CO5						S	S					

ARCHITECTURAL DESIGN **9Hours**

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

Signature of the Chairman
BOS/Civil Engineering

SITE PLANNING **9Hours**

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

BUILDING TYPES **9Hours**

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 **9Hours**

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

ENVIRONMENTAL DESIGN **9Hours**

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

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE15 **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 pavement based on IRC guidelines.
CO2:design rigid pavement based on IRC guidelines.
CO3:implement various techniques to evaluate performance of pavements.
CO4:utilize geosynthetics for pavements
CO5:adopt suitable soil stabilization techniques for pavements

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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					
CO3		S	S			S	M					
CO4			S			S	M					
CO5	M		S		S		M					

TYPES OF PAVEMENT AND STRESS DISTRIBUTION ON LAYERED SYSTEM

9Hours

Signature of the Chairman
BOS/Civil Engineering

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

DESIGN OF FLEXIBLE PAVEMENTS **9Hours**

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 Hours**

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 **9Hours**

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 **9Hours**

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

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

ELECTIVE II

Signature of the Chairman BOS/Civil Engineering

U14CETE21 **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: develop simple modelling with respect to water resources.
CO2: identify the sources for the collection of data for developing water resource model.
CO3:optimize the water resource models.
CO4: apply bellman's optimality criteria Problem solution.
CO5: develop deterministic simulation model for water resources application.

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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					
CO3		S			S	S	S					
CO4		S			S	S	S					
CO5		S			S	S	S					

SYSTEM APPROACH **9Hours**

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

PHYSICAL AND SOCIO ECONOMIC DATA **9Hours**

Signature of the Chairman
BOS/Civil Engineering

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

LINEAR PROGRAMMING **9Hours**

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

DYNAMIC PROGRAMMING **9Hours**

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

SIMULATION **9Hours**

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

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE22 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: assess the aquifer properties and its dynamics.
CO2: estimate the ground water yield from an open well/ bore well
CO3:plan the ground water management schemes
CO4:study the impact of saline water intrusion in ground water
CO5:suggest artificial recharge techniques

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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	PO 12
CO1	M	S				M						
CO2	M	S				M						
CO3		S			M	M						
CO4		S			M	M						
CO5		S			M	M	M					

HYDROGEOLOGICAL PARAMETERS **9Hours**

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

Signature of the Chairman
BOS/Civil Engineering

in India – GEC norms

WELL HYDRAULICS

9Hours

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

GROUND WATER MANAGEMENT **9Hours**

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 **9Hours**

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 **9Hours**

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

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE23 **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: apply the concepts of Electro Magnetic energy, spectrum and spectral signature curves in the practical problems

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

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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	PO 12
CO1	S				S	S						M
CO2	S				S	S						M
CO3	S				S	S						M
CO4	S	S			S	S						M
CO5	S	S			S	S						M

Signature of the Chairman
BOS/Civil Engineering

EMR AND ITS INTERACTION WITH ATMOSPHERE & EARTH MATERIAL **9Hours**

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 **9Hours**

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 **9Hours**

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.

GEOGRAPHIC INFORMATION SYSTEM **9Hours**

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 **9Hours**

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.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman BOS/Civil Engineering

U14CETE24 **HYDROLOGY**

L	T	P	C
3	0	0	3

Course Outcomes

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

CO1:measure the rainfall intensity , duration and frequency
CO2:assess the losses of precipitation due to evaporation
CO3:prepare the unit hydrograph for surface runoff
CO4:solve the flood routine and channel routine problems
CO5:conduct yield test on aquifers

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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	PO 12
CO1	S					S	S					
CO2		S				S	S					
CO3		S			S							
CO4		S			M	S						
CO5		S			M							

PRECIPITATION **9Hours**

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.

Signature of the Chairman
BOS/Civil Engineering

ABSTRACTION FROM PRECIPITATION **9Hours**

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

HYDROGRAPHS **9Hours**

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 **9Hours**

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

GROUND WATER HYDROLOGY **9Hours**

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

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

ELECTIVE III

Signature of the Chairman BOS/Civil Engineering

U14CETE31 **MATRIX METHODS OF STRUCTURAL**

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:find out the deflections in beams and trusses using various methods
CO3:analyse the structures using flexibility and stiffness method
CO4:determine member forces using element and system matrices for determinate and indeterminate structures
CO5:determine the forces in various members due to lack of fit and thermal expansion**.**

Pre-requisite :
1. U14CET601 Structural Analysis - II

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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									

CONSTRAINED MEASUREMENTS **9Hours**

Generalized measurements- Degrees of freedom- constrained measurements- Behaviour of structures- Principle of superposition, stiffness and flexibility matrices- Constrained

Signature of the Chairman
BOS/Civil Engineering

measurements- stiffness and flexibility coefficients from virtual work.

STRAIN ENERGY **9Hours**

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 **9Hours**

Determinate and indeterminate structures- Transformation of element matrices to system matrices- Transformation of system vectors to element vectors- Normal coordinates and orthogonal transformations.

FLEXIBILITY METHOD **9Hours**

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 **9Hours**

Development of the method – internal forces due to thermal expansion and lack of fit- Application of symmetrical structures- Comparison between stiffness and flexibility methods.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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

Signature of the Chairman BOS/Civil Engineering

U14CETE32 **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

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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									

INTRODUCTION **9Hours**

Introduction –types-advantages-comparison-limit states of composite sections- introduction to plastic analysis – mechanism of composite members

Signature of the Chairman
BOS/Civil Engineering

SHEAR CONNECTORS 9Hours

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 9Hours

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 9Hours

Design of composite beam with profile sheet- propped and un-propped condition – deflection of composite beams – design of partial shear connection

COMPOSITE SLABS 9Hours

Introduction- Composite slabs- profiled sheeting-sheeting parallel to span-sheeting perpendicular to span- analysis and design of composite floor system..

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE33 **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: apply the concept ofthe differential equilibrium equations and their relationship in the analysis of structures

CO2: apply numerical methods to FEM for structural analysis

CO3: use displacement models and load vectors to find the member forces

CO4: perform finite element analysis for structures

Pre-requisite courses:

1.U14CET601 Structural Analysis - II

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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							
CO2		S	S		S							
CO3		S	S		S							
CO4		S	S		S							

INTRODUCTION **9Hours**

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.

Signature of the Chairman
BOS/Civil Engineering

DISPLACEMENT MATRIX **9Hours**

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 **9Hours**

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 **9Hours**

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.

ANALYSIS OF FRAMED STRUCTURES **9Hours**

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.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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

Signature of the Chairman BOS/Civil Engineering

U14CETE34 **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: implement design philosophies for the development of high rise structures

CO2: find out the design loads for high rise buildings

CO3:analyse the behavior of tall buildings subjected to lateral loading.

CO4: perform computerized general three dimensional analysis for high rise building

CO5: perform stability analysis using various methods for tall buildings

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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									

DESIGN CRITERIA AND MATERIALS **9Hours**

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.

Signature of the Chairman
BOS/Civil Engineering

LOADING 9Hours

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 9Hours

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 9Hours

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 9Hours

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.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE35 **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 steel water tank, staging and foundation
CO2: design concrete , overhead and underground water tanks
CO3: design steel bunkers and silos as per IS codal provisions
CO4: design concrete bunkers and silos as per IS codal provisions
CO5: design prestressed concrete circular water tank

Pre-requisites:

1.U14CET504 Design of steel structures
2.U14CET502 Design of reinforced concrete elements
3.U14CET602 Design of masonry and RC structures

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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									

STEEL WATER TANKS **15Hours**

Design of rectangular riveted steel water tank – Tee covers – Plates – Stays –Longitudinal and

Signature of the Chairman
BOS/Civil Engineering

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 **15Hours**

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 **5Hours**

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 **5Hours**

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

PRESTRESSED CONCRETE WATER TANKS **5Hours**

Principles of circular prestressing – Design of prestressed concrete circular water tanks.

Theory: 45Hrs **Total:45 Hrs**

REFERENCES

1. Punmia B.C., Ashok Kumar Jain, ArunK.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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE36 **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: design of through type and deck type steel highway bridges.

CO2:design various type of plate girder and truss girder railway bridge

CO3:design various types of RC slab bridges for IRC loading

CO4:design various types of RC girder bridges for IRC loading

CO5:design prestressed concrete bridges

Pre-requisites:

1.U14CET504 Design of steel structures
2.U14CET502 Design of reinforced concrete elements
3.U14CET602 Design of masonry and RC structures

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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									

Signature of the Chairman
BOS/Civil Engineering

INTRODUCTION **9Hours**

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

9Hours

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 **9Hours**

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 **9Hours**

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.

PRESTRESSED CONCRETE BRIDGES **9Hours**

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.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE37 **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: Prepare the layout for industrial buildings

CO2: design for functional requirements

CO3: design steel girder, bunker and silos

CO4: design RC structures like chimneys, silos and folded plates

CO5:design prestressed precast concrete units.

Pre-requisites:

1.U14CET504 Design of steel structures
2.U14CET502 Design of reinforced concrete elements
3.U14CET602 Design of masonry and RC structures

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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									
CO3		S	S									
CO4		S	S									
CO5		S	S									

Signature of the Chairman
BOS/Civil Engineering

PLANNING **9Hours**

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 **9Hours**

Lighting – Ventilation – Accounts – Fire safety – Guidelines from factories act.

DESIGN OF STEEL STRUCTURES **9Hours**

Industrial roofs – Crane girders – Mill buildings – Design of Bunkers and Silos

DESIGN OF R.C. STRUCTURES **9Hours**

.Silos and bunkers – Chimneys – Principles of folded plates and shell roofs

PREFABRICATION **9Hours**

Principles of prefabrication – Prestressed precast roof trusses- Functional requirements for Precast concrete units

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE38 **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:prepare wire frame modelling and solid modelling using drafting packages
CO2: perform structural analysis using computer packages
CO3: prepare algorithms for the analysis and design of steel and RC structures
CO4:analysis simple structures using expert systems

Pre-requisites:

1. U14CET601 Structural analysis - I
2.U14CST101 Structured programming using C

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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		S	S						
CO2		S	S		S	S						
CO3		S	S		S	S						
CO4		S	S		S	S						

INTRODUCTION **9Hours**

Fundamentals of CAD - Hardware and software requirements -Design process - Applications and benefits.

COMPUTER GRAPHICS **9Hours**

Signature of the Chairman
BOS/Civil Engineering

Graphic primitives - Transformations -Wire frame modeling and solid modeling -Graphic standards –Drafting packages

STRUCTURAL ANALYSIS **9Hours**

Fundamentals of finite element analysis - Principles of structural analysis -Analysis packages and applications.

DESIGN AND OPTIMISATION **9Hours**

Principles of design of steel and RC Structures -Applications to simple design problems – Optimisation techniques - Algorithms - Linear Programming – Simplex method

EXPERT SYSTEMS **9Hours**

Introduction to artificial intelligence - Knowledge based expert systems -Rules and decision tables –Inference mechanisms - Simple applications

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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. KrishnamoorthyC.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.
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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE39 **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 prestressed composite beams

CO3: design flexural members with partial prestressing

CO4: design prestressed concrete tanks, poles and sleepers

CO5: design prestressed concrete bridges

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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									

INTRODUCTION – THEORY AND BEHAVIOUR **9Hours**

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

Signature of the Chairman
BOS/Civil Engineering

influencing deflections – Calculation of deflections – Short term and long term deflections - Losses of prestress – Estimation of crack width

DESIGN **9Hours**

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 **9Hours**

Design of prestressed concrete tanks – Poles and sleepers

COMPOSITE CONSTRUCTION **9Hours**

Analysis for stresses – Estimate for deflections – Flexural and shear strength of composite members

PRE-STRESSED CONCRETE BRIDGES **9Hours**

General aspects – pretensionedprestressed bridge decks – Post tensioned prestressed bridge decks – Principles of design only.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

ELECTIVE IV

Signature of the Chairman BOS/Civil Engineering

U14CETE41 **GEOTECHNICAL 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: applythe 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.

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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			S						
CO5		S	S									

Signature of the Chairman
BOS/Civil Engineering

MECHANISM OF EARTHQUAKE **9Hours**

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 **9Hours**

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

GROUND MOTION **9Hours**

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

EARTHQUAKE RESPONSE OF SLOPES **9Hours**

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

HAZARD ASSESSMENT **9Hours**

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

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE42 **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: suggest suitable ground improvement techniques for different types of soil
CO2:suggest dewatering and drainage techniques for different types of soil
CO3:perform insitu treatment of cohesionless and cohesivesoils
CO4: utilize geotextiles for soil stabilization
CO5:implement grouting techniques for stabilization of expansive soil

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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	PO 12
CO1		S	S									
CO2		S	S									
CO3		S	S									
CO4		S				S						
CO5		S	S									

INTRODUCTION **9Hours**

Role of ground improvement in foundation engineering - methods of ground improvement – Geotechnical problems in alluvial, laterite and black cotton soils -Selection of suitable ground

Signature of the Chairman
BOS/Civil Engineering

improvement techniques based on soil condition.

DRAINAGE AND DEWATERING **9Hours**

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 SOIL **9Hours**

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 **9Hours**

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 **9Hours**

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

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman BOS/Civil Engineering

U14CETE43 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:suggest maintenance and repair strategies
CO2: assess the durability of concrete due to various climatic conditions
CO3: suggest the suitable materials and techniques for repair
CO4:implement various rehabilitation and retrofitting techniques
CO5: select suitable demolition techniques for structures

Pre-requisite :
1. U14CET305 Concrete Technology

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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			S						
CO4		S	S									
CO5		S	S			S						

MAINTENANCE AND REPAIR STRATEGIES **8Hours**

Maintenance, repair and rehabilitation, Facets of Maintenance, importance of Maintenance

Signature of the Chairman
BOS/Civil Engineering

various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

SERVICEABILITY AND DURABILITY OF CONCRETE **12Hour**

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 **15Hour**

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 **6Hours**

Repairs to overcome low member strength, Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure

DEMOLITION TECHNIQUES **4Hours**

Engineered demolition techniques for Dilapildated structures – case studies

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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..

Signature of the Chairman
BOS/Civil Engineering

U14CETE44 **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:summarize the basics of seismology.
CO2:interpret the cyclic loading behavior of various elements.
CO3: make use of IS code provisions for shear walls and raced frames.
CO4:analyze a structure by equivalent static procedure and determine base shear.
CO5:apply base isolation systems in buildings

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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						
CO2		S	S	S		S						
CO3		S	S			S						
CO4		S	S			S						
CO5		S	S			S						

ELEMENTS OF ENGINEERING SEISMOLOGY **9Hours**

Elements of Engineering Seismology- Theory of Vibrations- Indian Seismicity – earthquake history – behavior of structures in the past earthquakes.

Signature of the Chairman
BOS/Civil Engineering

SEISMIC DESIGN CONCEPTS **9Hours**

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 **9Hours**

Provision of Seismic code for frames, shear walls, Braced frames, Combinations- Torsion.

DESIGN METHODOLOGY **9Hours**

IS 1893, IS 13920 and IS 4326 – Codal provisions, Determination of design base shear as per code books – problems.

BASE ISOLATION **9Hours**

Seismic performance – irregular Buildings – Soil performance, modern concepts – Base Isolation – Adoptive systems – case studies.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

1. S.K.Duggal, Earthquake Resistant Design of Structures, Prentice Hall of India, New Delhi, 2013.
2. Pankaj Agarwal and Manish Shrikhande, Earthquake Resistant Design of Structures, Prentice Hall of India, New Delhi, 2006.
3. Bullen K.E., Introduction to the Theory of Seismology, Great Britain at the University Printing houses, Cambridge University press 1996.
4. IS 1893-Part I (2002), "Indian Standard Criteria for Earthquake Resistant Design of Structures".
5. IS 4326 (1993), "Indian Standard Earthquake Resistant Design and construction of buildings - Code of practice PART 1 General provisions and Buildings".
6. IS 13920 (1993), "Indian Standard Ductile detailing of reinforced Concrete Structures subjected to Seismic forces – Code of practice".

Signature of the Chairman
BOS/Civil Engineering

U14CETE45 **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 SDOFsystems

CO3: identify, formulate and solve dynamic response of MDOFsystems

CO4: analyze continuous systems subjected to different types of dynamic loads

CO5: identify, formulate and solve free and forced vibrations response of structural systems.

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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									

DYNAMIC ANALYSIS **9Hours**

Dynamic analysis – Elements of vibratory systems and simple Harmonic Motion – Mathematical models of SDOF systems- Principle of Virtual displacements – Evaluation of damping resonance.

Signature of the Chairman
BOS/Civil Engineering

VIBRATION ANALYSIS **9Hours**

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 **9Hours**

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 **9Hours**

Evaluation of structural property matrices – Natural vibration – Solution of the eigen value problem – Iteration due to Holzer and Stodola

DESIGN OF EARTHQUAKE RESISTANT STRUCTURES **9Hours**

Idealization of multi-storeyed frames- analysis to blast loading – Deterministic analysis of earthquake response – lumped SDOF system – Design of earthquake resistant structures.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman BOS/Civil Engineering

ELECTIVE V

Signature of the Chairman BOS/Civil Engineering

U14CETE51 **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

CO1: carry out screening and scoping for developmental projects.
CO2:implement different methodologies for environmental impact assessment
CO3:measure quantitatively environmental impact on major environments
CO4: implement ISO guidelines in industries
CO5:prepare environmental impact assessment reports.

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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
CO5							S			S		

INTRODUCTION **5Hours**

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

Signature of the Chairman
BOS/Civil Engineering

limitations – Legal provisions on EIA.

METHODOLOGIES **5Hours**

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

PREDICTION AND ASSESSMENT **10Hours**

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

10Hours

ENVIRONMENTAL MANAGEMENT PLAN

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 **15Hours**

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

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE52 **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:apply sampling techniques to collect municipal solid wastes from an area
CO2:select shortest route for effective municipal solid waste collection
CO3:conduct break even analysis and locate transfer station location
CO4:select suitable equipment , process for handling and disposal of municipal solid waste
CO5:construct an engineered landfill site for disposal of municipal solid waste

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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					M
CO2		S		M		M	M					M
CO3			S		M		M					M
CO4	M	S				S	M					M
CO5			S			S	M					M

SOURCES AND TYPES OF MUNICIPAL SOLID WASTES **9Hours**

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

Signature of the Chairman
BOS/Civil Engineering

aspects; Public awareness; Role of NGOs; Legislation.

ON-SITE STORAGE & PROCESSING **9Hours**

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 **9Hours**

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

OFF-SITE PROCESSING **9Hours**

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

9Hours

DISPOSAL

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

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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

Signature of the Chairman
BOS/Civil Engineering

U14CETE53 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:identify the impact on human being , flora and fauna due to air pollution
CO2:perform quantitative measurements of the dispersion of pollutants in the atmosphere
CO3:select suitable equipment for air pollution control
CO4:implement town planning rules and regulation with respect to air pollution
CO5:assess the ill effects of noise pollution

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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					M
CO3		S				S	S					M
CO4		S				S	S					M
CO5		S				S	S					M

SOURCES AND EFFECTS OF AIR POLLUTANTS **9Hours**

Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution –

Signature of the Chairman BOS/Civil Engineering

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 **9Hours**

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

AIR POLLUTION CONTROL **15Hours**

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 **7Hours**

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

NOISE POLLUTION **9Hours**

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

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE54 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: suggest the industrial waste disposal methods on land and water environment.
CO2: conduct waste audit in an industry and implement waste minimization techniques.
CO3: identify the impacts on environment due to various industrial effluents.
CO4:select suitable treatment methods for low, medium and high polluting industries.
CO5: suggest methods for safe disposal of hazardous waste.

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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					S
CO2						S	S					S
CO3						S	S					M
CO4						S	S					M
CO5						S	S					M

INTRODUCTION 7Hours

Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage

Signature of the Chairman
BOS/Civil Engineering

treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

CLEANER PRODUCTION **8Hours**

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

POLLUTION FROM MAJOR INDUSTRIES **10Hours**

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 **12Hours**

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

HAZARDOUS WASTE MANAGEMENT **8Hours**

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

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

ELECTIVE VI

Signature of the Chairman BOS/Civil Engineering

U14CETE61 **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: apply the remote sensing and GIS techniques for predicting the natural disasters.
CO2:apply various geospatial technology for disaster mapping
CO3:prepare disaster management plan
CO4:assess disaster vulnerability of a location
CO5:work on recovery & rehabilitation due to disasters.

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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					M
CO2		S			S	S	M					M
CO3		S			S	S	M					M
CO4		S			S	S	M					M
CO5		S			S	S	M					M

Signature of the Chairman
BOS/Civil Engineering

NATURAL DISASTERS **9Hours**

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

MAN MADE DISASTERS **9Hours**

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

GEOSPATIAL TECHNOLOGY **9Hours**

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

RISK ASSESSMENT AND MITIGATION **9Hours**

Hazards, Risks and Vulnerabilities. -Disasters in 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 **9Hours**

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.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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. RajdeepDasgupta, 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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE62 **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:implement scientific and modern management principles
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.

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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	PO 12
CO1		S									S	M
CO2		S									S	M
CO3		S									S	M
CO4		S									S	M
CO5		S							S		S	M

INTRODUCTION **9Hours**

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

Signature of the Chairman
BOS/Civil Engineering

management.

PLANNING **9Hours**

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.

HUMAN RESOURCE **9Hours**

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.

LEADERSHIP THEORIES **9Hours**

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

PROCESS CONTROL **9Hours**

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.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE63 **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:prepare bar chart for work schedule
CO3: execute quality control and safety during execution
CO4: judge the quality control through statistical modelling
CO5: perform cost control monitoring

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal Tests 2. Assignment / Seminar	1. Course End survey

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	M
CO3						S			S			
CO4					S	S					M	M
CO5					S				S		S	M

CONSTRUCTION PLANNING **9Hours**

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

Signature of the Chairman
BOS/Civil Engineering

SCHEDULING PROCEDURES AND TECHNIQUES **9Hours**

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 **9Hours**

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 **9Hours**

Quality and safety Concerns in Construction-Organizing for Quality and Safety-Work and Material Specifications-Total Quality control-Quality control by statistical methods - Statistical Quality control with Sampling by Attributes-Statistical Quality control by Sampling and Variables-Safety.

ORGANIZATION AND USE OF PROJECT INFORMATION **9Hours**

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.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14CETE64 **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: apply the principles and systems of prefabrication in the field.

CO2: identify suitable prefabricated components for specific use

CO3:adopt the design principles for prefabricated structures

CO4: classify the structural connections

CO5: utilize the various code provisions regarding progressive collapse.

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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			S						
CO3		S	S			S						
CO4		S	S									
CO5		S	S			S						

INTRODUCTION **9Hours**

Need for prefabrication – Principles – Types of prefabrication - Disuniting of structures - Materials – Modular coordination – Standarization – Systems – Production – Transportation – Erection – Elimination of erection stresses

Signature of the Chairman
BOS/Civil Engineering

PREFABRICATED COMPONENTS **9Hours**

Behaviour of structural components – Large panel constructions –roof and floor slabs – Wall panels – Columns – Shear walls.

DESIGN PRINCIPLES **9Hours**

Form factor - Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation – Precision and dimensional Tolerance.

JOINTS IN STRUCTURAL MEMBERS **9Hours**

Types of joints - Joints for different structural connections – Dimensions and detailing – Design of expansion joints

PROGRESSIVE COLLAPSE & CODE PROVISIONS **9Hours**

Progressive collapse – Code provisions – IS 15916:2010 – ASCE 7-02, ACI 318-02, GSA PBS Facilities Standards 2000, GSA PBS Facilities Standards 2003, GSA PBS Progressive collapse Guidelines 2003 - Importance of avoidance of progressive collapse.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

1. L. Mokk, Prefabricated Concrete for Industrial and Public Structures, Publishing House of the Hungarian, Academy of Sciences, Budapest, 2007.
2. CBRI, Building materials and components, India, 1996
3. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994
4. Koncz T., Manual of precast concrete construction, Vols.I,IIandIII,Bauverlag, GMBH, 1971.
5. B.Lewicki, Building wih large prefabricates, Elsevier Publishing CompanyAmserdam/London/Newyork.1966.
2. Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland BetorVerlag, 1978.
3. IS 15916:2010 – Building design and erection using prefabricated concrete – Code of practice.

Signature of the Chairman
BOS/Civil Engineering

ELECTIVE VII

Signature of the Chairman BOS/Civil Engineering

U14GST002 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

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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

Signature of the Chairman
BOS/Civil Engineering

INTRODUCTION **9Hours**

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 **9Hours**

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 **9Hours**

Theseven 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.

TQM TOOLS **9Hours**

Quality Policy Deployment (QPD), Quality Function Deployment (QFD), Benchmarking, Taguchi Quality Loss Function, Total Productive Maintenance (TPM), FMEA

QUALITY SYSTEMS **9Hours**

Need for ISO 9000 and Other Quality Systems, ISO 9001:2008 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, ISO 14001:2004

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

U14GST003 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:prepare wire frame modelling and solid modelling using drafting packages
CO2: perform structural analysis using computer packages
CO3: prepare algorithms for the analysis and design of steel and RC structures
CO4:analysis simple structures using expert systems

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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	PO 12
CO1									M		S	M
CO2									M		S	M
CO3									M		S	M
CO4									M		S	M
CO5									M		S	M

MANAGEMENT CONTEXT **9Hours**

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 **9Hours**

Signature of the Chairman
BOS/Civil Engineering

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

9Hours

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.

DIRECTING & CONTROLLING **9Hours**

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 **9Hours**

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.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

1. Tripathy PC and Reddy PN, "Principles of Management", Tata McGraw-Hill, 4th Edition, 2008.
2. DinkarPagare, "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.

Signature of the Chairman
BOS/Civil Engineering

U14GST006 **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

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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	
CO2	S					S					S	
CO3	S					S					S	
CO4	S					S					S	
CO5	S					S					S	

INTRODUCTION - DEVELOPMENT PROCESSES AND ORGANIZATIONS - PRODUCT PLANNING **9Hours**

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

Signature of the Chairman
BOS/Civil Engineering

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.

9Hours

IDENTIFYING CUSTOMER NEEDS - PRODUCT SPECIFICATIONS

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.

CONCEPT GENERATION - CONCEPT SELECTION - CONCEPT TESTING 9Hours

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 9Hours

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 9Hours

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.

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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.

Signature of the Chairman
BOS/Civil Engineering

4. Product Design for Manufacture and Assembly: GeofferyBoothroyd, Peter Dewhurst and Winston Knight.

Signature of the Chairman BOS/Civil Engineering

U14GST004 **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.

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Internal test I 2. Internal test II 3. Internal test III 4. Assignment 5. End semester exam	1. Course End survey

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						
CO3		S	S		S	M						
CO4		S	S		S	M						
CO5		S	S		S	M						

Signature of the Chairman
BOS/Civil Engineering

LINEAR MODEL **9Hours**

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 **9Hours**

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 **9Hours**

Basic terminologies – Constructing a project network – Scheduling computations – PERT - CPM – Resource smoothening, Resource leveling, PERT cost.

REPLACEMENT AND SEQUENCING MODELS **9Hours**

.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.

I

NVENTORY AND QUEUING THEORY **9Hours**

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

Theory: 45Hrs **Total:45Hrs**

REFERENCES

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

Signature of the Chairman
BOS/Civil Engineering

ONE CREDIT COURSES

Signature of the Chairman BOS/Civil Engineering

U14CEIN01 TOTAL STATION SURVEYING

Course Outcomes

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

CO1:survey the given area using total station and prepare the project report.

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Quiz 2. Seminar	

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		

15 Hours

Introduction to total station-fundamental measurements-horizontal axis-vertical axis-basic calculations-horizontal, vertical, distances-coordinate calculation- hands on training on total station-fixing of change point-total station traversing-calculation of distances between two in accessible points-columns marking using total station-contour mapping-application of total station for any one of the real time field problems including gaining of the knowledge on total station related software, coordinate to ground marking and ground point to coordinate calculation, etc- report preparation.

Total:15Hrs

Signature of the Chairman
BOS/Civil Engineering

U14CEIN02 **TENDER DOCUMENT PREPARATION**

Course Outcomes

After successful completion of this course, the students should be able to
CO1:prepare tender document for Civil Engineering works

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Quiz 2. Seminar	

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	

15Hours

Definition of tender-reasons to float tender-competent agency to call tender- financial limit or powers to call a tender by various officials in state and central government-turnkey project-execution methods-Design Build Operate and then Transfer(DBOT)- Design Build Operate, Train and then Transfer DBOTT,etc- global tender-company tie up- technical bid-commercial bid-techno commercial bid-final selection-vested powers/authority to finalize the tender in public sector and in private sector-single or monopoly tender–delegation of powers-documents /drawings to be attached along with tender documents while selling the tender document and while filling the tender documents-tender document notification-news paper references-tender related /associated terms definitions like specifications, rate analysis , lead, lift, estimates, locally available materials, contractors profit, compromise/arbitration, schedule of rates, etc-online submission of tender documents.

Total:15Hrs

Signature of the Chairman
BOS/Civil Engineering

U14CEIN03 BUILDING BYE-LAWS AND APPROVAL DRAWING PREPARATION

Course Outcomes

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

CO1: implement building bye-laws for preparing the drawings to get the approval from competent authority.

Pre-requisite : Nil

Course Assessment methods:

Direct	Indirect
1. Quiz 2. Seminar	

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		

15Hours

Introduction to National Building Code (NBC), Building bye-laws formulated by Local Planning Authority (LPA), Town and Country Planning Authority (TCPA), Municipal Corporation, Punchayat Authorities, etc. preparation of drawings incorporating necessary standards and submitting for approval from competent authorities. Key factors to be included while preparing approval drawings- Role of Licensed Building Surveyor (LBS) in preparing and submitting the drawings for approval. Pros and Cons while violating the norm of building bye laws, advantages of getting the drawing approval from competent authorities- hierarchy in government sector departments, jurisdiction, delegation of powers, etc

Total:15Hrs

Signature of the Chairman
BOS/Civil Engineering

U14CEIN04 CONSTRUCTION PLANNING USING SOFTWARE

Course Outcomes

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

CO1:prepare planning and scheduling for Civil Engineering project works.

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Quiz 2. Seminar	

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	

15Hours

Need For Construction Planning - introduction to basic Construction Planning methods-bar chart, PERT, CPM networks, critical path-sequential approach of works in Civil engineering projects like building construction, road works, construction of dam works, water supply and irrigation projects,etc. construction resources management (i.e money material, men, ,machinery and time). fund flow, break even analysis-golden ratio of material management , labour management, outturn of men and machinery in project works, benefits and ill effects of in time completion of project and delay in construction works. Introduction to construction planning software (Primavera and MS Projects). Simple construction planning works using software. A case study report on construction planning works for any one of the civil engineering project works

Total:15Hrs

Signature of the Chairman
BOS/Civil Engineering

U14CEIN05 GREEN BUILDING AUDIT

Course Outcomes

After successful completion of this course, the students should be able to
CO1:rate the building with respect to IGBC guidelines

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Quiz 2. Seminar	

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					

15Hours

Green building- Definition - Myths of Green Buildings – difference between conventional and green buildings- elements in green building- reasons to go for green building construction-benefits and subsidies given to green buildings. Indian Green Building Council (IGBC)-IGBC Ratings for Green Buildings-Other rating systems for green buildings - Application of eQuest software for green building analysis. Simulation of data for the green concepts applied in conventional building-rating of green building from the simulation study.

Total:15Hrs

Signature of the Chairman
BOS/Civil Engineering

U14CEIN06 **ENVIRONMENTAL QUALITY MODELING**

Course Outcomes

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

CO1:analyze and interpret data for developing Environmental quality model

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Quiz 2. Seminar	

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					

15Hours

Introduction to Environmental Models (land, air and water)-Need for mathematical models-types of models with examples-water quality models, Water Quality Index (WQI) and its application. Classic Streeter Phelps Oxygen Sag Equation, and its application, wastewater quality models-bio degradability of wastewater-Industrial wastewater reactor models –Air Quality Models-Air Pollution Index (AQI) –air pollution dispersion model in the atmosphere-Maximum Mixing Depth (MMD) calculation in chimney/stack design for dispersing the pollutants for various plume rise conditions-application of pollutant dispersion model in under water disposal of pollutants in ocean/sea-statistics for environmental engineers-data analysis-simple statistical model calculation with respect to water,air,land

Total:15Hrs

Signature of the Chairman
BOS/Civil Engineering

U14CEIN07 **APPLICATION OF REMOTE SENSING AND GIS IN CIVIL ENGINEERING**

Course Outcomes

After successful completion of this course, the students should be able to
CO1:integrate RS and GIS for execution of Civil Engineering projects.

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Quiz 2. Seminar	

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	

15Hours

Introduction to Remote Sensing (RS)-classification of RS - historical background of RS- stages in an idealized RS system- basic principle of RS-electromagnetic energy-electromagnetic spectrum and spectral regions-wave length regions and its application in RS-EM radiation and the atmosphere-Atmospheric Windows-interaction of EM radiation with earth surface-RS observing platforms-IRS satellites-RS sensors- -Introduction to Geographical Information System(GIS) –Essentials of GIS-interdisciplinary approach in GIS-Hardware Components of GIS- GIS Software Packages-Arc/Info GIS Packages-Linkage of GIS to RS - Application of RS and GIS for urban sprawl-Urban Zoning-Watershed Management-Water Quality Management-EIA-Vehicle Routing For Municipal Solid Waste Management-Monitoring Urban Forestry

Total:15Hrs

Signature of the Chairman
BOS/Civil Engineering

U14CEIN08 INTRODUCTION TO INDIAN TRADITIONAL ARCHITECTURE

Course Outcomes

After successful completion of this course, the students should be able to
CO1:apply vaastusastra in vernacular architecture

Pre-requisite: Nil

Course Assessment methods:

Direct	Indirect
1. Quiz 2. Seminar	

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								W		W		

15Hours

Introduction to Indian Architecture- Vedic age, Indus Valley civilization, Gupta, Maurya period Indian Texts on Architecture -Vaastu Sastra, their role in design and construction, Introduction to Mayamatha, Maanasara, Styles in Indian Architecture- Historical evolution of Dravida, Vesara, Nagara Architecture with examples-Vernacular architecture- Introduction to vernacular architecture- residential & public buildings.

Total:15Hrs

Signature of the Chairman
BOS/Civil Engineering