P.S.R. ENGINEERING COLLEGE

(An Autonomous Institution & Affiliated to Anna University, Chennai)

SIVAKASI - 626140

B.E. – CIVIL ENGINEERING

UG REGULATION-2012

CURRICULUM AND SYLLABI

[1st To 8th Semester]

THIS IS THE FINAL VERSION OF THE SYLLABUS AS RATIFIED AND APPROVED BY THE ACADEMIC COUNCIL OF THE COLLEGE IN THE MEETINGS HELD ON 7/7/2012, 1/6/2013 & 12/4/2014

DEAN(ACADEMIC)

PROGRAMME EDUCATIONAL OBJECTIVES OF B.E – CIVILENGINEERING:

- Graduates will be successful in professional career by continuously acquiring the fundamentals and core in Civil Engineering.
- Graduates will be able to get technical knowledge to analyze and design the real life problems in Civil Engineering.
- Graduates will engage in lifelong learning by pursuing higher studies and Research.
- Graduates will exhibit good ethical and communication skills, lead a team with good leadership traits and good interpersonal relationship.

PROGRAMME OUTCOMES OF B.E – CIVIL ENGINEERING:

a. Apply knowledge of mathematics, physical sciences and Civil Engineering fundamentals.

b. Able to identify, formulate, analyze and solve for Civil Engineering problems.

c. Able to design and realize civil structures to meet desired needs within practical constraints such as economical, environmental, social, political, ethical, health and safety, manufacturability and sustainability.

d. Able to investigate and conduct experiments, as well as to analyze and interpret data.

e. Use of techniques, skills and modern engineering tools necessary for engineering practice.

f. Contextual knowledge to assess societal, health, safety, legal and cultural issues related to Engineering.

g. Realize the impact of Civil Engineering solutions in a global, economic and environmental context.

h. Apply ethical principles and commitment to professional ethics and responsibility.

i. Function as an individual and as a member or leader in multidisciplinary teams.

j. Communicate effectively with the engineering community and society at large.

k. Knowledge and understanding of management and business practices and their limitations.

l. Recognize the need and have the ability to engage in life-long learning.

REGULATIONS FOR UG PROGRAMME (B.E/B.Tech) CANDIDATE ADMITTED DURING THE ACADEMIC YEAR 2012 - 2013 AND ONWARDS [UG Regulation-2012]

I. CONDITIONS FOR ADMISSION

Candidates for admission to the first year of the four year B.E / B.Tech Degree course shall be required to have passed

i) The higher secondary examination (academic stream) conducted by the Government of Tamilnadu with Mathematics, Physics and Chemistry

(or)

ii) The higher secondary examination(Vocational stream offering the vocational groups of Engineering and Technology)conducted by the Government of tamilnadu

(or)

iii) An examination of any university or authority, accepted by the Anna University as equivalent thereto

(or)

iv) Any other examinations as notified by the Government of Tamilnadu

LATERAL ENTRY ADMISSION (YEAR 2013 - 2014 AND ONWARDS)

Candidate who have passed the Diploma in Engineering / Technology conducted by the State Board of Technical Education and training are eligible for admission to the third semester under lateral entry scheme of the B.E / B.TECH degree programmes.

Any other conditions as notified by the Government of Tamilnadu

2. BRANCHES OF STUDY

Branches will be offered at the time of admission to the course. The following are the courses offered in this college.

1) B.E-Civil Engineering

2) B.E-Mechanical Engineering

3) B.E-Electrical and Electronics Engineering

4) B.E-Electronics and Communication Engineering

5) B.E-Computer Science and Engineering

6) B.Tech-Information Technology

7) B.Tech-Bio-Technology

3. STRUCTURE OF PROGRAMMES

3.1 Every programme shall have a curriculum with well-defined syllabi comprising theory and practical courses such as:

i) General core courses comprising Mathematics, Basic sciences, Engineering Sciences, Humanities and Engineering.
ii) Core courses of Engineering/ Technology.
iii) Elective courses for specialization in related fields.
iv) Workshop practice, computer practice, engineering graphics, laboratory work, industrial training, seminar presentation, project work, industrial visit, etc.,
v) NSS/RRC/ISTE/CISCO/IEEE/YRC/SPORTS activities for character development.

3.2 The subjects of study shall be both theory and practical and shall be in accordance with the prescribed syllabus.

3.3 Each semester curriculum shall normally have a blend of lecture courses not exceeding 6 and practical courses not exceeding 4.

3.4 A student who has passed all the subjects prescribed in the curriculum for the award of the degree shall not be permitted to-enroll to improve his/her marks in a subject or the aggregate marks.

3.5 The medium of instruction, examination and project report shall be in English, expect for courses on language other than English.

4. DURATION OF THE PROGRAMME

The duration of the programme for the degree of B.E/B.TECH programme shall be four academic years with semester pattern for HSC students and three years for lateral entry students. The number of working days will be 90 days (which includes the days for conducting unit tests.), 450 hours, or 540 periods of each 50 minutes duration for semester pattern. The number of working days is to be calculated excluding study holidays, Government holidays, and end-semester examination days. The head of the department shall ensure that every teacher imparts instruction as per the number of period specified in the syllabus and that the teacher teaches the full content of the specified syllabus for the course being taught.

5. SYSTEMS OF EXAMINATION

Performance in each course of study shall be evaluated based on i) Continuous internal assessment throughout the semester and ii) an end semester examination**.**

Theory

End semester examination will be conducted in all the theory subjects of study at the end of each semester for all the courses. The maximum marks of each subject shall be 100, out of which the continuous internal assessment will carry 25 marks, while the end semester examination will carry 75 marks.

To derive the internal mark the following guidelines are to be followed:

1) Test (3 Nos) {Each test is to be conducted for 60 marks} : 60 marks
2) Assignment /Seminar/mini project
   a) Assignment 2 Nos (or)
   b) 1 Assignment +1 Seminar (or) : 30 marks
   c) Mini project
   d) Attendance* : 10 marks

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   100 marks

Total 100 marks should be reduced to 25 marks

*Attendance (10 marks)

Percentage of attendance	**Marks**
75	2
76-80	4
81-85	6
86-90	8
91 and above	10

Practical

The practical classes for all the practical/lab component courses will be assessed continuously and marks will be entered in the prescribed Performa. The progress of classes will be monitored by a committee formed by the concerned head of the departments/ professor in-charge of the course to ensure that the concerned staff conducts the laboratory experiments as specified in the syllabus. The maximum marks for the practical/lab component courses shall be 100, out of which the continues internal assessment will carry 25 marks, while the end semester practical examination will carry 75 marks. If any practical course contains Part A Part B components, the maximum marks for each part of the lab will be 50 marks, while the end semester practical examination will carry 37.5 marks. The internal and external examiners shall conduct the end semester practical examination and award marks. To derive the internal mark the following guidelines are to be followed.

i) Continuous Assessment : 50 marks
ii) Test (minimum one) : 40 marks
iii) Attendance : 10 marks

Total 100 marks should be reduced to 25 marks

*Attendance (10) marks

Percentage of attendance	Marks
75	2
76-80	4
81-85	6
86-90	8
91 and above	10

Project work and Viva-voce

For the project work and vivo-voce examination the maximum marks shall be 200 comprising 150 marks for internal assessment and 150 for the end semester examination. The award of the end semester marks for 150 shall be evaluated by both the internal and external examiners. Out of 150 the project report shall carry a maximum of 50 marks (same mark must be awarded to every student of the project group) while the viva-voce **examination shall carry 100 marks** (awarded to each student of the project group based on the individual performance in the viva-vice examination).

For internal mark:

Work assessed by Guide/Supervisor : 50 % weight
Work assessed by Committee : 50 % weight
(Committee consists of 3 members one among them is the Guide/Supervisor)

6. REQUIREMENTS FOR EXAMINATION AND ATTENDANCE

A candidate who has fulfilled by the following conditions shall be deemed to have satisfied the requirements for completions of a semester.

6.1 i. A candidate will be permitted to appear for the examination for any semester, only if he/she secures not less than 75% of attendance in the number of working days during that semester, if it shall be open to chairman of the academic council or any authority delegated with such powers (by the governing body) to grant condonation (based on the recommendation of the head of the department) to a candidate who has failed to secure 75% of the attendance for valid reasons and has secured not less than 66% of the attendance. Such exemptions can be allowed only TWO times during his/her entire course of study.

ii Candidate representing university in State/National/International /Inter University sports events, co and extra-curricular activities, paper or project presentation with prior permission form the head of the institution are given exemption up to 10% of the required attendance and such candidates shall be permitted to appear for the current semester examinations.

iii his/her conduct and progress have been certified to be satisfactory by the concerned head of the department.

iv Condonation can be allowed only two times during his/her entire course of study.

6.2 Candidates who do not complete the semester (as per clause 6.1) will not be permitted to write the end semester examination and are not permitted go to next

semester. They are required to repeat the incomplete semester in the next academic year.

7. PROCEDURE FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

i. Every teacher is required to maintain an 'ATTENDANCE AND ASSESSMENT RECORD' which consists of attendance marked in each lecture or practical or project work class, the test marks and the record of class work (Topic Covered) for each course. This should be submitted to the Head of the departments periodically (at least 3 times in a semester) for checking the syllabus coverage and the records of test marks and attendance. The Head of the department shall affix the signature and date after due verification at the end of the semester. This record should be verified by the Head of the Institution who will keep this document in safe custody (for five years).

ii. Theory Courses (25 Marks):

(a) Unit Tests [60% Weight]

Three tests each carrying sixty (60) marks shall be conducted by the department / Institution. The total marks obtained in all tests put together out of 180, shall be reduced to 60 marks and rounded to nearest integer (this implies equal weight to all the three tests). However retest at the discretion of the head of the department may be conducted for the deserving candidates.

(b) Assignment / Seminar / Miniproject [30% weight]

i) **Assignment**

Two assignments each carrying 15 marks and requiring work of average 5 to 6 hours of study and written work of average 5 to 6 hours shall be given to be carried out by each student in a separate assignment folder, duly indexed with headings, date of submission, Marks, remarks and signature of faculty with date etc.

ii) **Assignment and seminar**

A student has to carry out one assignment and one seminar carrying 15 marks each. An assignment normally requires work of average 5 to 6 hours of study and written work of average 5 to 6 hours which has to submitted in a separate assignment folder, duly indexed with headings, date of submission, Marks, remarks and signature of faculty with date etc.,

The student has to make one technical seminar on current topics related to the specialization. The students are expected to submit a report of his / her presentation. The seminar will be assessed by the course tutor with common parameters as described by the department.

iii) **Mini Project**

A student has to carry out mini project carrying 30 marks either in hardware or software with the approval of the head of the department.The student has to submit a report before the end of the semester. Mini project will be assessed based on the model presentation and report as decided by the department.

(c) Attendance [10% weight]

Attendance (10) marks

Percentage of attendance	**marks**
75	2
76-80	4
81-85	6
86-90	8
91 and above	10

The internal marks are valid for two more attempts in addition to the current attempt for the candidates admitted from the academic year 2012 to 2013 and onwards. if a candidates scores a minimum of 50% marks in the end semester examination, after three attempts(first attempt + two more attempts), he / she would be declared as passed in that examination.

iii. Practical Subjects [25 marks)

Every practical exercise / experiment shall be evaluated based on conduct of exercise / experiment and records maintained. There shall be at least one test. The criteria for determining the internal assessment marks are:

Experiment / Record / Average Practical classes' performance	: 50 % Weight
Practical Test	: 40%Weight
Attendance	: 10 % Weight

Total 100 marks should be reduced to 25 Marks.

iv. Project Work

There shall be three assessments during the semester by a review committee. The students shall make presentation on the progress made before the committee. The Head of the Institution shall constitute the review committee for each branch of study. The criteria for arriving the internal assessment marks for the project work evaluated for 50 marks are:

Work accessed by the Project Guide	:	50% weight
Assessment by a three (3)-member internal review committee (Guide will be one of the members of the committee)	:	50%weight

The internal marks are valid for two more attempts in addition to the current attempt for the candidates admitted from the academic year 2012-2013 and onwards. If a candidate scores a minimum of 50% marks only in the end semester examination, after three attempts (First attempt + two more attempts), he / she would be declared as a passed candidate in that examinations.

8. PROCEDURE FOR COMPLETING THE COURSE

(i) A candidate who has for some reason discontinued the course can join the course of study of any semester only at the time of its normal commencement in the institution for regular students upon satisfying all the following conditions.

(a) he/she should have completed the course of study of the previous semester.
(b) he/she should be eligible to register for the examination and satisfy rule 8(iii).
(c) he/she should have registered for all the examination of the previous semesters.

(ii) A candidate will be permitted to proceed from one semester to the next higher semester only if he/she has satisfied the regulation for eligibility to appear for the end semester examination in the concerned semester, subject to the condition that the candidate should register for all the arrear subjects of lower semesters along with the current (higher) semester subject.

(iii) A candidate should have completed B.E/B.Tech, degree course within a period of SEVEN (or 14 semesters) consecutive academic years (Six consecutive years or 12 semesters for lateral entry students) from the date of admission to the course, even if the candidate discontinues and rejoins subsequently, to be eligible for the award of the degree. The minimum and maximum period for completion of the U.G. Programmes (B.E/B.Tech) are given below.

B.E /B.Tech. (Full Time)	Minimum Number of Semester	Maximum Number of Semesters
HSC Candidates	8	14
Lateral Entry Candidates	6	12

9. REQUIREMENTS TO APPEAR FOR END SEMESTER EXAMINATION

A candidate shall normally be permitted to appear for the end semester examination of the current semester if he/she has satisfied the semester completion requirements (Subject to clause 6.1) and has registered for examination in all course of that semester. Registration is mandatory for current semester examination as well as appear examination failing which the candidate will not be permitted to move to the higher semester.

10. PASSING MINIMUM AND CLASSIFICATION OF SUCCESSFUL CANDIDATE

(i) For each subject the examination will be conducted for 100 marks. A candidate who secures not less than 50% of the total marks in the end semester examinations and internal assessment put together in both theory and practical courses, including project work, subject to securing a minimum of 50% in the end-semester examination, wherever applicable, shall be declared to have passed the examination in that subject. When the marked secured for 100 is converted to 75, minimum 37 marks must be secured for pass. If any programme, during any semester, conducts the laboratory in two parts, say part a A and Part B, a candidate should register and appear for both parts in the end semester practical examination. If a candidate for any reason is absent in any one part of the practical examination, despite his/her presence in the other part, he/she is declared as fail in both parts A and B (marked as absent in end semester examination) and should appear again for both part A and B in the next attempt. For a pass, a candidate should secure a minimum of 50% in each part and final mark secured is the sum of marks secured in Part A and B.

(ii) A candidate who successfully completes the course requirements and has passed all the prescribed examinations in all the eight semester within a maximum period of seven years reckoned from the commencement of the first semester to which the candidate was admitted is eligible to get the degree.

(iii) A candidate who qualifies for the degree by passing the examination in all subject of the entire course in first attempt within a period of four consecutive academic years from the date of admission to the course and secures a CGPA of not less than 8.5 for the entire course shall be declared to have passed the examination for the degree in FIRST CLASS WITH DISTINCTION. For this purpose, the withdrawal from examination will not be construed as an appearance. Further, the authorized break of study will not be counted for the purpose of classification.

(iv) A candidate transferred from other institution, who qualifies for the degree by passing the examination in all subjects of the entire course in first attempt within a period of four consecutive academic years from the date of admission to the course and secures a CGPA of not less than 8.5 for the entire course shall be declared to have passed the examination for the degree in FIRST CLASS WITH DISTINCTION. For this purpose, the withdrawal from examination will not be construed as an appearance. Further, the authorized break of study will not be counted for the purpose of classification.

(v) A candidate who qualifies for the award of the degree having passed the examination in all the subject of the course in the semester first to eight within a maximum period of ten consecutive semester after his/her commencement of study in the first semester and secures a CGPA of not less than 6.5 for the entire course shall be

declared to have to have passed the examination for the degree in FIRST CLASS. For this purpose, the authorized break of the study will not be counted for the purpose of classifications.

(vi) All other successful candidates shall be declared to have passed the examination for the degree in SECOND CLASS.

(vii) A candidate who is absent in semester examination in a course/ project work after having registered for the same shall be considered to have appeared in that examination for the purpose of classification.

11. ISSUE OF MARK SHEET

Individual mark sheet for each semester will be issued, through the head of the department concerned, after the publication of the result.

The mark sheet will contain credit, grade, grade point and result status for the course concerned.

12. MALPRACTICE

If a student indulges in malpractices in any of the end semester examination, he/she shall be liable for punitive action as prescribed by the Anna University, Chennai from time to time.

13. REVALUATION

(i) Copies of answer script for the theory course(s) can be obtained from the Office of the Controller of Examinations on payment of a prescribed fee specified for this purpose through proper application.

(ii) A candidate can apply for revaluation of his/her examination answer paper in a theory course, within a week from the declaration of results, on payment of a prescribed fee through proper application to the Office of the Controller of Examinations, as per the norms given by the Chairman Academic Council. Revaluation is not permitted for practical course and for project work.

(iii) Re totaling is permissible for all arrear and current theory subjects.

14. ELIGIBILITY FOR THE AWARD OF DEGREE

A candidate shall be declared eligible for the award of the B.E/B.Tech. degree provided the candidate has

(i) Successfully completed the course requirements and has passed all the prescribed examinations in all the 8 semesters within a maximum period of 7 years (6

semesters within a maximum period of 6 years for lateral entry candidates) from the commencement of first semester (third semester for lateral entry) to which the candidate was admitted.

(ii) The syndicate of the university must have approved the award of degree.

15. CLASS COMMITTEE

15.1 A class committee consists of teachers of the concerned class, student representatives and a chairperson who is not teaching the class. It is the like the "QUALITY CIRCLE" (more commonly used in industries) with the overall goal of improving he teaching-learning process. The functions of the class committee include.

* Solving problems experienced by students in the class room and in the laboratories.

* Clarifying the regulations of the degree programme and details of rules therein.

* Informing the student representatives the academic schedule including the dates of assessments and the syllabus coverage for each assessment.

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

* Analyzing the performance of the students of the class after each test and finding the ways and means of solving problems, if any.

* Identifying the weak students, if any, and requesting the teachers concerned to provided some additional or guidance of coaching to such weak students.

15.2 The class committee for a class under a particular branch is normally constituted by the head of the department. However, if the students of different branches are mixed in each class of the first semester (generally common to all branches), the class committee is to be constituted by the head of the institution.

15.3 The class committee shall be constituted on the first working day of any semester or earlier.

15.4 At least 6 student representatives (usually 3 boys and 3 girls) shall be included in the class committee.

15.5 The chairperson of the class committee any invite the faculty adviser(s) and the head of the department to the meeting of the class committee.

15.6 The head of the institution may participate in any class committee of the institution.

15.7 The chairperson is required to prepare the minutes of every meeting, submit the same to the head of the institution within two days of the meeting and arrange to circulate among the concerned students and teachers. If there are some points in the minutes requiring action by the authorities concerned. The same shall be brought to the notice of the authority by the head of the institutions.

15.8 The first meeting of the class committee shall be held within one week from the date of commencement of the semester, in order to inform the students about the nature and weight of assessments within the framework of the regulations. Two or three subsequent meetings may be held at suitable intervals, During these meetings the student members representing the entire class, shall meaningfully interact and express the opinions and suggestions of the class students to improve the effectiveness of the teaching-learning process.

16. FACULTY ADVISER

To help the students in planning their courses of study and for general advice on the academic programme, the Head of the Department of the student will attach a certain number of students to a teacher of the Department who shall function as Faculty Adviser for those students throughout their period of study. Such Faculty Adviser shall advise the students and monitor the courses taken by the students, check the attendance and progress of the students attached to him / her and counsel them periodically. If necessary, the faculty adviser may also discuss with or inform the parents about the progress of the students.

17. COURSE COMMITTEE FOR COMMON COURSES

Each common theory course offered to more than one discipline or group of students shall have a "Course Committee" comprising all the teachers teaching the common course with one of them nominated as Course Coordinator. The nomination of the Course Coordinator shall be made by the Head of the Department /Head the Institution depending upon whether all the teachers teaching the common course belong to a single department or to several departments. The "Course committee" shall meet as often as possible and ensure uniform evaluation of the tests and arrive at a common scheme of evaluation for the tests. Wherever it is feasible, the course committee may also prepare a common question paper for the test(s).

18. PROVISION FOR WITHDRAWAL FROM EXAMINATION

(i) A candidate may, for valid reasons, be granted permission to withdraw from appearing for the examination in any course or courses of only one semester examination during the entire duration of the degree programme. Also only one application for withdrawal is permitted for that semester examination in which withdrawal is sought. Withdrawal from appearing for the examination in any course or courses in the middle of the examination is not permitted.

(ii) Withdrawal application shall be valid only if the candidate is, otherwise, eligible to write the examination and if it is made prior to the commencement of the last examination in that semester and duly recommended by the Head of Department and approved by the Head of the Institution.

(iii) Withdrawal shall not be construed as an appearance for the eligibility of a candidate for first class with distinction.

(iv) Withdrawal is possible only if the candidate satisfies the attendance requirements [as per clause 6.1]

19. TEMPORARY BREAK OF STUDY FROM A PROGRAMME

(i) A candidate is not normally permitted to temporarily break the study. However if a candidate intends to temporarily discontinued the programme in the middle for valid reasons (such as accident or hospitalization due to prolonged ill health) and to rejoin the programme in a later than the last date for registering for the semester examinations of the semester in question, through the head of the department starting the reasons thereof.

(ii) The candidate permitted to rejoin the programme after the break shall be governed by the rules and regulations in force at the time of rejoining.

(iii) The duration specified for passing all the course for the purpose of classification vide clause 10(iii), 10(iv) and 10(v) shall be increased by the period of such break of study permitted.

(iv) The period for completion of the programme reckoned from, the commencement of the first/third semester to which the candidate was admitted shall not exceed the maximum period specified in clause 8(iii) irrespective of the period of break of study in order that he/she may be eligible for the award of the degree (vide clause 14).

(v) If any student is detained for want of requisite attendance, progress and good conduct, the period spent in that semester shall not be considered as permitted 'break of study' and clause 19(iii) is not applicable for this case.

20. RANK OF STUDENT

A candidate who qualifies for the degree by passing the examination in all subjects of the entire course in first attempt within a period of four (three for lateral entry) consecutive academic years from the date of admission to the course can be given his/her position in the class as rank. The rank is determined from III semester to VIII semester examination CGPA. Student transferred from other institution to P.S.R. Engineering College are not eligible for rank.

21. PROCUDURE FOR USING SCRIBER

If candidate is physically handicapped (in case of accidents/ill health) at the time of examination, he/she may be permitted to use a scriber to write the examination. In such case 30 minutes, extra time will be permitted. The scriber shall be a non-engineering student/graduate.

22. INDUSTRIAL VISIT

Every student is required to undergo one industrial visit, starting from the third semester of the progremme. Every teacher shall take the students are least for one industrial visit in a year.

23. PERSONALITY AND CHARACTER DEVELOPMENT

All students shall enroll, on admission, in any one of their personality and character development programmes (NSS/YRC/RRC/ISTE/IEEE/CISCO). The training shall include classes to hygiene and health awareness and training in first aid.

- NATIONAL SERVICE SCHEME (NSS) will have social service activities in and around the college/institution.
- YOUTH RED CROSS (YRC) will have activities related to social service in and around college/institution.
- RED RIBBON CLUB (RRC) will have activities to improve health awareness among the people in and around the college campus.
- INDIAN SOCIETY FOR TECHNICAL EDUCATION (ISTE) will have activities to improve students technical skill and career development.
- INSTITUTION OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE) will have activities to enhance professional students innovative skill.
- COMPUTER INFORMATION SYSTEM COMPANY (CISCO) will have activities to enhance professional student's innovative skill with help of enhanced human network.

While the training activities will normally be during weekends, the camp will normally be during vacation period.

24. DISCIPLINE

Every student is required to observe and decorous behavior both inside and outside the college and not to indulge in any activity, which will tend to bring down the prestige of the college. In the event act indiscipline being reported, the principal shall constitute a disciplinary committee consisting of three heads of department of which on should be from the faculty of the student, to inquire into acts in discipline. The disciplinary action is subject to review by the university in case the student represents to the university. Any expulsion of the student from the college shall be with prior concurrence from director of technical education/university.

25. CREDIT SYSTEM

The letter grade and the grade point are awarded base on percentage of marks secure by a candidate in individual course as detailed below:

Range of Total Marks	Letter Grade	Grade Points (GP)
90 to 100	S	10
80 to 89	A	9
70 to 79	B	8
60 to 69	C	7
55 to 59	D	6
50 to 54	E	5
0 to 49	U	0
INCOMPLETE	I	0

"U" denotes failure in the course.
"I" denotes incomplete as per clause 6.1 and hence prevention from writing end semester examination
"W" denotes withdrawal from the course.

After results are declared, grade sheets will be issued to each student which will contain the following details:

- The list of subjects enrolled the semester and the grades scored.
- The grade point average (GPA) for the semester and
- The cumulative grade point average (CGPA) of all subject enrolled from first semester onwards.

GPA is the ratio of the sum of the products of the number of credits of course registered and the points corresponding to the grades scored in that course, taken for all the course, to the sum of the number of credits of all the course in the semester.

$$GPA = \frac{\text{Sum of [C x GP]}}{\text{Sum of C}}$$

Where C - Credit of a particular course
GP - Grade point obtained by the student in the respective course

CGPA will be calculated in a similar manner, considering all the course enrolled from first semester, ”U”, “T”, and “W” grades will be excluded for calculating GPA and CGPA.

Each course is normally assigned certain number of credits with 1 credit per lecturer period per week, 1 credit per tutorial period per week, 1 credit for 2 periods of laboratory or practical or seminar or project work per week (2 credits for 3 or 4 periods of practical).

26. REVISION OF REGULATION AND CURRICULUM

The college may from time to time revise, amend of change the regulations, scheme of examinations and syllabus, if found necessary.

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REGULATION – 2012
B.E. CIVIL ENGINEERING
CURRICULUM & SYLLABI
Full time candidates admitted during 2012-2013 and onwards

S.No.	Sub. Code	Subject Name	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits				Pre requisite / Corequisite (CR)
						L	T	P	C	
SEMESTER I										
Theory										
1	12F1Z1	Technical English-I	25	75	100	3	1	0	4	----------
2	12F1Z2	Engineering Mathematics-I	25	75	100	3	1	0	4	----------
3	12F1Z3	Engineering Physics-I	25	75	100	3	0	0	3	----------
4	12F1Z4	Engineering Chemistry-I	25	75	100	3	0	0	3	----------
5	12F1Z5	Computing Fundamentals and C Programming	25	75	100	3	0	0	3	----------
6	12F1Z6	Engineering Graphics	25	75	100	3	1	0	4	----------
Practical										
7	12F1Z7	Physics and Chemistry Laboratory - 1	25	75	100	0	0	3	2	12F1Z3-Engineering Physics-I (CR) 12F1Z4-Engineering Chemistry-I (CR)
8	12F1Z8	Computer Practice Laboratory -1	25	75	100	0	0	3	2	12F1Z5-Computing Fundamentals and C Programming (CR)
9	12F1Z9	Engineering Practices Laboratory	25	75	100	0	0	3	2	----------
	Total				900	18	3	9	27	

S.No.	Sub. Code	Subject Name	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits				Pre requisite / Corequisite (CR)
						L	T	P	C	
SEMESTER II										
Theory										
1	12F2Z1	Technical English-II	25	75	100	3	1	0	4	12F1Z1-Technical English-I
2	12F2Z2	Engineering Mathematics-II	25	75	100	3	1	0	4	12F1Z2-Engineering Mathematics-I

3	12F2Z3	Engineering Physics-II	25	75	100	3	0	0	3	12F1Z3-Engineering Physics-I
4	12F2Z4	Engineering Chemistry-II	25	75	100	3	0	0	3	12F1Z4-Engineering Chemistry-I
5	12F2Y5	Engineering Mechanics (For Non-Circuit branches)	25	75	100	3	1	0	4	12F1Z2-Engineering Mathematics-I
6	12F2Y6	Basic Electrical and Electronics Engineering (For Non-Circuit branches)	25	75	100	3	1	0	4	----------
Practical										
7	12F2Z7	Physics and Chemistry Laboratory - II	25	75	100	0	0	3	2	12F1Z7-Physics and Chemistry Laboratory – I 12F2Z3- Engineering Physics-II (CR) 12F2Z4- Engineering Chemistry-II (CR)
8	12F2X7	Computer Aided Drafting and Modeling Laboratory (For Non Circuit Branches)	25	75	100	0	0	3	2	12F1Z8-Computer Practice Laboratory -1
9	12F2Z8	Computer Practice Laboratory - II	25	75	100	0	0	3	2	12F1Z8-Computer Practice Laboratory -1
	Total				900	18	4	9	28	

S.No.	Sub. Code	Subject Name	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits				Pre requisite / Corequisite (CR)
						L	T	P	C	
SEMESTER III										
Theory										
1	12MA31	Transforms and Partial Differential Equations	25	75	100	3	1	0	4	12F2Z2-Engineering Mathematics-II
2	12GE31	Environmental Science and Engineering	25	75	100	3	0	0	3	12F2Z4- Engineering Chemistry-II
3	12CE31	Applied Geology	25	75	100	3	0	0	3	12F1Z4-Engineering Chemistry-I
4	12CE32	Mechanics of Solids	25	75	100	3	1	0	4	12F2Y5-Engineering Mechanics
5	12CE33	Mechanics of Fluids	25	75	100	3	1	0	4	12F2Y5-Engineering Mechanics
6	12CE34	Building Materials and Construction Techniques	25	75	100	4	0	0	4	12F2Y6- Basic Electrical and Electronics Engineering.
7	12CE35	Surveying - I	25	75	100	3	0	0	3	----------
Practical										
8	12CE36	Survey Practical – I	25	75	100	0	0	4	2	12CE35- Surveying-I(CR)

9	12CE37	Computer Aided Building Drawing	25	75	100	0	0	4	2	12F2X7- Computer Aided Drafting and ModelingLaboratory
10	12HS31	Professional English - I	25	75	100	0	0	2	1	12F2Z1- Technical English-II
Total					1000	22	3	10	30	

S.No.	Sub. Code	Subject Name	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits				Pre requisite / Corequisite (CR)
						L	T	P	C	
SEMESTER IV										
Theory										
1	12MA42	Numerical Methods	25	75	100	3	1	0	4	12MA31- Transforms and Partial Differential Equations
2	12CE41	Geotechnical Engineering - I	25	75	100	3	0	0	3	12CE31- Applied Geology
3	12CE42	Strength of Materials	25	75	100	3	1	0	4	12CE32- Mechanics of Solids
4	12CE43	Applied Hydraulic Engineering	25	75	100	3	1	0	4	12CE33- Mechanics of Fluids
5	12CE44	Surveying – II	25	75	100	3	0	0	3	12CE35- Surveying-I
6	12CE45	Highway Engineering	25	75	100	3	0	0	3	12CE34- Building Materials and Construction Techniques
Practical										
7	12CE46	Strength of Materials Laboratory	25	75	100	0	0	3	2	12CE42- Strength of Materials(CR) 12CE32- Mechanics of Solids
8	12CE47	Hydraulic Engineering Laboratory	25	75	100	0	0	3	2	12CE43- Applied Hydraulic Engineering(CR) 12CE33- Mechanics of Fluids
9	12CE48	Survey Practical – II	25	75	100	0	0	4	2	12CE44- Surveying – II(CR) 12CE35- Surveying-I
10	12HS41	Professional English - II	25	75	100	0	0	2	1	12HS31- Professional English-I
Total					1000	18	3	12	28	

S.No.	Sub. Code	Subject Name	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits				Pre requisite / Corequisite (CR)
						L	T	P	C	
SEMESTER V										
Theory										
1	12CE51	Irrigation Engineering	25	75	100	3	0	0	3	12CE43- Applied Hydraulic Engineering
2	12CE52	Structural Analysis - I	25	75	100	3	1	0	4	12CE42- Strength of Materials
3	12CE53	Concrete Technology	25	75	100	3	0	0	3	12CE34- Building Materials and Construction Techniques
4	12CE54	Environmental Engineering -I	25	75	100	3	0	0	3	12GE31-EnvironmentalScienceandEngineering
5	12CE55	Geotechnical Engineering -II	25	75	100	3	0	0	3	12CE41- Geotechnical Engineering - I
6	12CE56	Design of RC Elements	25	75	100	3	1	0	4	12CE42- Strength of Materials
Practical										
7	12CE57	Concrete and Highway Engineering Lab	25	75	100	0	0	3	2	12CE53- Concrete Technology(CR)
8	12CE58	Soil Mechanics Laboratory	25	75	100	0	0	3	2	12CE55- Geotechnical Engineering –II(CR) 12CE41- Geotechnical Engineering - I
9	12CE59	Survey Camp	25	75	100	-	-	-	2	12CE44- Surveying – II 12CE35- Surveying-I
10	12HS51	English for Employment - I	25	75	100	0	0	2	1	12HS41- Professional English - II
Total					1000	18	2	8	27	

S.No.	Sub. Code	Subject Name	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits				Pre requisite / Corequisite (CR)
						L	T	P	C	
SEMESTER VI										
Theory										
1	12MG52	Principles of Management	25	75	100	3	0	0	3	
2	12CE61	Structural Analysis – II	25	75	100	3	1	0	4	12CE52- Structural Analysis - I
3	12CE62	Design of Steel Structures	25	75	100	3	1	0	4	12CE56- Design of RC Elements
4	12CE63	Construction Planning & Scheduling	25	75	100	3	0	0	3	12CE34- Building Materials and Construction Techniques

5	12CE64	Environmental Engineering-II	25	75	100	3	0	0	3	12CE54- Environmental Engineering -I
6	12CE65	Railways, Airports and Harbour Engineering	25	75	100	3	0	0	3	12CE45- Highway Engineering
Practical										
7	12CE66	Environmental and Irrigation Engineering Drawing	25	75	100	0	0	4	2	12CE64- Environmental Engineering-II(CR) 12CE54- Environmental Engineering –I 12CE51- Irrigation Engineering
8	12CE67	Environmental Engineering Laboratory	25	75	100	0	0	3	2	12CE64- Environmental Engineering-II(CR) 12CE54- Environmental Engineering –I
9	12HS61	English for Employment - II	25	75	100	0	0	2	1	12HS51- English for Employment - I
Total					900	18	2	9	25	

S.No.	Sub. Code	Subject Name	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits				Pre requisite / Corequisite (CR)
						L	T	P	C	
SEMESTER VII										
Theory										
1	12CE71	Design of Reinforced Concrete & Brick Masonry Structures	25	75	100	3	1	0	4	12CE56- Design of RC Elements
2	12CE72	Estimation and Quantity Surveying	25	75	100	3	0	0	3	12CE63- Construction Planning & Scheduling
3	12CE73	Basics of Dynamics and Aseismic Design	25	75	100	3	0	0	3	12CE62- Design of Steel Structures
4	12CE74	Prestressed Concrete Structures	25	75	100	3	0	0	3	12CE56- Design of RC Elements
5	E1	Elective – I	25	75	100	3	0	0	3	----------
6	E2	Elective – II	25	75	100	3	0	0	3	----------
Practical										
7	12CE75	Computer Aided Design and Drafting Laboratory	25	75	100	0	0	4	2	12CE71- Design of Reinforced Concrete & Brick Masonry Structures(CR) 12CE56- Design of RC Elements
8	12CE76	Design Project	25	75	100	0	0	4	2	----------
Total					800	11	1	8	23	

S.No.	Course Code	Course Name	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits			
						L	T	P	C
SEMESTER VIII									
Theory									
1	E3	Elective – III	25	75	100	3	0	0	3
2	E4	Elective – IV	25	75	100	3	0	0	3
Practicals									
3	12CE81	Project Work	25	75	100	0	0	12	6
Total					300	6	0	12	12

Credits (I &II Semesters) : 55
Credits (III &VIII Semesters) : 145
Total Credits (I to VIII Semesters): 200

LIST OF ELECTIVES

S.No.	Course Code	Course Name	Internal Marks	Final Exam Marks	Total Marks	Hrs &Credits				Pre requisite / Corequisite (CR)
						L	T	P	C	
VII – SEMESTER ELECTIVES I										
1	12CE7A	Hydrology	25	75	100	3	0	0	3	12CE51- Irrigation Engineering
2	12CE7B	Remote Sensing Techniques and GIS	25	75	100	3	0	0	3	12F2Z3- Engineering Physics-II 12CE44- Surveying – II
3	12CE7C	Architecture	25	75	100	3	0	0	3	12CE63- Construction Planning & Scheduling
4	12MG71	Total Quality Management	25	75	100	3	0	0	3	12MG52- Principles of Management
5	12CE7D	Traffic Engineering and Management	25	75	100	3	0	0	3	12CE45- Highway Engineering
6	12CE7E	Water Resources Engineering	25	75	100	3	0	0	3	12CE51- Irrigation Engineering
7	12CE7F	Ground Improvement Techniques	25	75	100	3	0	0	3	12CE34- Building Materials and Construction Techniques

S.No.	Course Code	Course Name	Internal Marks	Final Exam Marks	Total Marks	Hrs &Credits				Pre requisite / Corequisite (CR)
						L	T	P	C	
VII – SEMESTER ELECTIVES II										
1	12CE7G	Contract Laws And Regulations	25	75	100	3	0	0	3	12MG52- Principles of Management
2	12CE7H	Introduction to Soil Dynamics and Machine Foundations	25	75	100	3	0	0	3	12CE55- Geotechnical Engineering –II(CR) 12CE41- Geotechnical Engineering - I
3	12CE7I	Rock Engineering	25	75	100	3	0	0	3	12CE31- Applied Geology
4	12CE7J	Environmental Impact Assessment of Civil Engineering Projects	25	75	100	3	0	0	3	12CE64- Environmental Engineering-II 12CE54- Environmental Engineering –I
5	12CE7K	Industrial Waste Management	25	75	100	3	0	0	3	12CE64- Environmental Engineering-II 12CE54- Environmental Engineering –I
6	12CE7L	Air Pollution Management	25	75	100	3	0	0	3	12GE31-Environmental Science and Engineering
7	12CE7M	Municipal Solid Waste Management	25	75	100	3	0	0	3	12CE64- Environmental Engineering-II 12CE54- Environmental Engineering –I
8	12CE7N	Ecological Engineering	25	75	100	3	0	0	3	12GE31-Environmental Science and Engineering

S.No.	Course Code	Course Name	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits				Pre requisite / Corequisite (CR)
						L	T	P	C	
VIII – SEMESTER ELECTIVES III										
1	12CE8A	Bridge Structures	25	75	100	3	0	0	3	12CE56-Design of RC Elements
2	12CE8B	Storage Structures	25	75	100	3	0	0	3	12CE62-Design of Steel Structures
3	12CE8C	Design of Plate and Shell Structures	25	75	100	3	0	0	3	12CE71-Design of Reinforced Concrete & Brick Masonry Structures
4	12CE8D	Tall Buildings	25	75	100	3	0	0	3	12CE34- Building Materials and Construction Techniques
5	12CE8E	Prefabricated Structures	25	75	100	3	0	0	3	12CE74-Prestressed Concrete Structure
6	12CE8F	Wind Engineering	25	75	100	3	0	0	3	----------

S.No.	Course Code	Course Name	Internal Marks	Final Exam Marks	Total Marks	Hrs & Credits				Pre requisite / Corequisite (CR)
						L	T	P	C	
VIII – SEMESTER ELECTIVES IV										
1	12CE8G	Computer Aided Design of Structure	25	75	100	3	0	0	3	12F1Z5- Computing Fundamentals and C Programming
2	12CE8H	Industrial Structures	25	75	100	3	0	0	3	12CE62-Design of Steel Structures
3	12CE8I	Smart Structures and Smart Materials	25	75	100	3	0	0	3	12CE34- Building Materials and Construction Techniques
4	12CE8J	Finite Element Techniques	25	75	100	3	0	0	3	12CE52- Structural Analysis – I 12CE61- Structural Analysis - II
5	12CE8K	Repair and Rehabilitation of Structures	25	75	100	3	0	0	3	12CE34- Building Materials and Construction Techniques

12F1Z1	TECHNICAL ENGLISH - I		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem:**	I			
Category:	Core					
Prerequisites:	------					
Aim:	To improve English communication skill with relevance to technical context.					
Course Objectives:	• To Show the Basic knowledge of English Language and grammar • To develop error-free communication • To construct written communication with the mechanics of Writing • To summarize the text • To improve the basic knowledge of Business Communication					
Course Outcomes:	1. Relate basic grammar and structure of a language with relevance to technical vocabulary. 2. Analyze the technical English resources with reading skill. 3. Develop technical communication skill in writing. 4. Distinguish the sounds of English with Technical audio resources. 5. Adapt Basic English language skill for effective oral communication.					

UNIT-I	**FOCUS ON LANGUAGE**	**12**
General Vocabulary- prefix, suffix –Denotative & connotative- Parts of Speech-Types of Sentences- Conditionals Connectors Concord -Tenses- -Active &Passive voice -Phrases & Clauses-Spelling& Punctuation-Cause & Effect-Correct use of words(parts of speech)-Question Tags-'wh'&'Yes/No'Type questions-Rearranging Jumbled Sentences-One-Word Substitution		
UNIT-II	**READING**	**12**
Reading for gist/Identifying information/gap filling-Reading different types of text like advertisement, instruction, manuals, report - Reading passage with multiple choice questions/cloze type passage/sentence matching/completing passage-Reading for flow chart completion/matching information/matching headings, Reading for sentence completion		
UNIT-III	**WRITING**	**12**
Writing Sentences for Brevity, Clarity and Simplicity-Writing Topic sentences/General Information/Description Paragraph-structuring an Essay-Writing effective conclusions-Writing a Process- Writing formal letter like Requisition letter, Placing an order, Quotation letter, Acknowledgement letter, Enquiry Letter, Complaint Letter, Permission Letter.		
UNIT-IV	**LISTENING**	**12**
Listening for Learning-Word Stress and Pronunciation practices-Listening for Specific information-Note taking-Listening to announcements- Listening to News on the radio/TV		
UNIT-V	**SPEAKING**	**12**
Introducing oneself–offering Suggestions and recommendations-Expressing opinions suggestions-(agreement/disagreement)-Role play- Purchase Manager& Customer, Customer care executive (voice) & Customer, Bank manager& Employee, Commenting on the basis of Discussion-Using Verbal & Non-verbal cues in speech-Using Familiar Expressions in different situations		
		TOTAL: 60 PERIODS

TEXT BOOK(S)

1. Department of Humanities & Social Sciences, Anna University, '*English for Engineers and Technologists*' Combined Edition (Volumes 1 & 2), Chennai: Orient Longman Pvt. Ltd., 2006.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1									2	3	3		1			3
CO2				1					3	3	3		1			3
CO3									1	2	2		1			3
CO4									3	3	3		1			3
CO5									2	3	3		1			3

12F1Z2	ENGINEERING MATHEMATICS - I		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem:**	I			
Category:	Core					
Prerequisites :	------					
Aim:	The Course is aimed at Developing the basic mathematical skills of Engineering Student.					
Course Objectives:	• To develop the basic mathematical knowledge and computational skills of the student in the areas of applied mathematics. • To develop the skills of the students in the area of Calculus, Three Dimensional Geometry and Matrices. • To make the student for appreciating the purpose of using Eigen value and Eigen Vector to create a new domain in which it is easier to handle the problems that is being investigated in Spectral Theory.					
Course Outcomes:	1. Develop the inverse of given matrix and reduce matrix equation using Cayley-Hamilton theorem 2. Elaborate given function as a power series using Taylor's series. 3. Apply double integration to find area between two curves. 4. Make use of Calculus in finding the envelope, Evolutes & Involutes. 5. Evaluate the shortest distance between two skew-lines and find equation of coplanar planes. 6. Classify Conic system in Three Dimensional Geometry.					

UNIT-I	**MATRICES**	**12**
Characteristic equation - Eigen Values and Eigen vectors of a real matrix - Properties of Eigen values - Problem solving using Cayley-Hamilton - Similarity Transformation - Orthogonal Transformation of a Symmetric matrix to diagonal form - Quadratic form - Orthogonal reduction to canonical form		
UNIT-II	**THREE DIMENSIONAL GEOMETRY**	**12**
Introduction – Sphere - Tangent Plane - Plane Section of a Sphere – Lines – Skew Lines - Coplanar Lines – Equation of Cylinder - Right Circular Cylinder.		
UNIT-III	**DIFFERENTIAL CALCULUS**	**12**
Curvature - Radius of curvature - Cartesian and Parametric Coordinates - Circle of Curvature - Involutes and Evolutes – Envelope - Evolutes as Envelope of its normal..		
UNIT-IV	**FUNCTIONS OF SEVERAL VARIABLES**	**12**
Partial Derivatives - Euler's Theorem for homogeneous function - Total Derivative - differentiation of Implicit function – Jacobian - Taylor's Expansion - Maxima/Minima for function of two variables - Method of Lagrange's multipliers		
UNIT-V	**MULTIPLE INTEGRALS**	**12**
Double Integration – Cartesian and Polar co-ordinates – Change of order of Integration - Change of variable between Cartesian and polar co-ordinates – Triple integration – Area as a double integral – Volume as a triple integral		
		TOTAL: 60 PERIODS

TEXT BOOK(S)
1. B.S.Grewal,'Higher Engineering Mathematics', Thirty Sixth Edition, Khanna Publishers,Delhi,2005. 2. Kreyszig, E., Advanced Engineering Mathematics, 8th edition, John Wiley Sons, 2001. 3. Dr.P.Kandasamy , Dr.K.Thilagavathy , Dr.K.Gunavathy , S. Chand & Company Ltd. Ram nagar, New Delhi.
REFERENCE(S)
1. Greenberg, M.D. Advanced Engineering Mathematics, Second Edition, Pearson Education Inc. (First Indian reprint), 2002 2. Venkataraman.M.K.,"Engineering Mathematics",Volume I and II Revised enlarged Fourth Edition, The National Publishing Cpompany,Chennai,2004. 3. Veerarajan.T"Engineering Mathematics",Fourth Edition,Tata McGraw – Hill publishing company Ltd,New Delhi,2005.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3		1								3	3			3
CO2	3	3		2								2	3			3
CO3	2	2										2	2			2
CO4	1	1											2			3
CO5	3	3		1									3			2
CO6	2	2		1								3	3			2

12F1Z3	ENGINEERING PHYSICS – I		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**SEM:**	I			
Category:	Core					
Prerequisites:	------					
Aim:	To endow the students with the fundamentals of Physics and apply new ideas in the field of Engineering and Technology.					
Course Objectives:	To study the properties, production of ultrasonic waves and their applications in engineering field. To study the principle, types and applications of LASER and the principle of fiber optic communication and its applications. To study the basic concepts of Quantum physics and Crystal physics.					
Course Outcomes:	1. Apply the ultrasonics principles to engineering applications. 2. Summarize the principles of different types of laser and laser characteristics, industrial and medical applications of the laser. 3. Estimate the light propagation in optical fiber and analyze its structures, types and applications such as sensors, endoscope. 4.Interpret the Planck's theory in quantum phenomena and basic concepts like 5. Compton scattering, Schrodinger equations and its application. 6. Identify the cubic unit cells (SC, BCC, FCC) and HCP, miller indices and crystal defects.					

UNIT-I	ULTRASONICS	9
Introduction – Production – magnetostriction effect - magnetostriction generatorpiezoelectric effect - piezoelectric generator- Detection of ultrasonic waves properties – Cavitations - Velocity measurement – acoustic grating - Industrial applications – drilling, welding, soldering and cleaning – SONAR - Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C –scan displays, Medical applications - Sonograms		
UNIT-II	**LASERS**	**9**
Introduction – Principle of Spontaneous emission and stimulated emission. Population inversion, pumping. Einsteins A and B coeffcients - derivation. Types of lasers – He-Ne, CO2 , Nd-YAG, Semiconductor lasers - Qualitative Industrial Applications - Lasers in welding, heat treatment, cutting – Medical applications - Holography & uses.		
UNIT-III	**FIBER OPTICS & APPLICATIONS**	**9**
Principle and propagation of light in optical fibres – Numerical aperture and Acceptance angle - Types of optical fibres (material, refractive index, mode) – Double crucible technique of fibre drawing - Fibre optical communication system (Block diagram) - Light sources - Detectors - Fibre optic sensors – temperature & displacement - Endoscope.		
UNIT-IV	**QUANTUM PHYSICS**	**9**
Black body radiation – Planck's theory (derivation) – Deduction of Wien's displacement law and Rayleigh – Jeans' Law from Planck's theory – Compton effect. Theory and experimental verification – Matter waves – Schrödinger's wave equation – Time independent and time dependent equations – Physical significance of wave function – Particle in a one dimensional box.		
UNIT-V	**CRYSTAL PHYSICS**	**9**

Lattice – Unit cell – Bravais lattice – Lattice planes – Miller indices – d spacing in cubic lattice – Calculation of number of atoms per unit cell – Atomic radius – Coordination number – Packing factor for SC, BCC, FCC and HCP structures - Crystal defects – point, line and surface defects- Burger vector.
TOTAL:45 PERIODS

1. R. K. Gaur and S.C. Gupta, 'Engineering Physics' Dhanpat Rai Publications, New Delhi(2003)
2. M.N. Avadhanulu and PG Kshirsagar, 'A Text book of Engineering Physics', S.Chand and company, Ltd., New Delhi, 2005.

REFERENCE(S)

1. Serway and Jewett, 'Physics for Scientists and Engineers with Modern Physics',6th Edition, Thomson Brooks/Cole, Indian reprint (2007)
2. Rajendran, V and Marikani A, 'Engineering Physics' Tata McGraw Hill Publications Ltd, III Edition, New Delhi, (2004).
3. Palanisamy, P.K., 'Engineering Physics' Scitech publications, Chennai, (2007).
4. Jayakumar. S, 'Engineering Physics', R.K. Publishers, Coimbatore, (2003).
5. Chitra Shadrach and Sivakumar Vadivelu, 'Engineering Physics', Pearson Education, New Delhi, (2007).

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3		1								3	3			3
CO2	3	3		2								2	3			3
CO3	2	2										2	3			3
CO4	1	1											3			3
CO5	3	3		1									3			3

12F1Z4	ENGINEERING CHEMISTRY – I		3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	I			
Category:	Core					
Prerequisites:	------					
Aim:	To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.					
Course Objectives:	• The student should be conversant with the principles of water characterization and treatment for potable and industrial purposes. • Principles of polymer chemistry and engineering applications of polymers • Industrial applications of surface chemistry • Conventional and non-conventional energy sources and energy storage devices • To study the chemistry of engineering materials.					
Course Outcomes:	1. Demonstrate the essential concept of water chemistry with their properties and applications of water technology 2. Analyze the chemistry of polymers and composites 3. Clarify the core concepts of surface chemistry 4. Create the concepts of non-renewable energy sources and storage devices 5. Examine and pertain the chemistry of engineering materials like abrasives 6. Identify the chemistry of Engineering materials like Lubricants and refractories 7. Illustrate the structure and applications of engineering materials like nano materials					

UNIT-I	WATER TECHNOLOGY	9
Hardness-Types and Estimation by EDTA method, Problems, Characteristics of water, alkalinity – types of alkalinity and determination – hardness –types and estimation by EDTA method (problems); Domestic water treatment –disinfection methods (Chlorination, ozonation. UV treatment) – Boiler feed water– requirements – disadvantages of using hard water in boilers – internal conditioning (phosphate, calgon and carbonate conditioning methods) – external conditioning – demineralization process – desalination and reverse osmosis.		
UNIT-II	**POLYMERS AND COMPOSITES**	**9**
Polymers-definition – polymerization – types – addition and condensation Polymerization – free radical polymerization mechanism – Plastics, classification–Preparation, properties and uses of PVC, Teflon, polycarbonate, polyurethane, Nylon-6, 6, PET- Rubber -vulcanization of rubber, synthetic rubbers – buty1Rubber, SBR, Composites – definition, types polymer matrix composites – FRP only.		
UNIT-III	**SURFACE CHEMISTRY**	**9**
Adsorption – types – adsorption of gases on solids – adsorption isotherms –Frendlich and Langmuir isotherms – adsorption of solutes from solution – role of adsorbents in catalysis, ion-exchange adsorption and pollution abatement.		
UNIT-IV	**NON-CONVENTIONAL ENERGY SOURCES AND STORAGE DEVICES**	**9**
Nuclear energy – fission and fusion reactions and light water nuclear reactor for Power generation (block diagram only) – breeder reactor – solar energy Conversion – Solar cells – wind energy – fuel cells – hydrogen – oxygen fuel cell – Batteries – Alkaline batteries – lead–acid, nickel–cadmium and lithium batteries.		
UNIT-V	**ENGINEERING MATERIALS**	**9**
Refractories – classification – acidic, basic and neutral refractories – properties (refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling) – manufacture of		

alumina, magnesite and zirconia bricks, Abrasives – natural and synthetic abrasives – quartz, corundum, emery, garnet, diamond, silicon carbide and boron carbide. Lubricants – mechanism of lubrication, liquid lubricants, - properties – viscosity index, flash and fire points, cloud and pour points, oiliness) – solid lubricants – graphite and molybdenum sulphide. Nanomaterials – introduction to nanochemistry – carbon nanotubes and their Applications
TOTAL: 45 PERIODS

TEXT BOOK(S)
1. A. Ravikrishnan, "Engineering Chemistry", Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2009.
2. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co., New Delhi (2002).
REFERENCE(S)
1. B.K.Sharma "Engineering chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001).
2. B. Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3		2			3					3	2			3
CO2	3	2		2								2	2			3
CO3				2			2					2	2			3
CO4	2	1		2			2					1	2			3
CO5	3	2		1								2	2			3
CO6	3	3		2			3					3	2			3
CO7	3	3		2			3					3	2			3

12F1Z5	COMPUTING FUNDAMENTALS AND 'C' PROGRAMMING		L	T	P	C
			3	**0**	**0**	**3**
Programme:	B.E. Civil Engineering	**Sem:**	I			
Category:	Core					
Prerequisites:	------					
Aim:	To provide an awareness to Computing and Programming					
Course Objectives:	• To enable the student to learn the major components of a computer system • To know the correct and efficient ways of solving problems • To learn to program in C					
Course Outcomes:	1. Determine the major components of computer and its functionalities. 2. Summarize evolution of computers generation and their classification. 3. Solve computing problems using algorithm and flowchart. 4. Develop small programs related to simple/ moderate mathematical and logical problems in 'C'. 5. Develop programs in C language using arrays, functions, structures & pointers.					

UNIT I	INTRODUCTION TO COMPUTERS	9
Introduction – Characteristics of Computers – Evolution of Computers - Computer Generations – Classification of Computers – Basic Computer organization – Number Systems- Computer Software –Types of Software – Software Development Steps – Internet Evolution – Basic Internet Terminology- Internet Services.		
UNIT II	**PROBLEM SOLVING**	**9**
Problem Solving Using Computers- Planning the Computer Program – Purpose – Algorithm – Flow Charts – Pseudo code.		
UNIT III	**INTRODUCTION TO C**	**9**
Overview of C – Constants, Variables and Data Types – Operators and Expressions – Managing Input and Output operators – Decision Making - Branching and Looping.		
UNIT IV	**ARRAYS AND FUNCTIONS**	**9**
Arrays- Handling of Character Strings – User-defined Functions – Definitions – Declarations - Call by reference – Call by value.		
UNIT V	**STRUCTURES AND POINTERS**	**9**
Structures and Unions – Pointers – Arrays – The Preprocessor – Developing a C Program : Some Guidelines		
		TOTAL: 45 PERIODS

TEXT BOOK

1. Ashok.N.Kamthane," Computer Programming", Pearson Education (India) (2008).
2. Behrouz A.Forouzan and Richard.F.Gilberg, "A Structured Programming Approach Using C", II Edition, Brooks-Cole Thomson Learning Publications, (2007).

REFERENCES

1. Pradip Dey,Manas Ghoush, "Programming in C", Oxford University Press.(2007).
2. Byron Gottfried, "Programming with C", 2nd Edition, (Indian Adapted Edition), TMH publications, (2006). (Unit II, III, IV, and V).
3. Stephen G.Kochan, "Programming in C", Third Edition, Pearson Education India, (2005).

4. Brian W.Kernighan and Dennis M.Ritchie, "The C Programming Language", Pearson Education Inc., (2005).
5. E.Balagurusamy, "Computing fundamentals and C Programming", Tata McGRaw-Hill Publishing Company Limited, (2008).
6. S.Thamarai Selvi and R.Murugan, "C for All", Anuradha Publishers, (2008).

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2											3			2
CO2	3	2											3			2
CO3	3	3	2	1									3			2
CO4	3	2	1										3			2
CO5	2	2	3	2									3			2

12F1Z6	ENGINEERING GRAPHICS		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem:**	I			
Category:	Core					
Prerequisites:	------					
Aim:	To develop Graphic skills of the students.					
Course Objectives:	• To develop in student's graphic skill for communication of concepts, ideas and design of engineering products and expose them to existing national standards related to technical drawings.					
Course Outcomes:	1. Create the convention model for engineering graphics. 2. Examine the plane curves and free hand sketching. 3. Outline the projections of points, lines and plane. 4. Outline the projections of simple solids and their sectional views 5. Development of surfaces. 6. Evaluate isometric and perspective projections.					

UNIT I	PLANE CURVES AND FREE HAND SKETCHING	15 hrs
Conics – Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of squad and circle – Drawing of tangents and normal to the above curves.		
UNIT II	**PROJECTION OF POINTS, LINES AND PLANE SURFACES**	**15 hrs**
Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.		
UNIT III	**PROJECTION OF SOLIDS**	**15 hrs**
Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.		
UNIT IV	**SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES**	**15 hrs**
Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones – Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis.		
UNIT V	**ISOMETRIC AND PERSPECTIVE PROJECTIONS**	**15 hrs**
Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray method.		
		TOTAL= 75 PERIODS

TEXT BOOK

1. N.D. Bhatt, "Engineering Drawing" Charotar Publishing House, 46 Th Edition, (2003).

REFERENCES

1. K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai (2006).
2. M.S. Kumar, "Engineering Graphics", D.D. Publications, (2007).
3. K. Venugopal and V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited

(2008).
4. M.B. Shah and B.C. Rana, "Engineering Drawing", Pearson Education (2005).
5. K. R. Gopalakrishnana, "Engineering Drawing" (Vol.IandII), Subhas Publications (1998).
6. Dhananjay A.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill.
7. Publishing Company Limited (2008).Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, (2008).

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3		3		3					1			2			3
CO2	3		2		2					1			2			3
CO3	3		2		3					1			2			3
CO4	3		3		2					1			2			3
CO5	3		3		3					1			2			3
CO6	2		2		3					1			2			3

12F1Z7	PHYSICS AND CHEMISTERY LABORATORY - 1		L	T	P	C
			0	0	3	2
Programme:	B.E. Civil Engineering	**Sem :**	I			
Category:	Core					
Prerequisites/ Corequisites (CR):	12F1Z3-Engineering Physics-I (CR) 12F1Z4-Engineering Chemistry-I (CR)					
Aim:	To impart fundamental knowledge in various physics and chemistry experiments and train the students for systematic recording of experimental findings of various physics and chemistry parameters.					
Course Objectives:	The course should enable the students to: • To measure the wavelength of Laser, velocity of ultrasonic waves thickness of a thin wire and Refractive index of a prism. • To determine the thermal conductivity and Young's modulus of the materials. – light experiments • To determine the total hardness of water sample and amount of Ferrous ion , HCl and dissolved oxygen present in given solutions using various methods..					
Course Outcomes:	1. Construct the wavelength of Laser and velocity of ultrasonic waves 2. Determine the thickness of a thin wire and Refractive index of a prism – light experiments. 3. Experiment with the thermal conductivity and Young's modulus of the materials. 4. Determine the total hardness of unknown water sample. 5. Estimate the amount of Ferrous ion, HCl, dissolved oxygen and copper ion present in given solutions using various methods.					

LIST OF EXPERIMENTS
1. (a) Determination of a particle size using diode laser (b) Determination of wavelength of the laser source (c) Determination of acceptance angle and numerical aperture of an optical fiber 2. Determination of thickness of thin wire – Air wedge method. 3. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer. 4. Determination of dispersive power of the prism using spectrometer. 5. Determination of thermal conductivity of a bad conductor by Lee's disc method 6. Find the Young's Modulus of a Non Uniform Bending material. 7. Estimation of Total hardness of water by EDTA method 8. Estimation of copper in brass by EDTA method 9. Estimation of Ferrous ion by potetiometric titration 10. pH metry –Determination of strength of HCl by NaOH 11. Determination of DO in water (Winkler's Method)
TOTAL: 45 PERIODS

Evaluation Criteria & Marks	Internal (25)			End Semester Examination	Total Marks
	Observation (45%)	Record (45%)	Attendance (10%)		
	10	10	5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	1		2				1			1	3			3
CO2	1	2	2						2			1	2			2
CO3	2	1	3		2				2			2	2			2
CO4	2	2	1		1				1			1	2			3
CO5	3	2	1	2	2				2			2	3			3

12F1Z8	COMPUTER PRACTICE LABORATORY-I		L	T	P	C
			0	0	3	2
Programme:	B.E. Civil Engineering	**Sem:**	I			
Category:	Core					
Prerequisites/ Corequisites (CR):	12F1Z5- Computing Fundamentals And 'C' Programming (CR)					
Course Outcomes:	1. Make use of MS-Office packages like, MS-Word, MS-Excel and PowerPoint. 2. Develop flowcharts & algorithms for computing problems. 3. Formulate problems and propose algorithms in C. 4. Effectively choose programming components that efficiently compute. 5. Create programs using C language in advance like structures & pointers.					

LIST OF EXPERIMENTS

1) **Word Processing**

a) Create a word Document using Table creation, Table Formatting and Scientific notations

b) Create Mail Merge

c) Drawing Flowchart for the following

i) To find the largest of three numbers A,B, and C

ii) To find the sum of first 50 Natural numbers

iii) Factorial of given number using Recursion

2) **Spreadsheet**

a) Create Spreadsheet using the following features:

Tables, Charts, Formula, Formula Editor

Sorting, Import/Export Features.

3) **Power-point**

a) Create a Power point Presentation about your college.

"C" Programs

Aim:

To practice C programs for the following concepts:

4) Simple C Programs using Data types, Expression Evaluation
5) Program using Conditional and Looping Statements
6) Program using Arrays
7) Program using functions
8) Program using Switchcase Statement
9) Program using Strings
10) Program using Structures
11) Program using Unions
12) Program using Pointers

TOTAL: 45 PERIODS

Evaluation Criteria & Marks	Internal (25)			End Semester Examination	Total Marks
	Observation (45%)	Record (45%)	Attendance (10%)		
	10	10	5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	2						2				3			3
CO2	3	2	2						2				2			2
CO3	3	2	3						2				3			3
CO4	2	3	2						2				2			2
CO5	3		2						2				3			3

12F1Z9	ENGINEERING PRACTICES LABORATORY		L	T	P	C
			0	0	3	2
Programme:	B.E. Civil Engineering	**Sem:**	I			
Category:	Core					
Prerequisites:	---					
Course Objectives:	• To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.					
Course Outcomes:	1. Design the pipe connections and identify the various components used in plumbing 2. Model the simple wooden joints using wood working tools 3. Create simple lap, butt and tee joints using arc welding equipments 4. Model the simple components using lathe and drilling machine 5. Classify the fitting usage of square joint, L joint and stepped joints 6. Develop the operation of iron box, fluorescent lamp, fan and regulator wiring circuits 7. Analyze the fundamentals of Boolean algebra and digital logic gates.					

GROUP A	CIVIL AND MECHANICAL	

I .CIVIL ENGINEERING PRACTICE **9**

Buildings:

(a) Study of plumbing and carpentry components of residential and industrial buildings. Safety aspects.

Plumbing Works:

(a) Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings.

(b) Study of pipe connections requirements for pumps and turbines.

(c) Preparation of plumbing line sketches for water supply and sewage works.

(d) Hands-on-exercise:

Basic pipe connections – Mixed pipe material connection – Pipe Connections with different joining components.

(e) Demonstration of plumbing requirements of high-rise buildings.

Carpentry using Power Tools only:

(a) Study of the joints in roofs, doors, windows and furniture.

(b) Hands-on-exercise: Wood work, joints by sawing, planing and cutting.

II. MECHANICAL ENGINEERING PRACTICE **13**

Welding:

(a) Preparation of arc welding of butt joints, lap joints and tee joints.

(b) Gas welding practice

Basic Machining:

(a) Simple Turning and Taper turning

(b) Drilling Practice

Sheet Metal Work:

(a) Forming and Bending:

(b) Model making – Trays, funnels, etc.

(c) Different type of joints.

Machine assembly practice:
(a) Study of centrifugal pump
(b) Study of air conditioner
Demonstration on:
(a) Smithy operations, upsetting, swaging, setting down and bending. Example – Exercise – Production of hexagonal headed bolt.
(b) Foundry operations like mould preparation for gear and step cone pulley.
(c) Fitting – Exercises – Preparation of square fitting and vee – fitting models.

GROUP B ELECTRICAL AND ELECTRONICS

III ELECTRICAL ENGINEERING PRACTICE 10

1. Residential house wiring using switches, fuse, indicator, lamp and energymeter.
2. Fluorescent lamp wiring.
3. Stair case wiring
4. Measurement of electrical quantities – voltage, current, power and power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of electrical equipment.

IV ELECTRONICS ENGINEERING PRACTICE 13

1. Study of Electronic components and equipments – Resistor, colour coding measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
2. Study of logic gates AND, OR, EOR and NOT.
3. Generation of Clock Signal.
4. Soldering practice – Components Devices and Circuits – Using general purpose PCB.
5. Measurement of ripple factor of HWR and FWR.

TOTAL: 45 PERIODS

REFERENCES

1. K.Jeyachandran, S.Natarajan and S, Balasubramanian, "A Primer on Engineering Practices Laboratory", Anuradha Publications, (2007).
2. T.Jeyapoovan, M.Saravanapandian and S.Pranitha, "Engineering Practices Lab Manual", Vikas Publishing House Pvt.Ltd, (2006)
3. H.S. Bawa, "Workshop Practice", Tata McGraw – Hill Publishing Company Limited, (2007).
4. A.Rajendra Prasad and P.M.M.S. Sarma, "Workshop Practice", Sree Sai Publication, (2002).
5. P.Kannaiah and K.L.Narayana, "Manual on Workshop Practice", Scitech Publications, (1999).

Evaluation Criteria & Marks	Internal (25)			End Semester Examination	Total Marks
	Observation (45%)	Record (45%)	Attendance (10%)		
	10	10	5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	3	3	3				3			2	2		3	2
CO2	2	2	3	3	3				3			2	2		2	3
CO3	2	2	3	3	3				3			1	2		3	2
CO4	2	1	3	3	3				3			2	3		2	3
CO5	2	2	3	3	3				3			2	2		3	2
CO6	2	2	3	3	3				3			3	3		2	3
CO7	2	2	3	3	3				3			2	2		3	2

12F2Z1	TECHNICAL ENGLISH - II		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem:**	II			
Category:	Core					
Prerequisites:	12F1Z1-Technical English-I					
Aim:	To improve English communication skill with relevance to technical context.					
Course Objectives:	• To show the basic knowledge of English Language for the specific purpose • To construct written communication skill with mechanics of Writing • To develop error-free messages • To infer the meaning of the text to gather information • To develop Business and technical Communication skill					
``Course Outcomes:	1. Improve reading skill to distinguish different kinds of text. 2. Infer communication module used at workplace. 3. Determine specific information using listening skill. 4. Adapt audience analysis method for an effective mass communication. 5. Evaluate sentence structure and a word.					

UNIT-I	**READING**	**12**
Intensive reading and predicting content, Reading and interpretation, Reading comprehension exercises with questions on overall content – Discussions analyzing stylistic features (creative and factual description) – Reading comprehension exercises with texts including graphic communication– Exercises in interpreting non-verbal communication- Reading comprehension exercises with critical questions, multiple choice, Reading comprehension exercises with analytical questions on content – Evaluation of content questions.		
UNIT-II	**WRITING**	**12**
Writing a Report-Writing a Proposal-Writing a Feasibility Report-Writing Situational Report- Memo-Writing Agenda -Writing Minutes -Writing Manuals-Writing Thesis statements-Writing Recommendation, Checklist, Instruction-Writing Statement of Purpose-Writing Letter of Recommendation-Writing Statement of the Problem-Transcoding Flow Chart, Pie Chart, Bar Diagram, Line Graph		
UNIT-III	**LISTENING**	**12**
Listening to gather Information- Listening to stories- Listening to a conversations/Interviews Listening to a News Report- Listening to a famous speeches, ceremonial speech, awareness programme and technical presentation- Intensive Listening to find exact information-Listening for gist-Listening to identify expressions used in Discussions-Listening to identify tonal Variations in Speeches		
UNIT-IV	**SPEAKING**	**12**
Talking about General Contents, localities, home town, ambition in life, Future plan-Introducing others-Describing/Introducing function of a product/ machine, talking about pros and cons of the product-Communication for the Mass-Welcome Address, Special Address, Presidential Address, Vote of thanks -Speaking with good Pronunciation-Famous quotes, speeches- Public Speech-Speaking on the General Topic-Appropriate Communication-Answering to the Question, adding valuable points to the discussion, giving an appropriate reply, appropriate vocabulary according to the audience-Giving a specific information about Statistics used in Bar diagram, Pie Chart -Role-Play-Hr and applicant, Purchase Manager and Customer, Industrialist- Reporter, Employer- Employee, Managing		

Director-HR		
UNIT-V	**FOCUS ON LANGUAGE**	**12**
Synonym-Antonym- Homonym-Tenses-Phrasal Verbs- Acronym- Abbreviations-Foreign words-Confusing Words-Analogy- Numerical Expressions- Purpose Statement- Error Corrections-Direct and Indirect Speech		
		TOTAL: 60 PERIODS

TEXT BOOK(S)

1. Department of Humanities and Social Sciences, Anna University, '*English for Engineers and Technologists*' Combined Edition (Volumes 1 and 2), Chennai: Orient Longman Pvt. Ltd., 2006.

REFERENCES

1. Sharan J.Genrson and Steven M.Gerson – "Technical Writing – Process and Product" – Pearson Education – 2000.
2. Raymond V.Lesikar, John D. Pettit and Mary E.Flatley – Lesikass BasicCommunication Tata McGraw Will 8th Edition – 1999.
3. Stevel. E. Pauley, Daniel G.Riordan – Technical Report Writing Today – AITBS Publishing and Distributors, India 5th edition – 2000.
4. Robert L.Shurter, Effective letters in business Third Ed. 1983.
5. Norman Whitby, Business Benchmark – Pre-Intermediate to Intermediate, Students Book, Cambridge University Press, 2006.
6. Cambridge BEC Preliminary 1 : Practice Tests from the University of Cambridge Local Examinations Syndicate, University of Cambridge Local Examinations Syndicate, PB, ISBN: 9780521753012
7. CambridgeBECPreliminary2Student'sBookwithAnswers: ExaminationpapersfromUniversity ofCambridgeESOL Examinations, Cambridge ESOL, PB, ISBN: 9780521544504

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1		2		3					3	3		3	1			3
CO2									3	3		3	1			3
CO3		3		2					3	3		3	1			3
CO4										2		3	1			3
CO5									3	3		3	1			3

12F2Z2	ENGINEERING MATHEMATICS - II		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem:**	II			
Category:	Core					
Prerequisites:	12F1Z2-Engineering Mathematics-I					
Aim:	To analyse the engineering problems using the techniques and the mathematical skills acquired by studying vector calculus, Laplace transform, complex variables, ordinary differential equations.					
Course Objectives:	• To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems. • To acquaint the student with the concepts of vector calculus needed for problems in all engineering disciplines. • To develop an understanding of the standard techniques of complex variable theory so as to enable the student to apply them with confidence, in application areas such as heat conduction, elasticity, fluid dynamics and flow the of electric current. • To make the student appreciate the purpose of using transforms to create a new domain in which it is easier to handle the problem that is being investigated.					
Course Outcomes:	1. Apply Laplace transform to solve first and second order differential equations with elementary forcing function. 2. Classify Green's theorem to evaluate line integrals along simple closed contours on the plane. 3. Construct an analytic function using the properties of analytic function 4. Make use of Cauchy's residue theorem for applications in Engineering. 5. Evaluate complicated real integrals using the basics of analytic functions and the complex integration 6. Develop a series solution to an ODE and recognize special functions defined by series.					

UNIT-I	LAPLACE TRANSFORM	12
Laplace transform – Conditions for existence – Transform of elementary functions –Basic properties – Transform of derivatives and integrals – Transform of unit step function and impulse functions – Transform of periodic functions. Definition of Inverse Laplace transform as contour integral – Convolution theorem (excluding proof) – Initial and Final value theorems – Solution of linear ODE of second order with constant coefficients using Laplace transformation techniques		
UNIT-II	**VECTOR CALCULUS**	**12**
Gradient, Divergence and Curl – Directional derivative – Irrotational and Solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and stokes' theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelepipeds.		
UNIT-III	**ANALYTIC FUNCTIONS**	**12**
Functions of a complex variable – Analytic functions – Necessary conditions, Cauchy– Riemann equation and Sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping : w = z+c, cz, 1/z, and bilinear transformation.		
UNIT-IV	**COMPLEX INTEGRATION**	**12**
Statement and application of Cauchy's theorem and Cauchy's integral formula, Taylor and Laurent expansion, Singularities, Classification, Residues, Cauchy's residue theorem, Contour integration, Unit circle and semi-circular contours (excluding poles on real axis).		
UNIT-V	**ORDINARY DIFFERENTIAL EQUATIONS**	**12**
Higher order linear differential equations with constant coefficients – Method of variation of		

parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients.
TOTAL: 60 PERIODS

TEXT BOOK(S)
1. B.S.Grewal,'Higher Engineering Mathematics', Thirty Sixth Edition,Khanna Publishers, Delhi,2005. 2. Kreyszig, E., Advanced Engineering Mathematics, 8th edition, John Wiley Sons, 2001
REFERENCE(S)
1. Greenberg, M.D. Advanced Engineering Mathematics, Second Edition, Pearson Education Inc. (First Indian reprint), 2002 2. Venkataraman.M.K.,"Engineering Mathematics",Volume I and II Revised enlarged Fourth Edition The National ?Publishing Cpompany,Chennai,2004. 3. Veerarajan.T"Engineering Mathematics",Fourth Edition,Tata McGraw – hill publishing company Ltd,New Delhi,2005.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2		2								3	3			3
CO2	2	1		2								2	3			3
CO3	2	1		2								1	3			3
CO4	1	2		2								2	3			3
CO5	2	2										2	3			3
CO6	3	3										3	3			3

12F2Z3	ENGINEERING PHYSICS – II		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	II			
Category:	Core					
Prerequisites:	12F1Z3-Engineeriong Physics – I					
Aim:	To endow the students with the fundamentals of Physics and apply new ideas in the field of Engineering and Technology.					
Course Objectives:	• To study the theories of conducting and semiconducting materials. • To study the properties and applications of magnetic and super conducting materials. • To understand the properties and applications of dielectric materials and modern engineering materials.					
Course Outcomes:	1. Illustrate the free electron theories (classical and quantum), Fermi Function, carrier concentration in metals. 2. Analyze the theory of conducting and semiconducting materials, Hall Effect and its applications. 3. Explain the properties and applications of magnetic materials and super conducting materials. 4. Summarize the properties of dielectric materials and their applications – Ferro electricity. 5. Analyze the properties and applications of modern engineering materials. 6. Extend the acquaintance of nano phase materials.					

UNIT-I	CONDUCTING MATERIALS	9
Conductors – classical free electron theory of metals – Electrical and thermal conductivity – Wiedemann – Franz law – Lorentz number – Draw backs of classical theory – Quantum theory – Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.		
UNIT-II	**SEMICONDUCTING MATERIALS**	**9**
Intrinsic semiconductor – carrier concentration derivation – Fermi level – Variation of Fermi level with temperature – electrical conductivity – band gap determination – extrinsic semiconductors – carrier concentration derivation in n-type and p-type semiconductor – variation of Fermi level with temperature and impurity concentration – compound semiconductors – Hall effect –Determination of Hall coefficient – Applications.		
UNIT-III	**MAGNETIC AND SUPERCONDUCTING MATERIALS**	**9**
Origin of magnetic moment – Bohr magneton – Dia and para magnetism – Ferro magnetism – Domain theory – Hysteresis – soft and hard magnetic materials – anti – ferromagnetic materials – Ferrites – applications – magnetic recording and readout – storage of magnetic data – tapes, floppy and magnetic disc drives. **Superconductivity** : properties - Types of super conductors – BCS theory of superconductivity(Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation.		
UNIT-IV	**DIELECTRIC MATERIALS**	**9**
Electrical susceptibility – dielectric constant – electronic, ionic, orientational and space charge polarization – frequency and temperature dependence of polarization – internal field – Claussius – Mosotti relation (derivation) – dielectric loss – dielectric breakdown – uses of dielectric materials (capacitor and transformer) – ferroelectricity and applications.		
UNIT-V	**MODERN ENGINEERING MATERIALS**	**9**

Metallic glasses: preparation, properties and applications. Shape memory alloys (SMA): Characteristics, properties of NiTi alloy, application, advantages and disadvantages of SMA. Nanomaterials: synthesis –plasma arcing – chemical vapour deposition – sol-gels – electrodeposition – ball milling - properties of nanoparticles and applications. Carbon nanotubes: fabrication – arc method – pulsed laser deposition – chemical vapour deposition - structure – properties and applications.
TOTAL: 45 PERIODS

TEXT BOOK(S)
K.Rajagopal, "Engineering Physics, Printice – Hall of India Pvt. Ltd, Newdelhi, 2011. Charles Kittel ' Introduction to Solid State Physics', John Wiley & sons, 7 edition, Singapore 2007 Charles P. Poole and Frank J.Ownen, 'Introduction to Nanotechnology', Wiley India(2007)
REFERENCE(S)
Rajendran, V, and Marikani A, 'Materials science'Tata McGraw Hill publications, (2004) New Delhi. Jayakumar, S. 'Materials science', R.K. Publishers, Coimbatore, (2008). Palanisamy P.K, 'Materials science', Scitech publications(India) Pvt. LTd., Chennai, second Edition(2007) M. Arumugam, 'Materials Science' Anuradha publications, Kumbakonam, (2006).

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	1	1	1		1					1	3			3
CO2	3	1	2	1	1		1					1	3			3
CO3	3	1	1	2	1		1					1	3			3
CO4	3	2	2	2	2		2					1	3			3
CO5	3	2	2	3	2		1					2	3			2
CO6	3	2	2	1	2		1					2	3			3

12F2Z4	ENGINEERING CHEMISTRY – II		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	II			
Category:	Core					
Prerequisites:	12F1Z4 - Engineering Chemistry – I					
Aim:	To impart a sound knowledge on the principles of chemistry involving the different application oriented topics required for all engineering branches.					
Course Objectives:	The student should be conversant with the • Principles electrochemistry, electrochemical cells & applications. • Principles of corrosion control • Chemistry of fuels and combustion • Industrial importance of phase rule and alloys • Analytical techniques and their importance.					
Course Outcomes:	1. Explain the operating principles and the reaction involved in electrochemistry 2. Illustrate the principle and applications of different electrodes with their merits and demerits. 3. Explain the principles and application of corrosion control. 4. Describe the core concepts behind fuels and combustion. 5. Describe the concepts of fuel purification processes 6. Analyze the importance in phase rule and pertain the chemistry of alloys					

UNIT-I	ELECTROCHEMISTRY	9
Electrochemical cells – reversible and irreversible cells – EMF – measurement of emf – Single electrode potential – Nernst equation (problem) – reference electrodes –Standard Hydrogen electrode -Calomel electrode – Ion selective electrode – glass electrode and measurement of pH – electrochemical series – significance – potentiometric titrations (redox - Fe^{2+} vs dichromate and precipitation – Ag^{+} vs Cl^{-} titrations) and conductometric titrations (acid-base – HCI vs NaOH) titrations		
UNIT-II	**CORROSION AND CORROSION CONTROL**	**9**
Chemical corrosion – Pilling – Bedworth rule – electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion – factors influencing corrosion – corrosion control – sacrificial anode and impressed cathodic current methods – corrosion inhibitors – protective coatings – paints – constituents and functions – metallic coatings – electroplating (Au) and electroless (Ni) plating.		
UNIT-III	**FUELS AND COMBUSTION**	**9**
Calorific value – classification – Coal – proximate and ultimate analysis metallurgical coke – manufacture by Otto-Hoffmann method – Petroleum processing and fractions – cracking – catalytic cracking and methods-knocking – octane number and cetane number – synthetic petrol – Fischer Tropsch and Bergius processes – Gaseous fuels- water gas, producer gas, CNG and LPG, Flue gas analysis – Orsat apparatus – theoretical air for combustion.		
UNIT-IV	**PHASE RULE AND ALLOYS**	**9**
Statement and explanation of terms involved – one component system – water system – condensed phase rule – construction of phase diagram by thermal analysis – simple eutectic systems (lead-silver system only) – alloys – importance, ferrous alloys – nichrome and stainless steel – heat treatment of steel, non-ferrous alloys – brass and bronze.		
UNIT-V	**ANALYTICAL TECHNIQUES**	**9**
Beer-Lambert's law (problem) – UV-visible spectroscopy and IR spectroscopy – principles – instrumentation (problem) (block diagram only) – estimation of iron by colorimetry – flame photometry – principle – instrumentation (block diagram only) – estimation of sodium by flame photometry – atomic absorption spectroscopy – principles – instrumentation (block diagram only) – estimation of nickel by atomic absorption spectroscopy.		
		TOTAL: 45 PERIODS

TEXT BOOK(S)
1. G.Chandramohan and P.Saravanan, "Engineering Chemistry" Sri Murugan Publications, Thanjavur (2015). 2. P.C.Jain and Monica Jain, "Engineering Chemistry" Dhanpat Rai Pub, Co.,New Delhi (2002). 3. S.S.Dara "A text book of Engineering Chemistry" S.Chand & Co. Ltd., New Delhi (2006).
REFERENCE(S)
1. B.K.Sharma "Engineering chemistry" Krishna Prakasan Media (P) Ltd., Meerut (2001). 2. B. Sivasankar "Engineering Chemistry" Tata McGraw-Hill Pub.Co.Ltd, New Delhi (2008).

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	3	1								1	2			2
CO2		2	1	1								1	2			2
CO3	2	1		2								1	2			2
CO4	1	2	1									1	2			2
CO5	2	3	2									2	2			2
CO6	3	2	3									3	2			2

12F2Y5	ENGINEERING MECHANICS		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem:**	III			
Category	Core					
Prerequisites:	12F1Z2-Engineering Mathematics-I					
AIM:	To impart a sound knowledge on the applied physics laws in different engineering applications.					
Course Objectives:	To familiarize the vectorial and scalar representation of forces and moments, static equilibrium of articles and rigid bodies both in two dimensions and also in three dimensions. To understand the laws of motion, the kinematics of motion and the interrelationship. To learn the principle of work and energy.					
Course Outcomes:	1. Illustrate the laws of mechanics, Lame's theorem, parallelogram law, triangular law of forces and principle of transmissibility 2. Describe the types of supports and equilibrium of rigid bodies in three dimensions 3. Explain the parallel axis theorem and perpendicular axis theorem and polar moment of inertia 4. Solve the displacement, velocity and acceleration problems and their relationship with work energy equation of particles 5. Explain the various Frictional forces and general plane motion of rigid bodies Describe the concepts of fuel purification processes					

UNIT-I	**BASICS & STATICS OF PARTICLES**	**12**
Introduction – Units and Dimensions – Laws of Mechanics – Lame's theorem, Parallelogram and triangular Law of forces – Vectors – Vectorial representation of forces and moments, Parallelogram and triangular Law of forces – Vectors – Vectorial representation of forces and moments, Resolution and Composition of forces – Equilibrium of a particle – Forces in space, Equilibrium of a particle in space – Equivalent systems of forces, Principle of transmissibility – Single equivalent force.		
UNIT-II	**EQUILIBRIUM OF RIGID BODIES**	**12**
Free body diagram – Types of supports and their reactions – requirements of stable equilibrium, Moments and Couples – Moment of a force about a point and about an axis, Vectorial representation of moments and couples – Scalar components of a moment – Varignon's theorem, Equilibrium of Rigid bodies in two dimensions, Equilibrium of Rigid bodies in three dimensions – Examples.		
UNIT-III	**PROPERTIES OF SURFACES AND SOLIDS**	**12**
Determination of Areas and Volumes – First moment of area and the Centroid of sections – Rectangle, circle, triangle from integration, T section, I section, - Angle section, Hollow section by using standard formula – second and product moments of plane area, Rectangle, triangle, circle from integration – T section, I section, Angle section, Hollow section by using standard formula, Parallel axis theorem and perpendicular axis theorem, Polar moment of inertia – Principal moments of inertia of plane areas– Principal axes of inertia, Mass moment of inertia – Derivation of mass moment of inertia for rectangular section, prism, sphere from first principle – Relation to area moments of inertia.		
UNIT-IV	**DYNAMICS OF PARTICLES**	**12**
Displacements, Velocity and acceleration, their relationship, Relative motion, Curvilinear motion, Newton's law, Work Energy Equation of particles, Impulse and Momentum.		
UNIT-V	**FRICTION AND ELEMENTS OF RIGID BODY DYNAMICS**	**12**
Frictional force – Laws of Coloumb friction, simple contact friction – Rolling resistance, Belt friction,Translation and Rotation of Rigid Bodies, Velocity and acceleration, General Plane motion.		
		TOTAL: 60 HOURS

TEXT BOOK
1. Beer, F.P and Johnson Jr. E.R. "Vector Mechanics for Engineers", Vol. 1 Statics and Vol. 2 Dynamics, McGraw-Hill International Edition, (1997).

REFERENCE(S)
1. Rajasekaran, S, Sankarasubramanian, G., "Fundamentals of Engineering Mechanics", Vikas Publishing House Pvt. Ltd., (2000). 2. Hibbeller, R.C., "Engineering Mechanics", Vol. 1 Statics, Vol. 2 Dynamics, Pearson Education Asia Pvt. Ltd., (2000). 3. Palanichamy, M.S., Nagam, S., "Engineering Mechanics – Statics & Dynamics", Tata McGraw-Hill,(2001). 4. Irving H. Shames, "Engineering Mechanics – Statics and Dynamics", IV Edition – Pearson Education Asia Pvt. Ltd., (2003). 5. Ashok Gupta, "Interactive Engineering Mechanics – Statics – A Virtual Tutor (CDROM)", Pearson Education Asia Pvt., Ltd., (2002).

Evaluation Criteria & Marks	Continuous Assessment (25)	
	Internal Assessment Tests (60%)	Assign/Seminar/ Mini project (30%)
	15	7.5
Attendance Mark	91% and above – 10; 86-90% - 8; 81-85% - 6; 76-80% - 4; 75% -2	
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U(<50)-Fail	

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	1	2							3	3		2	3
CO2	2	1	2	2								2	2		2	1
CO3	3	2	2	2	2							3	3		1	2
CO4	2	3	2	3	1							2	1		2	1
CO5	2	2	2	2								3	2		1	2

12F2Y6	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	L	T	P	C
		3	1	0	4
Programme:	B.E. Civil Engineering **Sem:**	**II**			
Prerequisites:	------				
AIM:	To learn the fundamentals of electric circuits, types, measurements of electric quantities, types and working principle of various electrical machines, basic semiconductor devices and its applications, digital electronics and memory devices and fundamentals of communication engineering.				
Course Objectives:	• To understand the knowledge of basic electrical circuits and the laws associated with it, electrical quantities, definitions and the methods required to measure those quantities. • To enable you to understand different types of electrical machines their working principle and applications. • To enable you to fathom in to the concepts of semiconductor devices, types and their applications. • To enable you to understand the fundamentals of digital electronics, combinational circuits, memory devices and their design. • To study the fundamentals of communication engineering.				
Course Outcomes:	1. Able to analyze electrical circuit and measure electrical parameters. 2. Able to illustrate various electrical machines and explain its working. 3. Explain identify various electronic devices and represent its characteristics. 4. Able to design digital logic circuits and its applications 5. Able to classify various communication systems and its functioning.				

UNIT-I	**ELECTRICAL CIRCUITS & MEASURMENTS**	**12**
Ohm's Law – Kirchoff's Laws – Steady State Solution of DC Circuits – Introduction to AC Circuits – Waveforms and RMS Value – Power and Power factor – Single Phase and Three Phase Balanced Circuits – Operating Principles of Moving Coil and Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and Energy meters.		
UNIT-II	**ELECTRICAL MACHINES**	**12**
Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single Phase Transformer, single phase induction Motor.		
UNIT-III	**SEMICONDUCTOR DEVICES AND APPLICATIONS**	**12**
Characteristics of PN Junction Diode – Zener Effect – Zener Diode and its Characteristics – Half wave and Full wave Rectifiers – Voltage Regulation. Bipolar Junction Transistor – CB, CE, CC Configurations and Characteristics – Elementary Treatment of Small Signal Amplifier.		
UNIT-IV	**DIGITAL ELECTRONICS**	**12**
Binary Number System – Logic Gates – Boolean Algebra – Half and Full Adders – Flip-Flops – Registers and Counters – A/D and D/A Conversion (single concepts)		
UNIT-V	**FUNDAMENTALS OF COMMUNICATION ENGINEERING**	**12**
Types of Signals: Analog and Digital Signals – Modulation and Demodulation: Principles of Amplitude and Frequency Modulations. Communication Systems: Radio, TV, Fax, Microwave, Satellite and Optical Fibre (Block Diagram Approach only).		
		TOTAL: 60 PERIODS

TEXT BOOK(S)
1. N. Mittle "Basic Electrical Engineering", Tata McGraw Hill Edition, New Delhi, 1990. 2. R.S. Sedha, "Applied Electronics" S. Chand & Co., 2006.
REFERENCE(S)
1. Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics and Computer Engineering", Tata McGraw Hill, Second Edition, (2006). 2. Nagsarkar T K and Sukhija M S, "Basics of Electrical Engineering", Oxford press (2005). 3. Mehta V K, "Principles of Electronics", S.Chand & Company Ltd, (1994). 4. Mahmood Nahvi and Joseph A. Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, (2002). 5. Premkumar N, "Basic Electrical Engineering", Anuradha Publishers, (2003).

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2		3	1							3	1			3
CO2	2	3		3	2							3	1			3
CO3	2	3	1	3	2							3	1			3
CO4	2	3	2	2	3							3	1			3
CO5	2	3	1	2	3							3	1			3

12F2Z7	PHYSICS & CHEMISTRY LABORATORY - II		L	T	P	C
			0	0	3	2
Programme:	B.E. Civil Engineering	**Sem:**	II			
Category:	Core					
Prerequisites:	12F1Z7 – Physics and Chemistry Laboratory I, 12F2Z3- Engineering Physics-II (CR) 12F2Z4- Engineering Chemistry-II (CR)					
Aim:	To develop laboratory skills and realization of Physics and chemistry concepts by doing experiments.					
Course Objectives:	• The course should enable the students to: • To determine the different Modulus, specific resistance, Band gap of the given materials and the coefficient of viscosity of the given liquid. • To determine the amount of chloride, strong acid, HCl and CH_3COOH and barium chloride present in given sample solutions by various methods. • To estimate of alkalinity of the water sample.					
Course Outcomes:	1. Determine the rigidity modulus and Young's Modulus of the material of a wire. 2. Find the coefficient of viscosity of a liquid. 3. Determine the wavelength of mercury spectrum. 4. Find the specific resistance of a coil of wire and Band gap of a semiconducting material. 5. Determine the amount of chloride, strong acid, HCl and CH_3COOH and barium chloride present in given sample solutions by various methods. 6. Estimate of alkalinity of the water sample.					

LIST OF EXPERIMENTS
1. Torsional Pendulum – Determination of rigidity modulus.
2. Determination of Young's modulus of the material – Uniform bending.
3. Determination of Viscosity of liquid – Poiseuille's method.
4. Determination of wavelength of mercury spectrum – Spectrometer Grating.
5. Determination of band gap of semiconducting material.
6. Determination of specific resistance of a given coil of wire – Carey foster bridge.
7. Estimation of chloride content in water sample (Argentometric method)
8. Conductometric titration of strong acid with strong base.
9. Conductometric titration of mixture of acids (HCl & CH_3COOH)
10. Conductometric precipitation titration using $BaCl_2$ Vs Na_2SO_4
11. Estimation of alkalinity in water sample.
TOTAL: 45 PERIODS

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	1	1	1				2			1	3			3
CO2	2	2	1	1	1				1			1	3			3
CO3	2	2	1	1	1				2			1	3			3
CO4	2	2	1	2	2				2			1	3			3
CO5	3	2	2	2	2				1			2	3			3
CO6	2	2	2	1	1				2			1	3			3

12F2X7	COMPUTER AIDED DRAFTING AND MODELING LABORATORY		L	T	P	C
			0	0	3	2
Programme:	B.E. Civil Engineering	**Sem:**	I			
Category:	Core					
Prerequisites/ Corequisites (CR):	12F1Z8-Computer Practice Laboratory -1					
Course Outcomes:	1. Learn the fundamentals of drafting using AUTOCAD 2. Outline the basic shapes and modelling 3. Interpret the drawing from different perspective 4. Devise plan for residential building 5. Recall sectional views and Isometric projection of simple object. 6. Create 3D models for simple Objects.					

List of Exercises using software capable of Drafting and Modeling

1. Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.
2. Drawing of a Title Block with necessary text and projection symbol.
3. Drawing of curves like parabola, spiral, involute using Bspline or cubic spline.
4. Drawing of front view and top view of simple solids like prism, pyramid, cylinder,cone, etc, and dimensioning.
5. Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixie, Simple stool, Objects with hole and curves).
6. Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)
7. Drawing of a simple steel truss.
8. Drawing sectional views of prism, pyramid, cylinder, cone, etc,
9. Drawing isometric projection of simple objects.
10. Creation of 3D models of simple objects and obtaining 2D multi-view drawings from 3D model.

Note: Plotting of drawings must be made for each exercise and attached to the records written by students.

List of Equipments for a batch of 30 students:

1. Pentium IV computer or better hardware, with suitable graphics facility -30 Nos.
2. Licensed software for Drafting and Modeling. – 30 Licenses
3. Laser Printer or Plotter to print / plot drawings – 2 Nos.

TOTAL: 45 PERIODS

Evaluation Criteria & Marks	Internal (25)			End Semester Examination	Total Marks
	Observation (45%)	Record (45%)	Attendance (10%)		
	10	10	5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1			2	3	3				2			3	3		2	2
CO2			1	2	3				3			3	2		1	1
CO3			3	2	3				2			2	2		2	2
CO4			2	3	2				2			3	3		3	2
CO5			1	2	3				1			2	2		2	1
CO6			2	1	3				2			3	2		2	2

12F2Z8	COMPUTER PRACTICE LABORATORY-II		L	T	P	C
			0	0	3	2
Programme:	B.E. Civil Engineering	**Sem:**	II			
Category:	Core					
Prerequisite:	12F1Z8-Computer Practice Laboratory – I					
Course Outcomes:	1. Make use of basic UNIX commands and shell scripts. 2. Build simple shell programs. 3. Develop shell scripts using Conditional and Iterative statements. 4. Construct C program using functions. 5. Utilize File concepts in C.					

LIST OF EXPERIMENTS

1. Study of Unix OS
2. Basic Commands in Unix

Shell Programs

3. Simple Shell Programs
4. Script using for Loop
5. Script using if loop
6. Script using combination of for and if loop
7. Script using while and until loop
8. Script using combination of while and if loop
9. Script using Switch case
10. String Manipulation
11. File manipulation

C-Programs

1. Function with no arguments and no return type
2. Function with no arguments and return type
3. Function with arguments and no return type
4. Function with arguments and return type
5. Call by value
6. Call by reference
7. Recursion function
8. Pointers
9. Random access functions in files
10. File handling

SYLLABUS

1. UNIX COMMANDS

Study of UNIX OS - Basic Shell Commands - Unix Editor.

2. SHELL PROGRAMMING

Simple Shell program - Conditional Statements - Testing and Loops.

3. C PROGRAMMING ON UNIX

Dynamic Storage Allocation-Pointers-Functions-File Handling.

Evaluation Criteria & Marks	Internal (25)			End Semester Examination	Total Marks
	Observation (45%)	Record (45%)	Attendance (10%)		
	10	10	5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3		2					2			1	3			3
CO2	3	3	1	1					1				2			2
CO3	2	3		2					2				3			2
CO4	3	3		1					1				2			3
CO5	3	3	3	2					2				3			3

12MA31	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem:**	III			
Category	Core					
Prerequisites:	12F2Z2-Engineering Mathematics-II					
AIM:	The course is aimed at developing the basic mathematical skills of Engineering students.					
Course Objectives:	• The course objective is to develop the skills of the students in the areas of Transforms and Partial Differential Equations. • This will be necessary for their effective studies in a large number of engineering subjects like heat conduction, communication systems, electro-optics and electromagnetic theory. • The course will also serve as a prerequisite for post graduate and specialized studies and research.					
Course Outcomes:	1. Classify the Fourier series and half range Fourier sine and cosine series. 2. Explain the Fourier transform and with their properties. 3. Determine Z-inverse transform using convolution theorem and partial fraction method. 4. Solve the partial differential equation by using Lagrange'slinearequation. 5. Analyze separation of variable to solve linear partial differential equation.					

UNIT-I	FOURIER SERIES	12
Dirichlet's conditions – General Fourier series – Odd and even functions – Half range sine series – Half range cosine series – Complex form of Fourier Series – Parseval's identify – Harmonic Analysis.		
UNIT-II	**FOURIER TRANSFORMS**	**12**
Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem – Parseval's identity.		
UNIT-III	**PARTIAL DIFFERENTIAL EQUATIONS**	**12**
Formation of partial differential equations – Lagrange's linear equation – Solutions of standard types of first order partial differential equations – Linear partial differential equations of second and higher order with constant coefficients.		
UNIT-IV	**APPLICATIONS OF PARTIAL DIFFERENTIAL EQUATIONS**	**12**
Solutions of one dimensional wave equation – One dimensional equation of heat conduction – Steady state solution of two-dimensional equation of heat conduction (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.		
UNIT-V	**Z -TRANSFORMS AND DIFFERENCE EQUATIONS**	**12**
Z-transforms – Elementary properties – Inverse Z-transform – Convolution theorem – Formation of difference equations – Solution of difference equations using Z-transform.		
		TOTAL: 60 PERIODS

TEXT BOOK(S)

1. Grewal, B.S, "Higher Engineering Mathematics", 40th Edition, Khanna publishers, Delhi, (2007)
2. Veerarajan, T., "Transforms and Partial Differential Equation", Tata Mc-GrawHill Publishing Company limited, New Delhi (2011).

REFERENCE(S)

1. Bali, N.P and Manish Goyal "A Textbook of Engineering Mathematics", 7th Edition, Laxmi Publications(P) Ltd. (2007)
2. Ramana B.V., "Higher Engineering Mathematics", Tata Mc-GrawHill Publishing Company limited, New Delhi (2007)
3. Glyn James, "Advanced Modern Engineering Mathematics", 3rd edition-Pearson Education (2007)
4. Erwin Kreyszig "Advanced Engineering Mathematics", 8th edition-Wiley India (2007)

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2		2								3	1			
CO2	3	2		3								3	1			
CO3	3	2		3								3	1			
CO4	3	2		1									1			
CO5	3	2		2								1	1			

12GE31	ENVIRONMENTAL SCIENCE AND ENGINEERING		L	T	P	C
			3	1	0	3
Programme:	B.E. Civil Engineering	**Sem:**	III			
Category	Core					
Prerequisites:	12F2Z4- Engineering Chemistry-II					
AIM:	The aim of this course is to create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make them sensitive to the environment problems in every professional endeavor that they participates..					
Course Objectives:	• At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.					
Course Outcomes:	1. Recall the importance of environment and ecological systems 2. Illustrate the equitable use of resources for lifestyles 3. Determine the causes of environmental pollution 4. Explain the various disaster managements 5. Recognize the role of Individuals, Government and Technology in environmental protection and human health					

UNIT I	ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY	14 hrs
Definition, scope and importance of environment – need for public awareness - 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 – bio geographical 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. Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.		
UNIT II	**NATURAL RESOURCES**	**10 hrs**
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 overutilization 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. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.		
UNIT III	**ENVIRONMENTAL POLLUTION**	**8 hrs**

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 municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.		
UNIT IV	**SOCIAL ISSUES AND THE ENVIRONMENT**	**7 hrs**
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 – role of non-governmental organizationenvironmental 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 protection act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.		
UNIT V	**HUMAN POPULATION AND THE ENVIRONMENT**	**6 hrs**
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.		
		TOTAL: 45 PERIODS
TEXT BOOKS		
1.Ravi Krishnan. A, "Environmental Science and Engineering", Sri Krishna publications, Chennai 2012. 2.Benny Joseph, "Environmental Studies", Tata McGraw-Hill, New Delhi, 2008		
REFERENCES		
1. R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media. 2. Cunningham, W.P. Cooper, T.H. Gorhani, "Environmental Encyclopedia", Jaico Publ., House, Mumbai, 2001. 3. Dharmendra S. Sengar, "Environmental law", Prentice hall of India PVT LTD, New Delhi, 2007. 4. Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press (2005) 5. Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 2nd Edition, Pearson Education, 2004.		

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1		1				3	1				2				2
CO2			1			3	2	2				3				2
CO3	1		1	3		3	2	2				2				2
CO4	2		2			3	2	1				1				2
CO5	2		2			3	1	2				1				2

12CE31	APPLIED GEOLOGY		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	III			
Category	Core					
Prerequisites:	12F1Z4-Engineering Chemistry-I					
AIM:	The aim of this course is to create awareness to the civil engineering students in geological field.					
Course Objectives:	• To introduce the basic knowledge to civil engineering students. • To apply this knowledge to engineering projects such as dams, tunnels and roads.					
Course Outcomes:	1. Explain the importance of geology in civil engineering and the theory of plate tectonics. 2. Gain knowledge about the formation of minerals and identify the properties of minerals. 3. Gain knowledge about the formation of rocks and differentiate them based on their properties. 4. Examine geological maps and identify the geological structures from the maps. 5. Illustrate the seismic and electrical methods for civil engineering investigations..					

UNIT-I	**GENERAL GEOLOGY**	**9**
Geology in civil Engineering – Branches of geology – Earth Structures and composition – Elementary knowledge on continental drift and plate technologies – Earth processes –Weathering – Work of rivers, wind and sea and their engineering importance –Earthquake belts in India – Groundwater – Mode of occurrence – Prospecting –importance in civil engineering		
UNIT-II	**MINERALOGY**	**9**
Elementary knowledge on symmetry elements of important crystallographic systems –Physical properties of minerals – Study of the following rock forming minerals – Quartz family – Feldpar family – Augite, hornblende, biotite, muscovite, calcite, garnet – properties – behaviour and engineering significance of clay minerals – Fundamentals of process of formation of ore minerals – Coal and petroleum – Their origin and occurrence in India.		
UNIT-III	**PETROLOGY**	**9**
Classification of rocks – Distinction between igneous, sedimentary and metamorphic rocks – Description occurrence, engineering properties and distribution of following rocks – Igneous rocks – Granite, syenite , diorite , gabbro , pegmatite, dolerite and basalt sedimentary rocks sandstone – Limestone, shale conglo, conglomerate and breccia. Metamorphic rocks – Quartizite, marble, slate, phyllite, gniess and schist.		
UNIT-IV	**STRUCTURAL GEOLOGY AND GEOPHYSICAL METHOD**	**9**
Attitude of beds – Outcrops – Introduction to geological maps Study of structures – Folds, faults and joints – Their bearing on engineering construction – Seismic and electrical methods for civil engineering investigations.		
UNIT-V	**GEOLOGICAL INVESTIGATIONS IN CIVIL ENGINEERING**	**9**
Remote sensing techniques – Study of air photos and satellite images – Interpretation for civil Engineering projects – Geological conditions necessary for construction of dams - Tunnels – Buildings – Road cuttings – Landslides – Causes and preventions – Sea erosion and coastal protection.		
		Total: 45 Periods

Text Book

Parbin Singh, "Engineering and General Geology", Katson Publication House, 1987.
Legeet, "Geology and Engineering", McGraw-Hill Book Company 1998.

References

1. Blyth, "Geology for Engineers", ELBS, 1995.
2. Krynine and Judd, "Engineering Geology and Geotechniques", McGraw-Hill Book Company, 1990

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1		1			1	2	3				2				2
CO2	2		1			2	2	3				3				2
CO3	1		1			2	2	3				2				2
CO4	1		1			2	2	3				1				2
CO5	2		1			2	1	3				1				2

12CE32	MECHANICS OF SOLIDS		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem:**	III			
Category	Core					
Prerequisites:	12F2Y5-Engineering Mechanics					
AIM:	To study and analyze solid mechanics, stress and deflection of beams					
Course Objectives:	• To study the theory of elasticity and solid mechanics. • To locate the shear centre of thin wall beams • To analyze the forces in truss members					
Course Outcomes:	1. Explain the theory of elasticity including strain/displacement and Hooke's law relationships. 2. Analyze solid mechanics problems using classical methods and energy methods; 3. Solve torsion problems in bars and thin walled members 4. Solve for stresses and deflections of beams under unsymmetrical loading; 5. Locate the shear centre of thin wall beams.					

UNIT-I	**STRESS STRAIN AND DEFORMATION OF SOLIDS,STATES OF STRESS**	**9**
Rigid bodies and deformable solids – stability, strength, stiffness – tension, compression and shear stresses – strain, elasticity, Hooke's law, limit of proportionately, modules of elasticity, stress-strain curve, lateral strain – temperature stresses – deformation of simple and compound bars – shear modulus, bulk modulus, relationship between elastic constants – biaxial state of stress – stress at a point – stress on inclined plane – principal stresses and principal planes –Mohr's circle of stresses		
UNIT-II	**TRANSVERSE LOADING ON BEAMS**	**9**
Beams – types of supports – simple and fixed, types of load – concentrated, uniformly distributed, varying distributed load, combination of above loading – relationship between bending moment and shear force – bending moment, shear force diagram for simply supported, cantilever and over hanging beams – Theory of simple bending – analysis of stresses – load carrying capacity of beams – proportioning of sections		
UNIT-III	**DEFLECTION OF BEAMS AND SHEAR STRESSES**	**9**
Deflection of beams – double integration method – Macaulay's method – slope and deflection using moment area method, Conjugate Beam method – variation of shear stress – shear stress distribution in rectangular, I sections, solid circular sections, hollow circular channel sections – shearflow and shear centre		
UNIT-IV	**TORSION AND SPRINGS**	**9**
Stresses and deformation in circular (solid and hollow shafts) – stepped shafts – shafts fixed at both ends – leaf springs – stresses in helical springs and deflection of springs		
UNIT-V	**ANALYSIS OF PLANE TRUSS**	**9**
Stability and equilibrium of plane frames – types of trusses – analysis of forces in truss members method of joints, method of sections, method of tension coefficients		
		TOTAL: 60 PERIODS

TEXT BOOK(S)
1.Bansal R.K.Strength of materials, Laxmi 1Publications, New Delhi, Fourth Edition,2010 2.Subramanian R.,Strength of Materials, Oxford Univerisity press, New Delhi – 2010
REFERENCE(S)
1.William A.Nash, Theory and problems of strength of materials, Schaum's Outline series, Tata McGraw-Hill publishing co.,New Delhi-2010 2. Srinath L.S.,Advanced Mechanics of solids, Tata McGraw-Hill publishing co.,New Delhi-2003

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	2	3	1	3							1	3			
CO2	3	3	2	3	2							1	3			
CO3	3	2	2	2	2							1	2			
CO4	1	2	3	1	1							1	2			
CO5	2	2	3	2	2							1	2			

12CE33	MECHANICS OF FLUIDS		L	T	P	C
			3	1	0	4
Programme:	B.E. CIVIL ENGINEERING	**Sem:**	III			
Category	Core					
Prerequisites:	12F2Y5-Engineering Mechanics					
AIM:	The aim of this course is to provide knowledge in the field of Mechanics of Fluids and related areas					
Course Objectives:	• The student is introduced to the definition and properties of fluid. Principles of fluid statics, kinematics and dynamics are dealt with subsequently. • The application of similitude and model study is covered subsequently. • After undergoing this course, the student would have learnt fluid properties and application to real situations of fluid flow.					
Course Outcomes:	1. Determine the properties of fluid, pressure and their measurement 2. Apply continuity equation and energy equation in solving problems on flow through conduits. 3. Identify the discharge measurement, laminar flow through pipes and between plates. 4. compute the frictional loss in laminar and turbulent flows 5. Identify the Dimensional Analysis					

UNIT-I	DEFINITIONS AND FLUID PROPERTIES	5+2 hrs
Definitions – Fluid and fluid mechanics – Dimensions and units – Fluid properties – Continuum Concept of system and control volume		
UNIT-II	**FLUID STATICS & KINEMATICS**	**10+4 hrs**
Pascal's Law and Hydrostatic equation – Forces on plane and curved surfaces – Buoyancy – Meta centre – Pressure measurement – Fluid mass under relative equilibrium Fluid Kinematics Stream, streak and path lines – Classification of flows – Continuity equation (one, two and three dimensional forms) – Stream and potential functions – flow nets – Velocity measurement (Pilot tube, current meter, Hot wire and hot film anemometer, float technique, Laser Doppler velocimetry)		
UNIT-III	**FLUID DYNAMICS**	**10+3hrs**
Euler and Bernoulli's equations – Application of Bernoulli's equation – Discharge measurement – Laminar flows through pipes and between plates – Hagen Poiseuille equation – Turbulent flow – Darcy-Weisbach formula – Moody diagram – Momentum Principle.		
UNIT-IV	**BOUNDARY LAYER AND FLOW THROUGH PIPES**	**10 +3 hrs**
Definition of boundary layer – Thickness and classification – Displacement and momentum thickness – Development of laminar and turbulent flows in circular pipes – Major and minor losses of flow in pipes – Pipes in series and in parallel – Pipe network		
UNIT-V	**SIMILITUDE AND MODEL STUDY**	**10 +3hrs**
Dimensional Analysis – Rayleigh's method, Buckingham's Pi-theorem – Similitude and models – Scale effect and distorted models.		
		TOTAL: 60 PERIODS

TEXT BOOK(S)

. Rajput, R.K., "A text book of Fluid Mechanics" , S.Chand and Co.,New Delhi – 2007
2.Streeter, Victor, L. and Wylie, Benjamin E., "Fluid Mechanics", McGraw-Hill Ltd., 2010.

REFERENCE(S)

1 E. John Finnemore and Joseph B. Franzini, "Fluid Mechanics with Engineering Applications", McGraw-Hill International Edition, 2001.
2. PernardMessay, "Mechanics of Fluids" 7th Edition, Nelson Thornes Ltd. U. K. 1998.
3. Kumar, K.L., "Engineering Fluid Mechanics", Eurasia Publishing House (P) Ltd., New Delhi,

1995.
4.Garde, R.J. and Mirajgaoker, A.G., "Engineering Fluid Mechanics", Nem Chand Bros., Roorkee

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	1	1	3							1	3			2
CO2	3	3	2	3	2							1	3			1
CO3	3	2	2	2	2							1	2			2
CO4	3	2	3	1	1							1	2			1
CO5	3	2	3	2	2							1	2			2

12CE34	BUILDING MATERIALS AND CONSTRUCTION TECHNIQUES		L	T	P	C
			4	0	0	4
Programme:	B.E. Civil Engineering	**Sem:**	III			
Category	Core					
Prerequisites:	12F2Y6- Basic Electrical and Electronics Engineering.					
AIM:	To study the Building materials and the various construction techniques, practices and the equipment needed for different types of construction activities.					
Course Objectives:	• This course is to make the student aware of building materials and the various construction techniques, practices. • At the end of this course the student shall have a reasonable knowledge about the various construction procedures for sub to super structure. • To gather the knowledge and suitability of equipment needed for construction of various types of structures from foundation to super structure.					
Course Outcomes:	1. Describe the properties and behaviour of building materials. 2. Learn the advanced construction techniques used for sub structure construction. 3. Adapt appropriate techniques for super structure construction of buildings. 4. Explain the techniques used for construction of special structures. 5. Illustrate Suitability and optimum utility of construction equipments will meet the budget cash flow.					

UNIT-I	**UNIT I BUILDING MATERIALS**	**12**
Bricks-constituents-qualities-classifications-uses-Stones – qualities – uses – cement-types qualities-uses- Mortar-types-properties-uses-selection of mortar-concrete-properties-uses-steel sections-wood-characteristics-seasoning-properties-uses-paints-types-properties of building materials.		
UNIT-II	**BUILDING CONSTRUCTIONS**	**12hrs**
Specifications, details and sequence of activities and construction co-ordination – Site Clearance – Marking – Earthwork - masonry – stone masonry – Bond in masonry – concrete hollow block masonry – flooring – damp proof courses-building foundation –basement.		
UNIT-III	**SUB STRUCTURE CONSTRUCTION**	**12**
Techniques of Box jacking – Pipe Jacking -under water construction of diaphragm walls and basement-Tunneling techniques – Piling techniques - well and caisson - sinking cofferdam - cable anchoring and grouting-driving diaphragm walls, sheet piles - shoring for deep cutting - well points -Dewatering and stand by Plant equipment for underground open excavation.		
UNIT-IV	**SUPER STRUCTURE CONSTRUCTION**	**12hrs**
Launching girders, bridge decks, off shore platforms – special forms for shells - techniques for heavy decks – in-situ pre-stressing in high rise structures, Material handling - erecting light weight components on tall structures - Support structure for heavy Equipment and conveyors - Erection of articulated structures, braced domes and space decks.		
UNIT-V	**CONSTRUCTION EQUIPMENT AND PRACTICS**	**12hrs**
Selection of equipment for earth work - earth moving operations - types of earthwork equipment - Equipment for foundation and pile driving. Equipment for compaction, batching, mixing, concreting, material handling, erection of structures, dredging, trenching, tunneling- pre cast pavements –temporary shed –centering and shuttering – slip forms – scaffoldings – de-shuttering forms – Fabrication and erection of steel trusses - weather and water proof – roof finishes – acoustic and fire protection.		
		TOTAL: 60 PERIODS

TEXT BOOK(S)
1. Varghese, P.C. Building construction, Prentice Hall of India Pvt. Ltd, New Delhi, 2007.
REFERENCE(S)
1. Sheety, M.S, Concrete Technology, Theory and Practice, S. Chand and Company Ltd, New Delhi, 2005. 2. Arora S.P. and Bindra S.P., Building Construction, Planning Techniques and Method of Construction, Dhanpat Rai and Sons, 1997.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	1	2	1	3	2	1					1	3	1	2	
CO2	2	3	2	3	2	1	1					1	3	1	2	
CO3	2	2	2	2	2	1	1					1	2	1	2	
CO4	2	2	3	1	1	1	1					1	2	1	2	
CO5	2	2	3	2	2	1	1					1	2	1	2	

12CE35	SURVEYING I		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem: III**				
Prerequisite:	12F1Z6-Engineering Graphics					
Category:	Core					
AIM:	The aim of this course is to make the student aware of surveying techniques in civil engineering.					
Course Objectives:	• To study the Chain surveying, compass surveying • To study the Plane table surveying • To study the Leveling, Theodolite surveying • To study the Engineering surveys.					
Course Outcomes:	1. Carry out preliminary surveying in the field of civil engineering applications such as structural, highway engineering and geotechnical engineering. 2. Able to plan a survey, taking accurate measurements, field booking, plotting and adjustment of traverse 3. Use various conventional instruments involved in surveying with respect to utility and precision 4. Plan a survey for applications such as road alignment and height of the building 5. Undertake measurement and plotting in civil engineering					

UNIT I	INTRODUCTION AND CHAIN SURVEYING	8 hrs
Definition - Principles - Classification - Field and office work - Scales - Conventional signs - Survey instruments, their care and adjustment - Ranging and chaining - Reciprocal ranging - Setting perpendiculars - well - conditioned triangles - Traversing - Plotting - Enlarging and reducing figures.		
UNIT II	**COMPASS SURVEYING AND PLANE TABLE SURVEYING**	**7 hrs**
Prismatic compass - Surveyor's compass - Bearing - Systems and conversions – Local attraction - Magnetic declination - Dip - Traversing - Plotting - Adjustment of errors - Plane table instruments and accessories - Merits and demerits - Methods - Radiation - Intersection - Resection - Traversing.		
UNIT III	**LEVELLING AND APPLICATIONS**	**12**
Level line - Horizontal line - Levels and Staves - Spirit level - Sensitiveness - Bench marks - Temporary and permanent adjustments - Fly and check levelling - Booking - Reduction - Curvature and refraction - Reciprocal levelling - Longitudinal and cross sections - Plotting - Calculation of areas and volumes - Contouring - Methods - Characteristics and uses of contours - Plotting - Earth work volume - Capacity of reservoirs.		
UNIT IV	**THEODOLITE SURVEYING**	**8 hrs**
Theodolite - Vernier and microptic - Description and uses - Temporary and permanent adjustments of vernier transit - Horizontal angles - Vertical angles - Heights and distances - Traversing - Closing error and distribution - Gale's tables - Omitted measurements.		
UNIT V	**ENGINEERING SURVEYS**	**10 hrs**
Reconnaissance, preliminary and location surveys for engineering projects - Lay out – Setting out works - Route Surveys for highways, railways and waterways - Curve ranging – Horizontal and vertical curves - Simple curves - Setting with chain and tapes, tangential angles by theodolite, double theodolite - Compound and reverse curves - Transition curves – Functions and requirements - Setting out by offsets and angles - Vertical curves - Sight distances – Mine Surveying - instruments - Tunnels - Correlation of underground and surface surveys - Shafts - Adits.		
		TOTAL: 45 PERIODS

TEXT BOOKS
. Punmia B.C. Surveying, Vols. I, Laxmi Publications, 1989 . Clark D., Plane and Geodetic Surveying, Vols. I and II, C.B.S. Publishers and Distributors, Delhi, Sixth Edition, 1971.
REFERENCES
1. James M.Anderson and Edward M.Mikhail, Introduction to Surveying, McGraw-Hill Book Company, 1985. 2. Heribert Kahmen and Wolfgang Faig, Surveying, Walter de Gruyter, 1995. 3. Bannister A. and Raymond S., Surveying, ELBS, Sixth Edition, 1992. 4. Kanetkar T.P., Surveying and Levelling, Vols. I and II, United Book Corporation, Pune, 1994

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	2	1	3	2	1	1				2	3	3	2	1
CO2	2	3		3	3				2			2	1	1	2	1
CO3	1	3	3	2	2		1					1	2	1	2	1
CO4	3	3	1	1	1		1					1	2	1	2	1
CO5	2	3	2	2	2		1					1	2	1	2	1

12CE36	SURVEY PRACTICAL – I		L	T	P	C
			0	0	4	2
Programme:	B.E. Civil Engineering	**Sem:**	III			
Category:	Core					
Prerequisites:	12CE35- Surveying-I(CR)					
AIM:	The aim of this course is to make the student aware of surveying techniques and instruments.					
Course Objectives:	• At the end of the course the student will posses knowledge about Survey field techniques.					
Course Outcomes:	1. Use conventional surveying tools such as chain/tape, compass, plane table, level in the field of civil engineering applications such as structural plotting and highway profiling. 2. Apply the procedures involved in field work and to work as a surveying team. 3. Able to plan a survey appropriately with the skill to understand the surroundings. 4. Take accurate measurements, field booking, plotting and adjustment of errors can be understood. 5. Plot traverses / sides of building and determine the location of points present on field on a piece of paper.					

LIST OF EXPERIMENTS

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

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75	100
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	2	2	1	3	2	1	1				2	3	3	2	1
CO2	2	3		3	3				2			2	1	1	2	1
CO3	1	3	3	2	2		1					1	2	1	2	1
CO4	3	3	1	1	1		1					1	2	1	2	1
CO5	2	3	2	2	2		1					1	2	1	2	1

12CE37	COMPUTER AIDED BUILDING DRAWING		L	T	P	C
			0	0	4	2
Programme:	B.E. Civil Engineering	**Sem:**	III			
Category	Core					
Prerequisites:	12F2X7- Computer Aided Drafting and ModelingLaboratory					
AIM:	To get experience in draft the building plan, elevation, section.					
Course Objectives:	• At the end of this course the student should be able to draft the building drawings (Plan,elevation and sectional views). • The student shall also be able to appreciate the importance of geological formation in causing earthquakes and landslides.					
Course Outcomes:	1. Acquire knowledge and skills needed to design Building with load bearing walls(Flat and pitched roof)-including details of doors and windows 2. Develop the RCC framed structure 3. Adapt appropriate techniques for super structure construction of buildings. 4. Acquire basic skills needed to view, print, edit, and create Industrial building – north light roof structure –trussess.					

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

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75	100
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1		1	1									2	3			1
CO2		3	1	2	1							2	1			1
CO3		3	3	2	1							1	2			1
CO4		3	1	1	1							1	2			1

12HS31	PROFESSIONAL ENGLISH -I		L	T	P	C
			0	0	1	1
Programme:	B.E. Civil Engineering	**Sem:**	III			
Category	Core					
Prerequisites :	12F2Z1- Technical English-II					
AIM:	To create an Environment to improve learner's communication skill using Professional English module					
Course Objectives:	• To impart basics of Language & Grammar relating to Business Communication • To imbibe the spirit of accurate and appropriate Basic communication • To introduce the professional Communication module • To improve learners ability to understand Technical communication					
Course Outcomes:	1. Employ appropriate syntax and words. 2. Understand the text and its structure to respond any queries. 3. Improve technical communication. 4. Respond oral communication at work place. 5. Develop coherence in oral presentation and Initiate discussion with the mass.					

List of Experiments:
Language & Grammar
Use of Verb,Article,Adjectives,Adverbs,Preposition,Conjunction,Comparative Superlative, Noun –Antecedent & Precedent Spelling &Punctuation Concord Use of Active & Passive voice Use of Conditional Sentence & Reported speech
Reading
Reading technical reports for Gist Reading Technical Article, Graphs, Charts, Adverts, Notices & Proposals for Structure and detail
Writing
Writing E-mails for giving Instruction/ Summarizing/Persuading/Giving assurance/asking a comment Writing an Introduction to Report/Proposal/Technical Description Writing Instructions & Recommendations for User manuals/Equipments/devices/New Inventions
Listening
Listening to Technical News for Gist Listening to Technical Interviews for gathering information Listening to a Presentation for inferring meaning
Speaking
Self-Introduction Have your say- Recent gadgets/Technical Innovations/ Scientific Inventions

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1						2			2	3	1	2	2	2		3
CO2						3			2	3	1	2	2	2		3
CO3						3			2	3	1	1	2			3
CO4						3			2	3	1	1	3	3		2
CO5						3			2	2	2	1	1	3		1

12MA42	NUMERICAL METHODS		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem**				
Prerequisite:	12MA31- Transforms and Partial Differential Equations					
Category:	Core					
AIM:	To provide adequate analytical and problem solving skills for all the engineering students					
Course Objectives:	• At the end of the course, the students would be able to know the basic concepts in numerical methods and their uses like the roots of nonlinear equations, interpolation of data, application of differentiation and integration.					
Course Outcomes:	1. Evaluate matrix Inverse by using Gauss-Jordan method. 2. Apply Newton's forward and backward difference interpolation 3. Solve Numerical integration using Trapezoidal and Simpson's 1/3 rules. 4. Analyze the Modified Euler's method. 5. Evaluate Finite difference solution of Second order Equation					

UNIT I	**SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS**	**9+3 hrs**
Solution of equation –Fixed point iteration: x=g(x) method - Newton's method – Solution of linear system by Gaussian elimination and Gauss-Jordon method– Iterative method - Gauss- Seidel method - Inverse of a matrix by Gauss Jordon method – Eigen value of a matrix by power method and by Jacobi method for symmetric matrix.		
UNIT II	**INTERPOLATION AND APPROXIMATION**	**9+3 hrs**
Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton's forward and backward difference formulas.		
UNIT III	**NUMERICAL DIFFERENTIATION AND INTEGRATION**	**9+3 hrs**
Differentiation using interpolation formulae –Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Two and Three point Gaussian quadrature formulae – Double integrals using trapezoidal and Simpsons's rules.		
UNIT IV	**INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS**	**9+3 hrs**
Single step methods: Taylor series method – Euler method for first order equation – Fourth order Runge – Kutta method for solving first and second order equations – Multistep methods: Milne's and Adam's predictor and corrector methods.		
UNIT V	**BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL DIFFERENTIAL EQUATIONS**	**9+3 hrs**
Finite difference solution of second order ordinary differential equation – Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.		
		TOTAL: 60 PERIODS

TEXT BOOKS
1.P.Kandasamy, K.Thilagavathy and K.Gunavathy, 'Numerical Methods', S.Chand Co.Ltd., New Delhi,2003. New Delhi, 2007. 2. Veerarjan, T and Ramachandran, T., "Numerical methods with programming in C", Second Editiion, Tata McGraw-Hill Publishing.Co.Ltd, 2007.
REFERENCES
1. Sankara Rao K, "Numerical Methods for scientists and Engineers", 3rd Edition, Printice Hall of

India Private Ltd, New Delhi, 2007.
2. Gerald, C. F. and Wheatley, P.O., "Applied Numerical Analysis".., Edition, Pearson Education, Asia, New Delhi.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2		3		2		3					3	2		
CO2	3	2		3		2	3						3	2		
CO3	3	2	3	2		2	3						3	2		
CO4	3	2	3	2									3	2		
CO5	3		2	3	2								3	2		

12CE41	GEOTECHNICAL ENGINEERING – I		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	IV			
Category	Core					
Prerequisites:	12CE31- Applied Geology					
AIM:	After undergoing this course, the student gains adequate knowledge on engineering properties of soil.					
Course Objectives:	• To study the nature of soil and classification of soil. • To study the stress concept in soil. • To study the shear strength and its measurement. • To study the stability analysis for cohesive soil.					
Course Outcomes:	1. Classify the soil based on its nature. 2. Determine the permeability and seepage characteristics of soil. 3. Describe the stress analysis of soil by various theories. 4. Evaluate the shear strength of soil using Mohr - Coulomb failure theory. 5. Analyse the stability of soil and suggest protective measures.					

UNIT-I	INTRODUCTION	10 hrs
Nature of Soil – Phase relation – Sieve analysis – Sedimentation analysis – Atterberg's limits – BIS Classification system – Soil compaction – Factors affecting compaction – Field compaction methods and monitoring.		
UNIT-II	**SOIL WATER AND WATER FLOW**	**8 hrs**
Soil water – Various forms – Influence of clay minerals – Capillary rise – Suction – Effective stress concepts in soil – Total, neutral and effective stress distribution in soil - Permeability – Darcy's Law- Permeability measurement in the laboratory – quick sand condition - Seepage – Laplace Equation - Introduction to flow nets –properties and uses - Application to simple problems.		
UNIT-III	**STRESS DISTRIBUTION, COMPRESSIBILITY AND SETTLEMENT**	**10hrs**
Stress distribution in soil media – Boussinesque formula – stress due to line load and Circular and rectangular loaded area - approximate methods - Use of influence charts – Westergaard equation for point load – Terzaghi's one dimensional consolidation theory – governing differential equation - laboratoryconsolidation test – Field consolidation curve – NC and OC clays - problems on final and timerate of consolidation		
UNIT-IV	**SHEAR STRENGTH**	**9hrs**
Shear strength of cohesive and cohesionless soils - Mohr - Coulomb failure theory – Saturated soil - Strength parameters - Measurement of shear strength, direct shear, Triaxial compression, UCC and Vane shear tests –Types of shear tests based on drainage and their applicability - Drained and undrained behaviour of clay and sand – Stress path for conventional triaxial test.		
UNIT-V	**SLOPE STABILITY**	**8hrs**
Slope failure mechanisms - Modes - Infinite slopes - Finite slopes – Total and effective stress analysis - Stability analysis for purely cohesive and C- soils - Method of slices – Modified Bishop's method - Friction circle method - stability number – problems – Slope protection measures.		
		TOTAL:45 PERIODS

TEXT BOOK(S)
1. Punmia P.C., "Soil Mechanics and Foundations", Laximi Publications Pvt. Ltd., New Delhi,2005. 2. Coduto, D.P., "Geotechnical Engineering Principles and Practices", Prentice Hall of India Private Limited, New Delhi, 2002.
REFERENCE(S)
1. McCarthy D.F., "Essentials of Soil Mechanics and Foundations Basic Geotechniques", Sixth Edition, Prentice-Hall, New Jersey, 2002. 2. Das, B.M, "Principles of Geotechnical Engineering", (fifth edition), Thomas Books/ cole,2002 3. Muni Budhu, "Soil Mechanics and Foundations", John Willey & Sons, Inc, New York, 2000. 4. Gopal Ranjan and Rao A.S.R., "Basic and applied soil mechanics", New Age International Publishers, New Delhi, 2000. 5. Venkatramaiah, C. "Geotechnical Engineering", New Age International Publishers, New Delhi, 1995 6. Khan I.H., "A text book of Geotechnical Engineering", Prentice Hall of India, New Delhi, 1999..

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	3			**2**								3	3	2	
CO2	2	3	2		2								3	3		
CO3	2	3	1		3								3	3		
CO4	2	3	3		3								3	3	2	
CO5	2	3	3		3								3	3		

12CE42	STRENGTH OF MATERIALS		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem:**	IV			
Category:	Core					
Prerequisites:	12CE32- Mechanics of Solids					
Aim:	The aim of this course is to make the student familiar with the techniques and concept in Strength of Materials field in civil engineering.					
Course Objectives:	• This subject is useful for a detailed study of forces and their effects along with some suitable protective measures for the safe working condition. • This knowledge is very essential for an engineer to enable him in designing all types of structures and machines					
Course Outcomes:	1. Apply the principle of virtual work and also can able to apply energy methods for the determination of the deflections and rotations. 2. Perform Analysis for Statically Indeterminate beams 3. Visualize the behavior of column for combined bending and axial loading 4. Explain the concepts of three - dimensional stress and strain at a point as well as the stress -strain relationships for homogenous, isotropic materials 5. Examine the different failure criterion and predict the failure given to the stress state of a body.					

UNIT I	**ENERGY PRINCIPLES**	**9+3 hrs**
Strain energy and strain energy density – strain energy in traction, shear in 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		
UNITII	**INDETERMINATE BEAMS**	**9+3 hrs**
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 – shear force and bending moment diagrams for continuous beams – slope & deflections in continuous beams (qualitative study only)		
UNITIII	**COLUMNS**	**9+3 hrs**
Eccentrically loaded short columns – middle third rule – core section – Euler's theory of long columns – critical loads for prismatic columns with different end conditions; Rankine-Gordon formula for eccentrically loaded columns – Thin Cylinders and Shell - Thick cylinders – compound cylinders.		
UNITIV	**STATE OF STRESS IN THREE DIMENSIONS**	**9+3 hrs**
Spherical and deviatory components of stress tensor - determination of principal stresses and principal planes – volumetric strain – dilatation and distortion –theories of failure – principal strain – shear stress – strain energy and distortion energy theories		
UNIT V	**ADVANCED TOPICS IN BENDING OF BEAMS**	**9+3 hrs**
Columns of unsymmetrical sections - Unsymmetrical bending of beams of symmetrical and unsymmetrical sections – curved beams – Winkler Bach formula		
		TOTAL : 60 PERIODS

TEXT BOOKS

. Rajput R.K. Strength of Materials, S.Chand&company Ltd., New Delhi – 2006
. Srinath, L.S. Advanced mechanics and solids, Tata-McGraw Hill publishing company ltd, 2008.

. REFERENCES

1. Kazimi S.M.A, "Solid Mechanics", Tata McGraw-Hill Publishing Co., New Delhi, 2003
2. William A .Nash, "Theory and Problems of Strength of Materials", Schaum's Outline Series, Tata

McGraw Hill Publishing company Ltd, 2007.
3. Punmia B.C.Theory of Structures (SMTS) Vol 1&II, Laxmi publishing Pvt Ltd,New Delhi, 2004

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3		2	3								3	2	2	
CO2	3	3		2	3								3	2		
CO3	3	3		2	3								3	2		
CO4	3	3		2	3								3	2	2	
CO5	3	3		2	3								3	2		

12CE43	APPLIED HYDRAULIC ENGINEERING		L	T	P	C
			3	1	0	4
Programme:	B.E. CIVIL ENGINEERING	**Sem:**	IV			
Category	Core					
Prerequisites:	12CE33 Mechanics of Fluids					
AIM:	The aim of this course is to make the student aware of hydraulic engineering concepts and methodology.					
Course Objectives:	• Student is introduced to open channel flow characteristics including hydraulic jump and surges. • Hydraulic machines viz flow through turbines and pumps including their performance characteristics and design aspects are taught. • Student, at the end of the semester will have the abilities to analyse flow characteristics in open channel and design hydraulic machines.					
Course Outcomes:	1. Use the basic equations of motion for moving fluids in open channels 2. Apply the manning equation and Chezy's equation to describe uniform flow 3. Classify gradually varied flow profiles 4. Explain the working principles of different types of turbines and pumps. 5. Apply the knowledge of applied hydraulics on engineering applications and design problems					

UNITI	**OPEN CHANNEL FLOW**	**9+3 hrs**
Open channel flow – Types and regimes of flow – Velocity distribution in open channel – Wide open channel – Specific energy – Critical flow and its computation – channel transition.		
UNITII	**UNIFORM FLOW**	**8+3 hrs**
Uniform flow – Velocity measurement – Manning's and Chezy's formula – Determination of roughness coefficients – Determination of normal depth and velocity – Most economical sections – Non-erodible channels=		
UNITIII	**VARIED FLOW**	**9+3 hrs**
Dynamic equations of gradually varied flow – Assumptions – Characteristics of flow profiles – Draw down and back water curves – Profile determination – Graphical integration, direct step and standard step method – Flow through transitions - Hydraulic jump – Types – Energy dissipation – Surges.		
UNITIV	**PUMPS**	**9+3 hrs**
Centrifugal pump - minimum speed to start the pump – multistage Pumps – Jet and submersible pumps - Positive displacement pumps - reciprocating pump - negative slip - flow separation conditions - air vessels -indicator diagram and its variation - savings in work done – rotary pumps.		
UNIT V	**TURBINES**	**10+3 hrs**
Turbines - draft tube and cavitations – Application of momentum principle – Impact of jets on plane and curved plates - turbines - classification - radial flow turbines - axial flow turbines – Impulse and Reaction		
		TOTAL: 60 PERIODS

TEXT BOOKS

. Bansal R.K, Fluid mechanics & Hydraulic machines, Laxmi Publishing Pvt Ltd, New Delhi – 2007
. 1. Jain A.K., "Fluid Mechanics (including Hydraulic Machines)", Khanna Publishers, 10th edition

REFERENCES

1. Ranga Raju, K.G., "Flow through Open Channels", Tata McGraw-Hill, 1985
2. Subramanya K., "Flow in Open channels", Tata McGraw-Hill PublishingCompany, 1994.
3. Modi, P.N, and Seth S.M. Hydraulic and Fluid Mechanics Standard Book House, 2000.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	3	1	**2**								3	2		2
CO2	3	3	3	1	2								3	2		
CO3	3	3	3	1	2								3	2		
CO4	3	3	3	1	2								3	2	3	
CO5	3	3	3	1	2								3	2	3	2

12CE44	SURVEYING II		L	T	P	C
			3	0	0	3
Programme:	B.E. CIVIL ENGINEERING	**Sem:**	IV			
Category	Core					
Prerequisites:	12CE35- Surveying-I					
AIM:	The aim of this course is to make the student aware of surveying techniques in civil engineering.					
Course Objectives:	• At the end of the course the student will posses' knowledge about Tachometric surveying, Control surveying, Survey adjustments. • To get introduced to modern advanced surveying techniques involved such as Remote sensing, Total station, GPS, Photogrammetry etc.					
Course Outcomes:	1. Describe the tachometric systems and stadia systems. 2. Carry out a geodetic survey, taking accurate measurements using instruments and adjusting the traverse. 3. Apply mathematical adjustment of accidental errors involved in surveying measurements. 4. Plan a survey for applications such as road alignment and height of the building. 5. Invoke advanced surveying techniques over conventional methods in the field of civil engineering					

UNIT I	TACHEOMETRIC SURVEYIN	6 hrs
Tacheometric systems - Tangential, stadia and subtense methods - Stadia systems – Horizontal and inclined sights - Vertical and normal staffing - Fixed and movable hairs - Stadia constants - Anallactic lens - Subtense bar.		
UNIT II	**CONTROL SURVEYING**	**8 hrs**
Working from whole to part - Horizontal and vertical control methods - Triangulation - Signals - Base line - Instruments and accessores - Corrections - Satellite station - Reduction to centre - Trignometric levelling - Single and reciprocal observations - Modern trends – Bench marking		
UNITIII	**SURVEY ADJUSTMENTS**	**8 hrs**
Errors - Sources, precautions and corrections - Classification of errors - True and most probable values - weighted observations - Method of equal shifts - Principle of least squares – Normal equation - Correlates - Level nets - Adjustment of simple triangulation networks.		
UNITIV	**ASTRONOMICAL SURVEYING**	**11 hrs**
Celestial sphere - Astronomical terms and definitions - Motion of sun and stars – Apparent altitude and corrections - Celestial co-ordinate systems - Different time systems - use of Nautical almanac - Star constellations - calculations for azimuth of a line.		
UNITV	**HYDROGRAPHIC AND ADVANCE SURVEYING**	**12**
Hydrographic Surveying - Tides - MSL - Sounding methods - Location of soundings and methods - Three point problem - Strength of fix - Sextants and station pointer - River surveys - Measurement of current and discharge - Photogrammetry - Introduction – Basic concepts of Terrestial and aerial Photographs - Stereoscopy – Definition of Parallax. Electromagnetic distance measurement – Basic principles - Instruments – Trilateration. Basic concepts of Cartography and Cadastral surveying- Area calculation using Total Station & GPS.		
		TOTAL : 45 PERIODS

TEXT BOOKS
1. Punmia B.C., Surveying, Vols. II and III, Laxmi Publications, fifteenth edition, 2005. 2. Kanetkar T.P., Surveying and Levelling, Vols. I and II, United Book Corporation, Pune, 2008
REFERENCES
1. Clark D., Plane and Geodetic Surveying, Vols. I and II, C.B.S. Publishers and Distributors, Delhi, Sixth Edition, 1971. 2. James M.Anderson and Edward M.Mikhail, Introduction to Surveying, McGraw-Hill Book Company, 1985. 3. Wolf P.R., Elements of Photogrammetry, McGraw-Hill Book Company, Second Edition, 1986. 4. Robinson A.H., Sale R.D. Morrison J.L. and Muehrche P.C., Elements of Cartography, John Wiley and Sons, New York, Fifth Edition, 1984. 5. Heribert Kahmen and Wolfgang Faig, Surveying, Walter de Gruyter, 1995. 6. Bannister A. and Raymond S., Surveying, ELBS, Sixth Edition, 1992

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	3	1	2	**2**								3	3		2
CO2	3	3	2	2	2								3	3		
CO3	3	3	1	2	2								3	3		
CO4	3	3	2	2	2								3	3	2	
CO5	3	3	2	2	2								3	3	3	2

12CE45	HIGHWAY ENGINEERING		L	T	P	C
			3	0	0	3
Programme:	B.E. CIVIL ENGINEERING	**Sem:**	IV			
Category	Core					
Prerequisites:	12CE34- Building Materials and Construction Techniques					
AIM:	The aim of this course is to provide knowledge for the student with highways planning and design.					
Course Objectives:	The objective of the course is to educate the students on the various components of Highway Engineering. It exposes the students to highway planning, engineering surveys for highway alignment, Design of Geometric Elements of Highways and Urban roads, and Rigid and Flexible pavements design.					
Course Outcomes:	1. Describe the jayakar committee recommendations and realizations of highway engineering. 2. Explain about design of horizontal and vertical alignment of geometric design. 3. Describe the design principles of flexible and rigid pavements 4. Explain about factors affecting flexible and rigid pavement and its strengthening 5. Describe the desirable properties and testing of highway materials					

UNIT I	HIGHWAY PLANNING AND ALIGNMENT	9
History of Road Construction, Highway Development in India - Jayakar Committee Recommendations and Realisations, Twenty-year Road Development Plans, Concepts of ongoing Highway Development Programmes. Requirements of Ideal Alignment, Factors Controlling Highway Alignment Engineering Surveys for Alignment - Conventional Methods and Modern Methods (Remote Sensing, GIS and GPS techniques) Classification and Cross Section of Urban and Rural Roads (IRC), Highway Cross Sectional Elements – Principles of Highway Financing – Traffic Signals		
UNIT II	**GEOMETRIC DESIGN OF HIGHWAYS**	**9**
Design of Horizontal Alignment – Horizontal Curves Super elevation, Widening of Pavements on Horizontal Curves and Transition Curves Design of Vertical Alignments – Rolling, Limiting, Exceptional and Minimum Gradients, Summit and Valley Curves-Sight Distances – Factors affecting Sight Distances, PIEV theory, Stopping Sight Distance (SSD), Overtaking Sight Distance (OSD), Sight Distance at Intersections, Intermediate Sight Distance and Illumination Sight Distance [Derivations and Problems in SSD and OSD] -Geometric Design of Hill Roads [IRC Standards Only]		
UNIT III	**FLEXIBLE AND RIGID PAVEMENTS**	**9**
Rigid and Flexible Pavements- Components and their Functions -Design Principles of Flexible and Rigid Pavements, Factors affecting the Design of Pavements - ESWL, Climate, Sub-grade Soil and Traffic - Design Practice for Flexible Pavements [IRC Method and Recommendations- Problems] - Design Practice for Rigid Pavements – IRC Recommendations - concepts only.		
UNIT IV	**HIGHWAY MATERIALS AND CONSTRUCTION PRACTICE**	**9**
Desirable Properties and Testing of Highway Materials: Soil – California Bearing Ratio Test, Field Density Test - Aggregate - Crushing, Abrasion, Impact Tests, Water absorption, Flakiness and Elongation indices and Stone polishing value test - Bitumen - Penetration, Ductility, Viscosity, Binder content and Softening point Tests. - Construction Practice - Water Bound Macadam Road, Bituminous Road and Cement Concrete Road [as per IRC and MORTH specifications] - Highway Drainage [IRC Recommendations]		
UNIT V	**HIGHWAY MAINTENANCE**	**9**
Types of defects in Flexible pavements – Surface defects, Cracks, Deformation, Disintegration – Symptoms, Causes and Treatments. - Types of Pavement, Failures in Rigid Pavements – Scaling, Shrinkage, Warping, Structural Cracks Spalling of Joints and Mud Pumping – and Special Repairs. -		

Pavement Evaluation – Pavement Surface Conditions and Structural Evaluation, Evaluation of pavement Failure and strengthening - Overlay design by Benkelman Beam Method [Procedure only],
TOTAL : 45 PERIODS
TEXT BOOKS
1. Khanna K and Justo C E G, Highway Engineering, Nem chand & Bros, Roorkee, 9th Edition. 2. Kadiyali L R, Principles and Practice of Highway Engineering, Khanna Technical Publications, Delhi, 5th Edition.
REFERENCES
1. Transportation Engineering & Planning, C.S. Papacostas, P.D. Prevedouros, Prentice Hall of India Pvt ltd, 2006. 2. IRC Standards (IRC 37 - 2001 & IRC 58 -1998) 3. Bureau of Indian Standards (BIS) Publications on Highway Materials 4. Specifications for Road and Bridges, MORTH (India)

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1						3	2	1				2	1			
CO2	3	3	2		2								3	2	2	
CO3	3	3	2		2								3	2	2	
CO4	3	2	2	2	2								3	2	2	
CO5				3	2							2	2	2	2	

12CE46	STRENGTH OF MATERIALS LAB		L	T	P	C
			0	0	3	2
Programme:	B.E. Civil Engineering	**Sem:**	IV			
Category	Core					
Prerequisites:	12CE42- Strength of Materials(CR), 12CE32- Mechanics of Solids					
AIM:	The aim of this course is to make the student to practice and get familiar with strength of materials concepts.					
Course Objectives:	• The experimental work involved in this laboratory should make the student understand the fundamental modes of loading of the structures and also make measurements of loads, displacements and strains. • Relating these quantities, the student should be able to obtain the strength of the material and stiffness properties of structural elements.					
Course Outcomes:	1. Extract basic material properties of wood, aluminium and steel such as evaluate Young's Modulus, torsional strength, hardness and tensile strength of given specimens from simple mechanical tests. 2. Operate and handle Major equipments such as, Universal Testing Machine, Torsion Testing Machine, Rockwell/Brinnel Hardness testing machines, etc., 3. Identify the flexural behavior of simply supported beam. 4. Evaluate stiffness of open coiled and closed coiled springs 5. Evaluate the compressive strength of concrete cubes and bricks and Pavement block.					

LIST OF EXPERIMENTS
1. Test involving axial tension to obtain the stress – strain curve and the strength 2. Test involving torsion to obtain the torque vs. angle of twist and hence the stiffness 3. Test involving flexure to obtain the load deflection curve and hence the stiffness 4. Tests on springs 5. Hardness tests 6. Double Shear test 7. Izod Impact Test 8. Charpy Impact Test 9. Compression Test on wood Specimen. 10. Compression Test on Brick and Pavement block. The student should learn the use of deflectometer, extensometer, compressometer and strain gauges.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1						3	2	1				2	1			
CO2	3	3	2		2								3	2	2	
CO3	3	3	2		2								3	2	2	
CO4	3	2	2	2	2								3	2	2	
CO5				3	2							2	2	2	2	

12CE47	HYDRAULIC ENGINEERING LABORATORY		L	T	P	C
			0	0	3	2
Programme:	B.E. Civil Engineering	**Sem:**	IV			
Category	Core					
Prerequisites:	12CE43- Applied Hydraulic Engineering(CR), 12CE33- Mechanics of Fluids					
AIM:	The aim of this course is to make the student to practice and get familiar with Hydraulic Engineering concepts and equipments.					
Course Objectives:	• To study a design problem in any one of the disciplines of Civil Engineering. • Student should be able to verify the principles studied in theory by conducting the experiments.					
Course Outcomes:	1. Determine the co-efficient of discharge for orifice and mouth piece, Notches, Venturimeter 2. Determine the friction losses and minor losses in pipes 3. Identification of meta centre in a ship model. 4. Knowledge about Performance characteristics of Pelton, Francis and Kaplan turbine 5. Knowledge about Performance characteristics of Centrifugal and reciprocating pump.					

LIST OF EXPERIMENTS
1. Determination of co-efficient of discharge for orifice and mouth piece
2. Determination of co-efficient of discharge for notches
3. Determination of co-efficient of discharge for venturimeter
4. Determination of co-efficient of discharge for orifice meter
5. Determination of impact of jet on flat plate (normal / inclined)
6. Determination of friction losses in pipes
7. Determination of minor losses in pipes
8. Performance characteristics of Pelton turbine.
9. Performance characteristics of Francis turbine
10. Performance characteristics of Kaplan turbine
11. Performance characteristics of Centrifugal pumps (Constant speed / variable speed)
12. Performance characteristics of reciprocating pump.
13. Determination of Metacentric height.
TOTAL: 45 PERIODS

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	3	2								3		2	
CO2	3	3	2	3	2								3		2	
CO3	3	3	2	3	2								3		2	
CO4	3	3	2	3	2								3		2	
CO5	3	3	2	3	2								2		2	

12CE48	SURVEY PRACTICAL – II		L	T	P	C
			0	0	4	2
Programme:	B.E. Civil Engineering	**Sem:**	IV			
Category	Core					
Prerequisites:	12CE44- Surveying – II(CR), 12CE35- Surveying-I					
AIM:	The aim of this course is to make the student aware of surveying techniques and instruments					
Course Objectives:	• At the end of the course the student will posses knowledge about Survey field techniques					
Course Outcomes:	1. Use the theodolite along with chain, tape on the field 2. Apply field procedures in basic types of survey 3. Take accurate measurements using different surveying instruments 4. Use geometric and trigonometric calculations of basic surveying. 5. Practicing field observation by using advanced instruments like GPS and Total Station					

LIST OF EXPERIMENTS
1. Study of theodolite 2. Measurement of horizontal angles by reiteration and repetition and vertical angles 3. Theodolite survey traverse 4. Heights and distances - Triangulation - Single plane method. 5. Trilateration. 6. Tacheometry - Tangential system - Stadia system - Subtense system. 7. Setting out works - Foundation marking - Simple curve (right/left-handed) – Transition curve. 8. Field observation for and Calculation of azimuth, Latitude and Longitude 9. Calculating and plotting the given area using Total Station 10.Calculating and plotting the given area using GPS
TOTAL: 45 PERIODS

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	3	2				2	2			3	3	2	
CO2	3	3	2	3	2				2				3	3	2	
CO3	3	3	2	3	2				2	2			3	3	2	
CO4	3	3	2	3	2				2				3	3	2	
CO5	3	3	2	3	2				2	2			3	3	2	

12HS41	PROFESSIONAL ENGLISH –II		L	T	P	C
			0	0	2	1
Programme:	B.E. Civil Engineering	**Sem:**	IV			
Category	Core					
Prerequisites:	12HS31- Professional English-I					
AIM:	To Create an Environment to experiment Professional English communication module					
Course Objectives:	• The objective to improve the proficiency in business communication, to develop students accuracy in communication, to improve learners ability to understand kind of text and to give exposure to internal and official communication exposure.					
Course Outcomes:	1. Develop grasping skill to interpret the text. 2. Create technical communication at work place. 3. Distinguish sounds of English to respond any queries. 4. Identify vocabulary for effective communication. 5. Evaluate the topic and Present personal opinion using suitable verbal and non-verbal cues.					

List of Experiments:	
Reading	**7**
Reading for Identifying Information Reading for Structure and detail-Article, Report, Proposal Reading for Matching Information Reading for Matching short-answer questions Structure and Discourse features Reading for Error Identification Reading for identifying Main points	
Writing	**7**
Writing for clarity, accuracy, aptness Writing for Giving Instruction Writing for asking a comment Writing for Gathering Information Describing a Technical Report Summarizing/Persuading Proposal Writing for giving assurance	
Listening	6
Listening for writing short answers Listening for Matching words Listening for filling a gap Listening for Sentence completion Listening for writing short answers Listening to a Conversation to gather Information	
Speaking	10
Introduction Interview Long Turn Group Discussion	

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1				1					2	2	1	3			2	3
CO2									3	3	3	3			2	3
CO3				1					3	3	2	3			2	3
CO4				1					3	3	3	3			2	3
CO5									3	3	3	3			2	3

12CE51	IRRIGATION ENGINEERING		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	V			
Category	Core					
Prerequisites:	12CE43- Applied Hydraulic Engineering					
AIM:	Core					
Course Objectives:	• The aim of this course is to make the students aware of irrigation engineering concepts and water management.					
Course Outcomes:	1. Acquire the basic knowledge in irrigation, its importance and have knowledge in planning and development of irrigation project. 2. Learn the types of irrigation methods and able to adapt the efficient irrigation method. 3. Acquire broad knowledge in diversion and impounding structures and its types. 4. Acquire knowledge in canal irrigation, cross drainage works and river training works. 5. Describe the Participatory irrigation management and changing paradigms in water management.					

UNIT-I	**INTRODUCTION**	**9**
Irrigation – Need and mode of irrigation – Merits and demerits of irrigation – Crop and crop seasons – consumptive use of water – Duty – Factors affecting duty – Irrigation efficiencies – Planning and Development of irrigation projects.		
Unit-II	**IRRIGATION METHODS**	**8 hrs**
Canal irrigation – Lift irrigation – Tank irrigation – Flooding methods – Merits and demerits – Sprinkler irrigation – Drip irrigation.		
Unit-III	**Diversion and impounding structures**	**10 hrs**
Weirs – elementary profile of a weir – weirs on pervious foundations - Types of impounding structures - Percolation ponds – Tanks, Sluices and Weirs – Gravity dams – Earth dams – Arch dams – Spillways – Factors affecting location and type of dams – Forces on a dam – Hydraulic design of dams.		
UNIT-IV	**CANAL IRRIGATION**	**10 hrs**
Alignment of canals – Classification of canals – Canal drops – Hydraulic design of drops – Cross drainage works – Hydraulic design of cross drainage works – Canal Head works – Canal regulators – River Training works.		
UNIT-V	**IRRIGATION WATER MANAGEMENT**	**8 hrs**
Need for optimization of water use – Minimizing irrigation water losses – On farm development works - Participatory irrigation management – Water users associations – Changing paradigms in water management – Performance evaluation.		
		Total: 45 PERIODS

Text Book(s)
. Punima B.C. & Pande B.B .Lal Irrigation and Water Power Engineering, sixteenth Edition, Laxmi Publishing, New Delhi 2009. 2.Sharma R.K.. "Irrigation Engineering", S.Chand & Co. 2008.
Reference(s)
1. Dilip Kumar Majumdar, "Irrigation Water Management (Principles & Practices)", Prentice Hall of India (P), Ltd, 2000. 2. Basak, N.N, "Irrigation Engineering", Tata McGraw-Hill Publishing Co. New Delhi, 1999. 3. Michael, A.M, Irrigation Theory and Practical, Vikas Publishing Pvt Ltd, 2006. 4. Gupta, B.L, & Amir Gupta, "Irrigation Engineering", Satya Praheshan, New Delhi.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	1	2	1	3	3	3					1	1	2	2	2
CO2	3	1	2	1		1	1				1	1	1	1	2	1
CO3	1	3	2		2	1	1				1	1	2	1	2	1
CO4	1	2	3	1	1	1	1				1	1	1	2	2	1
CO5	1	1	1	1	2	1	1				1	2	1	1	3	1

12CE52	STRUCTURAL ANALYSIS I		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem:**	V			
Category	Core					
Prerequisites:	12CE42- Strength of Materials					
AIM:	The aim of this course is to provide adequate analytical skills for finding the forces and moments in the structure.					
Course Objectives:	• The members of a structure are subjected to internal forces like axial forces, shearing forces, bending and torsional moments while transferring the loads acting on it. • Structural analysis deals with analyzing these internal forces in the members of the structures. • At the end of this course students will be conversant with classical method of analysis.					
Course Outcomes:	1. Get exposure to basic principles of Irrigation. 2. Learn the types of irrigation methods. 3. Describe the various impounding structures. 4. Illustrate the canal head works and maintenance. 5. Assess the performance of an irrigation system					

UNIT I	**DEFLECTION OF DETERMINATE STRUCTURES**	**9+3 hrs**
Principles of virtual work for deflections – Deflections of pin-jointed plane frames and rigid plane frames – Willot diagram - Mohr's correction		
UNIT II	**MOVING LOADS AND INFLUENCE LINES (DETERMINATE & INDETERMINATE STRUCTURES WITH REDUNDANCY RESTRICTED TO ONE)**	**9+3 hrs**
Influence lines for reactions in statically determinate structures – influence lines for member forces in pin-jointed frames – Influence lines for shear force and bending moment in beam sections – Calculation of critical stress resultants due to concentrated and distributed moving loads. Muller Breslau's principle – Influence lines for continuous beams and single storey rigid frames		
UNITIII	**ARCHES**	**9+3 hrs**
Arches as structural forms – Examples of arch structures – Types of arches – Analysis of three hinged, two hinged and fixed arches, parabolic and circular arches.		
UNIT IV	**SLOPE DEFLECTION METHOD**	**9+3 hrs**
Continuous beams and rigid frames (with and without sway)–Symmetry and antisymmetry – Simplification for hinged end – Support displacements.		
UNIT V	**MOMENT DISTRIBUTION METHOD**	**9+3 hrs**
Distribution and carryover of moments – Stiffness and carry over factors – Analysis of continuous beams – Plane rigid frames with and without sway.		
		TOTAL: 60 PERIODS

TEXT BOOK(S)

1. Punmia B.C., Theory of Structures (SMTS) Vol II Laxmi Publishing Pvt ltd, New Delhi, 2004.
2. Bhavikatti, S.S, Structural Analysis – Vol. 1 & Vol. 2, Vikas Publishing Pvt Ltd., New Delhi, 2008.

REFERENCE(S)

1. Analysis of Indeterminate Structures – C.K. Wang, Tata McGraw-Hill, 1992.
2. L.S. Negi & R.S. Jangid, "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, Sixth Edition, 2003.
3. Vaidyanadhan, R and Perumal, P, "Comprehensive Structural Analysis – Vol. 1 & Vol. 2", Laxmi Publications, New Delhi, 2003.
4. Devdas Menon, "Structural Analysis", Narosa Book Distributors Pvt Ltd.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	3	1								2	3	1	2	1
CO2	3	3	2	3	1							2	3	1	2	1
CO3	3	2	2	2						1		2	2	3	1	1
CO4	2	3	1	3	1							1	1	3	2	3
CO5	2	3	2	2	2					1	1	2	1	2	2	1

12CE53	CONCRETE TECHNOLOGY		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	V			
Category	Core					
Prerequisites:	12CE34- Building Materials and Construction Techniques					
AIM:	The aim of this course is to make the students aware of technology involved in concrete.					
Course Objectives:	• To understand the properties of ingredients of concrete • To study the behavior of concrete at its fresh and hardened state • To study about the concrete design mix • To know about the procedures in concreting • To understand special concrete and their use					
Course Outcomes:	1. Test all the concrete materials as per IS code. 2. Determine the properties of fresh and hardened concrete. 3. Design the concrete mix using ACI and IS code methods. 4. Design special concretes and their specific applications. 5. Describe the special concreting method and test performance after hardening of concrete					

UNIT I	**CONCRETE MAKING MATERIALS**	**9**
Cement-Different types-Ordinary Portland Cement-Low-alkali cement-Blended Cement-Portland Pozzolana cement-Portland blast furnace slag cement-Portland Slag cement-Sulphate resisting Portland Cement-Low-heart Portland cement-Hydrophobic cement-Oil well cement-White cement-Aggregates-Aggregates-Classification-IS Specifications-Properties-Grading-Methods of combining aggregates-Specified Gradings-Testing of aggregates. Mineral admixtures-Water-Accelerators-Retarders-Plasticizers-Superplasticizers-Waterproofers-Miscellaneous admixtures.		
UNIT II	**CONCRETE**	**9**
Properties of Fresh Concrete-Workability-compactability-consistency-segregation-bleeding-maturity of concrete-curing-autogenous healing-Hardened Concrete-Strength-Elastic Properties-Creep & Shrinkage Variability of concrete Strength-Durability of Concrete-Sulphate and chloride attack on concrete.		
UNIT III	**MIX DESIGN**	**9**
Physical properties of materials required for mix design – Acceptance criteria for concrete – Determining the laboratory design strength of concrete – Quality control of concrete – Methods of concrete mix design – Trial mixes – Nominal mixes – ACI and BIS Method of mix design.		
UNIT IV	**SPECIAL CONCRETE**	**9**
Light weight concrete – High strength concrete – High performance concrete – Polymer concrete Polymer Impregnated concrete – Steel – fibre – reinforced concrete – Ready mixed concrete concrete – Self compacting concrete.		
UNIT V	**CONCRETING METHODS AND TEST**	**9**
Extreme weather concreting – Special concreting methods – Vacuum dewatering – Underwater concrete – Non destructive testing – semi –destructive testing techniques – Development in rebar technology – smart concrete.		
		TOTAL: 45 PERIODS

TEXT BOOKS
1. A.R.Santhakumar," Concrete technology, "Oxford University Press, 2003. 2. Shetty, M.S."Concrete Technology", S.Chand &Co., New Delhi, 2003.
REFERENCES

1. Neville," Properties of concrete, Prentice Hall, 1995, London.
2. Neville &Brooks, Concrete Technology, Longman Publishing Co.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	1	1	1	1	2				1		2	3	2	2	1
CO2	1	1	1	1		1				1	1	2	3	1	2	3
CO3	3	1	3	1		1				1		3	2	3	1	1
CO4	1	2	2	1	1	1				1	1	3	1	3	1	1
CO5	2	2	1	1	2	1				2	1	3	1	2	2	1

12CE54	ENVIRONMENTAL ENGINEERING – I		L	T	P	C
			3	0	0	3
Programme:	B.E. CIVIL ENGINEERING	**Sem:**	IV			
Category	Core					
Prerequisites:	12GE31- Environmental Science and Engineering					
AIM:	The aim of this course is to make the students familiar with the principles of water supply system.					
Course Objectives:	• To study the principles and objectives of planned water supply system. • To study about various process and treatment involved in a water supply scheme. • To study about advanced water treatment process and method of distribution to residential buildings.					
Course Outcomes:	1. Describe about public water supply system and the importance of conveyance system. 2. Summarize the potable water quality standards. 3. Illustrate the various unit operations in a water treatment plant. 4. Explain the advanced potable water treatment methods. 5. Analyze water supply distribution networks and house service connections and system of plumbing					

UNIT I	**PLANNING FOR WATERSUPPLY SYSTEM**	**9**
Public water supply system -Planning -Objectives -Design period -Population forecasting –Water demand -Sources of water and their characteristics -Surface and Groundwater- Impounding Reservoir Well hydraulics -Development and selection of source - Water quality - Characterization -Water quality standards.		
UNIT II	**CONVEYANCE SYSTEM**	**9**
Water supply -intake structures -Functions and drawings -Pipes and conduits for water- Pipe materials -Hydraulics of flow in pipes -Transmission main design -Laying, jointing and testing of pipes - Drawings appurtenances - Types and capacity of pumps -Selection of pumps and pipe materials.		
UNIT III	**WATER TREATMENT**	**9**
Objectives -Unit operations and processes -Principles, functions design and drawing of Flash mixers, fiocculators, sedimentation tanks and sand filters -Disinfection- Residue Management.		
UNIT IV	**ADVANCED WATER TREATMENT**	**9**
Aerator- Iron and manganese removal, Defluoridation and demineralization -Water softening - Desalination -Membrane Systems -Construction and Operation & Maintenance aspects of Water Treatment Plants -Recent advances -Membrane Processes		
UNIT V	**WATER DISTRIBUTION AND SUPPLY TO BUILDINGS**	**9**
Requirements of water distribution -Components -Service reservoirs -Functions and drawings - Network design -Economics -Computer applications -Analysis of distribution networks - Appurtenances -operation and maintenance -Leak detection, Methods. Principles of design of water supply in buildings -House service connection -Fixtures and fittings -Systems of plumbing and drawings of types of plumbing.		
		TOTAL: 45 PERIODS

TEXT BOOKS

1. Garg, S.K., Water Supply Engineering, Vol.1 Khanna Publishers, New Delhi, 2007.
2. Punmia, B.C., Ashok K Jain and Arun K Jain, Water Supply Engineering, Laxmi Publications (P) Ltd., New Delhi, 2005.

REFERENCES

1. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government

of India, New Delhi, 2003
2. Syed R.Qasim and Edward M.Motley Guang Zhu, Water Works Engineering Planning, Design and Operation, Prentice Hall of India Private Limited, New Delhi – 2006.
3. Modi.P.N. Water Supply Engineering, Vol. I Standard Book House, New Delhi, 2005.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	3	2	2	3	3					1	3	2	3	1
CO2	3	3	3	2	2	2	2					2	3	1	2	1
CO3	3	3	3	2	2	3	3					1	3	2	2	1
CO4	3	3	3	1	1	3	3					2	3	3	2	1
CO5	3	2	2	1	1	3	3					1	3	2	2	1

12CE55	GEOTECHNICAL ENGINEERING – II		L	T	P	C
			3	0	0	3
Programme:	B.E. CIVIL ENGINEERING	**Sem:**	V			
Category	Core					
Prerequisites:	12CE41- Geotechnical Engineering – I					
AIM:	To assess the soil condition at a given location in order to suggest suitable foundation and also gains the knowledge to design various foundations					
Course Objectives:	• To study the site investigation and selection of foundation • To study the types and load carrying capacity of Shallow and Raft foundations • To study the load carrying capacity of piles. • To study the types and stability analysis of Retaining wall.					
Course Outcomes:	1. Apply the concept of site investigation and soil exploration methods in field. 2. Determine the bearing capacity for various types of shallow foundation. 3. Learn the types of footings. 4. Predict load carrying capacity and settlement behavior for pile group. 5. Analyze the stability on retaining wall using earth pressure theories.					

UNIT-I	**SITE INVESTIGATION AND SELECTION OF FOUNDATIION**	**7 hrs**
Scope and objectives – Methods of exploration – Boring and drilling methods – Depth and spacing of boring – Sampling methods – Borehole – Selection of foundation.		
UNIT-II	**SHALLOW FOUNDATION**	**11+4=15 hrs**
Location and depth of foundation – Bearing capacity of shallow foundation – Terzaghi's theory – Factors affecting baring capacity – Bearing capacity from insitu tests – Allowable bearing pressure – Settlement of foundation - Allowable settlement		
UNIT-III	**FOOTINGS AND RAFTS**	**7+3=10hrs**
Types of foundation – Contact pressure distribution – Isolated and combined footing – Mat foundation – Floating foundation.		
UNIT-IV	**PILES**	**12+4= 16hrs**
Types and function of piles - Factors influencing for selection of piles - Carrying capacity of single pile – Capacity from insitu test – Negative skin friction - Uplift capacity - Group cpacity - Settlement of pile group - Interpretation of pile load test – Forces on pile cap - Under reamed piles.		
UNIT-V	**RETAINING WALL**	**8+4=12**
Plastic equilibrium in soils - active and passive states – Rankein's theory – Cohesionless and cohesive soil - Coloumb's wedge theory – Earth pressure on retaining wall - Graphical methods (Rebhann and Culmann) - Stability of retaining wall.		
		TOTAL: 60 PERIODS

TEXT BOOK(S)

1. Murthy, V.N.S, "Soil Mechanics and Foundation Engineering" , UBS Publishers Distribution Ltd,New Delhi – 2007
2. Das, B.M, "Principles of Foundation Engineering (Fifth Edition), Thomson Books/COLE, 2003.

REFERENCE(S)

1. Bowles, J.E, "Foundation Analysis and Design", McGraw-Hill, 1994.
2. Punmia, B.C, "Soil Mechanics and Foundation" Laxmi Publications Private Ltd, New Delhi, 1995.
3. Venkatramaiah, C, "Geotechnical Engineering", New Age International Publishers, New Delhi, 1995.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	1		1	1						1	3	2	2	1
CO2	3	2	3	2	1		1				1	1	3	2	2	1
CO3	3	1	3	2								1	2	3	1	1
CO4	3	2	1	1	2	1						2	3	3	2	3
CO5	2	3	2	2	1	1					1	2	1	2	2	1

12CE56	DESIGN OF RC ELEMENTS		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem:**	V			
Category	Core					
Prerequisites:	12CE42- Strength of Materials					
AIM:	The aim of this course is to make the students to design the RC elements in limit state method					
Course Objectives:	• To study the different types of philosophies related to Design of Reinforced Concrete Structures with emphasis on Limit State Method. • To study the design of Basic elements such as slab, beam, column and footing which form part of any structural system with reference to Indian standard code of practice for Reinforced Concrete Structures and Design Aids are included. • To study the end of course the student shall be in a position to design the basic elements of reinforced concrete structures					
Course Outcomes:	1. Explain the design codes and specifications, Limit State philosophy and also to design the slabs as detailed in IS code. 2. To design the different sections of beams as per Limit State philosophy. 3. To gain the knowledge of limit state design for flexure, shear, torsion, bond and anchorage 4. Explain the design of short column for axial, uniaxial and biaxial bending and Design of long columns. 5. To learn the design of various foundation					

UNIT I	**DESIGN OF CONCRETE STRUCTURES**	**9+3 hrs**
Concept of Working Stress method, ultimate load method and limit state method – Advantages of Limit State Method over other methods – Introduction to Structural System with load calculation - Design codes and specification – Limit State philosophy as detailed in IS code – Properties of un-cracked section. Application of virtual work method to square, rectangular, circular and triangular slabs - Analysis and design of one way and two way rectangular slab subjected to uniformly distributed load for various boundary conditions and corner effects		
UNIT II	**LIMIT STATE DESIGN FOR FLEXURE**	**9+3 hrs**
Analysis and design of singly and doubly reinforced rectangular and flanged beams – Design of T-Beams and L- Beam		
UNIT III	**LIMIT STATE DESIGN FOR BOND, ANCHORAGE SHEAR & TORSION**	**9+3 hrs**
Behaviour of RC members in bond and Anchorage - Design requirements as per current code - Behaviour of RC beams in shear and torsion - Design of RC members for combined bending shear and torsion.		
UNIT IV	**LIMIT STATE DESIGN OF COLUMNS**	**9+3 hrs**
Types of columns – Braced and unbraced columns – Design of short column for axial, uniaxial and biaxial bending – Design of long columns.		
UNIT V	**LIMIT STATE DESIGN OF FOOTING AND DETAILING**	**9+3 hrs**
Design of wall footing – Design of axially and eccentrically loaded rectangular footing – Design of combined rectangular footing for two columns only – Design of Strap Footing – Standard method of detailing RC beams, slabs and columns – Special requirements of detailing with reference to erection process.		
		TOTAL: 60 PERIODS

TEXT BOOK
. Krishna Raju, N., "Design of Reinforced Concrete Structures", CBS Publishers & Distributors, New Delhi,2012. . Varghese, P.C., "Limit State Design of Reinforced Concrete", Prentice Hall of India, Pvt. Ltd., New Delhi 2008.
REFERENCE(S)
1. Jain, A.K., "Limit State Design of RC Structures", Nemchand Publications, Rourkee 2. Sinha, S.N., "Reinforced Concrete Design", Tata McGraw-Hill Publishing Company Ltd., New Delhi. 3. Unnikrishna Pillai, S., Devdas Menon, "Reinforced Concrete Design", Tata McGraw-Hill

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	3	1	1	1						3	3	2	2	1
CO2	2	2	3	1			1					3	3	1	2	1
CO3	2	2	3	2								3	3	2		1
CO4	2	2	3	1	2	1						3	3	2		3
CO5	2	2	3	1		1						3	3	2		2

12CE57	CONCRETE AND HIGHWAY ENGINEERING LAB		L	T	P	C
			0	0	3	2
Programme:	B.E. Civil Engineering	**Sem:**	IV			
Category	Core					
Prerequisites:	12CE53- Concrete Technology(CR)					
AIM:	The aim of this course is to make the students to practice and get familiar with the properties of concrete and highway materials					
Course Objectives:	• To learn the principles and procedures of testing Concrete and Highway materials					
Course Outcomes:	1. Test all the concrete materials as per IS code 2. Design the concrete mix using ACI and IS code methods 3. Determine the properties of fresh and hardened of concrete 4. Design special concretes and their specific applications 1. Ensure quality control while testing/ sampling and acceptance criteria					

LIST OF EXPERIMENTS
Part A – Concrete
1. Consistency, Initial and final setting time.
Fineness test.
Soundness test
Specific gravity test
Sieve analysis-fineness modulus
Proportioning of Aggregates
Water Absorption
Mix design IS, ACI
Slump test
Compaction factor test
Compression test, split tensile test, flexure test
Part B – Highway
Aggregate impact test
Aggregate crushing strength test
Aggregate attrition test
Aggregate abrasion test
Softening point
Penetration test on bitumen
Specific gravity test on bitumen.
TOTAL: 45 PERIODS

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	1	1	1	1	2			2	2		2	3	2	2	1
CO2	1	1	3	1		1			1	2	1	2	3	1	2	3
CO3	2	1		1		1			2	1		3	2	3	1	1
CO4	1	2	3	1	1	1			2	1	1	3	1	3	1	1
CO5	2	2	2	1	2	1			2	2	1	3	1	2	2	1

12CE58	SOIL MECHANICS LABORATORY			L	T	P	C
				0	0	3	2
Programme:	B.E. Civil Engineering	**Sem:**	IV				
Category	Core						
Prerequisites:	12CE55- Geotechnical Engineering –II(CR), 12CE41- Geotechnical Engineering - I						
AIM:	The aim of this course is to make the students to practice and get familiar with the properties of soil.						
Course Objectives:	At the end of this course, the student acquires the capacity to test the soil to assess its Engineering and Index properties						
Course Outcomes:	1. Classify the soil based on index and engineering characteristics of soils. 2. Identify the shear strength parameters for different types of soils. 3. Determine the consolidation and permeability characteristics of soil 4. Evaluate the bearing capacity of soil from field exploration. 5. Determine the density of soil tests.						

LIST OF EXPERIMENTS
1. Grain size distribution - Sieve analysis
2. Grain size distribution - Hydrometer analysis
3. Specific gravity of soil grains
4. Relative density of sands
5. Atterberg limits test
6. Determination of moisture - Density relationship using standard Proctor test.
7. Permeability determination (constant head and falling head methods)
8. Determination of shear strength parameters.
9. Direct shear test on cohesion less soil
10. Unconfined compression test on cohesive soil
11. Triaxial compression test (demonstration only)
12. One dimensional consolidation test (Demonstration only)
13. Field density test (Core cutter and sand replacement methods)
14. Standard Penetration Test.
TOTAL: 45 PERIODS

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	3	1	1			1	2	2		.3	3	1	2	1
CO2	2	2		1	2	1	1	1	1	2	1	3	3	1	2	2
CO3	1	1		2		1	1	1	2	1		3	3	3	1	2
CO4	1		1		2	1	1	1	2	1		3	2	3	1	3
CO5	3	2		1	1	1	1	1	2	1		3	3	1	1	2

12CE59	SURVEY CAMP		L	T	P	C
			0	0	0	2
Programme:	B.E. Civil Engineering	**Sem:**	IV			
Category	Core					
Prerequisites:	12CE44- Surveying – II, 12CE35- Surveying-I					
AIM:	The aim of the camp is to make the student familiar in mapping and contouring any type of area					
Course Objectives:	• Ten days survey camp using Theodolite, cross staff, levelling staff, tapes, plane table and total station. • The camp must involve work on a large area of not less than 400 hectares. At the end of the camp, each student shall have mapped and contoured the area. • The camp record shall include all original field observations, calculations and plots.					
Course Outcomes:	1. Reconnaissance the given area and design the methodology for conducting a field survey. 2. Use the modern surveying equipments such as total station and automatic levels, along with other conventional equipments such as level, theodolite, compass, plane table etc. 3. Improve their team work qualities as the survey camp is being conducted in groups of four or five. 4. Create excellent leadership qualities as the entire survey project is divided into sub-activities distributed among the students. 5. Use modern plotting software to prepare the plan and contour maps					

LIST OF EXPERIMENTS

(i) Check Levelling
(ii) Traversing – Compass, Plane Table
  a. Open Traverse
  b. Closed Traverse
(iii) Alignment of Road (LS and CS)
(iv) Contouring (Radial and Grid)
(v) Setting out of work
  a. Curve
  b. Building
(vi) Triangulation
(vii) Trilateration
(viii) Sun / Star observation to determine azimuth
(ix) Use of GPS to determine latitude and longitude
(x) Calculating and plotting the given area using Total Station
Calculating and plotting the given area using GPS1

TOTAL: 45 PERIODS

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2		1	1				3	2		.3	2	3	2	1
CO2	3	2		1	2				3	2		3	2	3	2	2
CO3	2	2		2					3	1		3	2	3	1	2
CO4	2	2			2				3	1		3	2	3	1	3
CO5	2	2		1	1				3	1		3	2	2	1	2

12HS51	ENGLISH FOR EMPLOYMENT - I		L	T	P	C
			0	0	2	1
Programme:	B.E. Civil Engineering	**Sem:**	III			
Category	Core					
Prerequisites:	12HS41- Professional English – II					
AIM:	To practice English for Enhancing Employability skills					
Course Objectives:	• To get proficiency in business communication at work place • To develop student accuracy in communication • To improve learners ability to understand any kind of text					
Course Outcomes:	1. Develop analytical skill and vocabulary. 2. Improve job prospects. 3. Predict the main idea of the topic and use verbal cues. 4. Develop negotiation skill. 5. Utilize documentation methodology.					

Task: 1	Verbal Reasoning	1
Task: 2	Resume and Covering Letter	1
Task: 3	Channel Conversations	2
Task: 4	Debate	10
Task: 5	Mock Interview	6
Task: 6	Documentation methodology for Projects/ Products/ Softwares	10
	TOTAL=30 PERIODS	

E-MATERIAL:

www.indiabix.com/verbal-reasoning

INTERNAL ASSESSMENT **100 MARKS**

(100 Marks to be converted to 25)

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1		2		2					2	3	3	3	2			1
CO2									3	3	3	3	2			2
CO3				2					3	3	3	3	2			2
CO4									3	3	3	3	2			3
CO5				2					3	3	2	3	2			2

12MG52	PRINCIPLES OF MANAGEMENT		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	V			
Category	Core					
AIM:	The aim of this course is to make the students to have a clear idea about management skills.					
Course Objectives:	• Knowledge on the principles of management is essential for all kinds of people in all kinds of organizations. • After studying this course, students will be able to have a clear understanding of the managerial functions like planning, organizing, staffing, leading and controlling. • Students will also gain some basic knowledge on international aspect of management					
Course Outcomes:	1. Predict the structure of the management and to list the different strategies 2. Realize the purpose and steps involved in planning and decision making process 3. Construct the organizational structure, selection process, appraisal process and the skills by the organization 4. Identify the motivational and leadership theory and realize the importance of effective communication 5. Summarize the process of controlling and the management information system					

UNIT-I	OVERVIEW OF MANAGEMENT	9
Organization - Management - Role of managers - Evolution of Management thought - Organization and the environmental factors - Managing globally - Strategies for International Business.		
UNIT-II	**PLANNING**	**9hrs**
Nature and purpose of planning - Planning process - Types of plans – Objectives – Managing by objective (MBO) Strategies - Types of strategies - Policies - Decision Making - Types of decision - Decision Making Process - Rational Decision Making Process - Decision Making under different conditions		
UNIT-III	**ORGANIZING**	**9**
Nature and purpose of organizing - Organization structure - Formal and informal groups *I* organization - Line and Staff authority - Departmentation - Span of control - Centralization and Decentralization - Delegation of authority - Staffing - Selection and Recruitment - Orientation - Career Development Career stages – Training - Performance Appraisal		
UNIT-IV	**DIRECTING**	**9hrs**
Creativity and Innovation - Motivation and Satisfaction - Motivation Theories Leadership - Leadership theories - Communication - Hurdles to effective communication – Organization Culture - Elements and types of culture - Managing cultural diversity		
UNIT-V	**CONTROLLING**	**9hrs**
Process of controlling - Types of control - Budgetary and non-budgetary control techniques - Managing Productivity - Cost Control - Purchase Control - Maintenance Control - Quality Control - Planning operations		
		TOTAL: 45 PERIODS

TEXT BOOK(S)
1.”Vijayaraghavan G.K & Sivakumar M.” principles of Management, Lakshmi Publications Chennai,2012. 2. Hellriegel, Slocum & Jackson, ' Management - A Competency Based Approach', Thomson South Western, 10th edition, 2007.
REFERENCE(S)
1. Harold Koontz, Heinz Weihrich and Mark V Cannice, ‘Management – A global & Entrepreneurial Perspective’, Tata Mcgraw Hill, 12th edition, 2007. 2. Andrew J. Dubrin, 'Essentials of Management', Thomson Southwestern, 7th edition, 2007. 3. Stephen P. Robbins and Mary Coulter, 'Management', Prentice Hall of India, 8th edition. 4. Charles W L Hill, Steven L McShane, 'Principles of Management', Mcgraw Hill Education, Special Indian Edition, 2007.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3					3	2					1		2	1
CO2	3	2											1		2	1
CO3	3	2	3							3			1		3	1
CO4	3	2	3							3		2	1		3	2
CO5	3	3						2		3		2	1		3	2

12CE61	STRUCTURAL ANALYSIS - II		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem:**	VI			
Category	Core					
Prerequisites:	12CE52- Structural Analysis – I					
AIM:	To provide adequate skills for finding the forces and moments in the structure by using flexibility matrix method					
Course Objectives:	• This course is in continuation of Structural Analysis – Classical Methods. • Here in advanced method of analysis like Matrix method and Plastic Analysis are covered. • Advanced topics such as FE method and Space Structures are covered.					

UNITI	**FLEXIBILITY METHOD**	**9+3 hrs**
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).		
UNIT II	**STIFFNESS MATRIX METHOD**	**9+3 hrs**
Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors – Analysis of pin-jointed plane frames and rigid frames(with redundancy restricted to two)		
UNIT III	**FINITE ELEMENT METHOD**	**9+3 hrs**
Introduction – Discretisation of a structure – Displacement functions – Truss element – Beam element – Plane stress and plane strain - Triangular elements		
UNIT IV	**PLASTIC ANALYSIS OF STRUCTURES**	**9+3 hrs**
Statically indeterminate axial problems – Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor – Load factor – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames – Upper and lower bound theorems		
UNIT V	**SPACE AND CABLE STRUCTURES**	**9+3 hrs**
Analysis of Space trusses using method of tension coefficients –Suspension cables – suspension bridges with two and three hinged stiffening girders		
		TOTAL: 60 PERIODS

TEXT BOOKS

. Vaidyanathan, R. and Perumal, P., "Comprehensive structural Analysis – Vol. I & II", Laxmi Publications, New Delhi, 2007
. BhaviKatti, S.S, "Structural Analysis – Vol. 1 Vol. 2", Vikas Publishing House Pvt. Ltd., New Delhi, 2008

REFERENCE(S)

1. Ghali.A, Nebille,A.M. and Brown,T.G. "Structural Analysis" A unified classical and Matrix approach" –5th edition. Spon Press, London and New York, 2003.
2. Coates R.C, Coutie M.G. and Kong F.K., "Structural Analysis", ELBS and Nelson, 1990
3. Structural Analysis – A Matrix Approach – G.S. Pandit & S.P. Gupta, Tata McGraw Hill 2004.
4. Matrix Analysis of Framed Structures – Jr. William Weaver & James M. Gere, CBS Publishers and Distributors, Delhi.
5. L.S. Negi & R.S. Jangid, "Structural Analysis", Tata McGraw-Hill Publications, New Delhi, 2003

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	1	3	2				1		1	2	3	1	1	
CO2	2	2	1	3	2				1		1	2	3	1		
CO3	2	3	2	3	2				2		1	2	3	1	1	
CO4	2	3	2	3	2				2		1	2	3	1	1	
CO5	2	2	2	3	2				2		1	2	3	1	1	

12CE62	DESIGN OF STEEL STRUCTURES		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem:**	VI			
Category	Core					
Pre requisite	12CE56- Design of RC Elements					
AIM:	The aim of this course is to make the students familiar with the design of steel members					
Course Objectives:	• This course covers the design of structural steel members subjected to compressive, tensile and bending loads, as per current code provisions (IS 800 - 2007) including connections. • Designs of structural systems such as roof trusses, gantry girders are included.					
Course Outcomes:	1. Understand the concepts of various design philosophies and Design common bolted and welded connections for steel structures 2. Design tension members and understand the effect of shear lag. 3. Understand the design concept of axially loaded columns and column base connections 4. Understand specific problems related to the design of laterally restrained and unrestrained steel beams. 5.Knowledge about design concepts of trusses and industrial structures.					

UNIT I	**INTRODUCTION**	**9+3 hrs**
Properties of steel – Structural steel sections – Limit State Design Concepts – Loads on Structures – Metal joining methods using rivets, welding, bolting – Design of bolted, riveted and welded joints – Eccentric connections - Efficiency of joints – High Tension bolts		
UNIT II	**TENSION MEMBERS**	**9+3 hrs**
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		
UNIT III	**COMPRESSION MEMBERS**	**9+3 hrs**
Types of compression members – Theory of columns – Basis of current codal provision for compression member design – Slenderness ratio – Design of single section and compound section compression members – Design of lacing and battening type columns – Design of column bases – Gusseted base		
UNIT IV	**BEAMS**	**9+3 hrs**
Design of laterally supported and unsupported beams – Built up beams – Beams subjected to biaxial bending – Design of plate girders riveted and welded – Intermediate and bearing stiffeners – Web splices – Design of beam columns		
UNIT V	**ROOF TRUSSES AND INDUSTRIAL STRUCTURES**	**9+3hrs**
Roof trusses – Roof and side coverings – Design loads, design of purlin and elements of truss; end bearing – Design of gantry girder		
		TOTAL: 60 PERIODS

TEXT BOOK(S)
1 Bhavikatti.SS,"Design of Steel Structure" I.K.International (PVT) LTD,2009 (as per IS 800-2007). N. Subramanian, "Design of Steel Structures", Oxford University
REFERENCE(S)
1. "Teaching Resources for Structural Steel Design – Vol. I & II", INSDAG, Kolkatta. 2. Gaylord, E.H., Gaylord, N.C., and Stallmeyer, J.E., "Design of Steel Structures", 3rd edition, McGraw-Hill Publications, 1992 3. Negi L.S.. Design of Steel Structures, Tata McGraw Hill Publishing Pvt Ltd, New Delhi, 2007. 4. IS 800-2007 Indian Standard General Construction in Steel – code of practice (3rd Revision). 5. Dayaratnam, P., "Design of Steel Structures", Second edition, S. Chand & Company, 2003. 6. Ramachandra, S. and Virendra Gehlot, "Design of Steel Structures – Vol. I & II", Standard Publication, New Delhi, 2007

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	2	3	2	1				1			2	3	1	1	1
CO2	2	2	3	2	2				1			2	3	1	1	1
CO3	2	2	3	3	2				1			2	3	1	1	1
CO4	2	2	3	3	1				1			2	3	1	1	1
CO5	2	2	3	2	1				1			1	3		1	1

12CE63	CONSTRUCTION PLANNING & SCHEDULING		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VI			
Category	Core					
Pre requisite	12CE34- Building Materials and Construction Techniques					
AIM:	The aim of this course is to make the students as a decision maker in the construction industry					
Course Objectives:	• At the end of this course the student is expected to have learnt how to plan construction projects, schedule the activities using network diagrams. • Determine the cost of the project, control the cost of the project by creating cash flows and budgeting and how to use the project information as information and decision making tool.					
Course Outcomes:	1. Assemble and use various construction schedules to manage a construction project. 2. Assemble and sketch a WBS (Work Breakdown Structure) and develop an activity list with durations. 3. Develop and sketch logic diagrams. Compute and sketch a CPM (Critical Path Method) diagram and use computer technology to inter-link various project data with planning and scheduling. 4. Prioritize scheduled tasks in order to streamline planning strategies, shorten overall construction schedules and reduce direct cost and indirect cost. 5. Communicate effectively with team members by recognizing and utilizing best practices for planning and scheduling of construction tasks.					

UNIT I	**CONSTRUCTION PLANNING**	**6 hrs**
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.		
UNIT II	**SCHEDULING PROCEDURES AND TECHNIQUES**	**12**
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 tradeoffs -Improving the Scheduling process – Introduction to application software.		
UNIT III	**COST CONTROL MONITORING AND ACCOUNTING**	**11 hrs**
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.		
UNIT IV	**QUALITY CONTROL AND SAFETY DURING CONSTRUCTION**	**8 hrs**
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.		
UNIT V	**ORGANIZATION AND USE OF PROJECT INFORMATION**	**8 hrs**
Types of project information-Accuracy and Use of Information-Computerized organization and use of Information -Organizing information in databases-relational model of Data bases-Other conceptual Models of Databases-Centralized database Management systems-Databases and application programs-Information transfer and Flow.		
		TOTAL: 45 PERIODS

TEXT BOOK(S)
.1 Chitkara, K.K. "Construction Project Management Planning", Scheduling and Control, Tata McGraw-Hill Education., New Delhi, 2010. Chris Hendrickson and Tung Au, "Project Management for Construction – Fundamentals Concepts for Owners", Engineers, Architects and Builders, Prentice Hall, Pitsburgh, 2000
REFERENCE(S)
1. . Moder.J., C.Phillips and Davis, "Project Management with CPM", PERT and Precedence Diagramming, Van Nostrand Reinhold Co., Third Edition, 1983. 2. Willis., E.M., "Scheduling Construction projects", John Wiley and Sons 1986. 3. Halpin,D.W., "Financial and cost concepts for construction Management", John Wiley and Sons, New York, 1985. 5. Srinath,L.S., "Pert and CPM Priniples and Applications ", Affiliated East West Press,2001

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	3		2	1						2				2	
CO2	1	2	1	2	3						2				2	
CO3	1	1	2		1						2				2	
CO4	1	1	2	2	1	2		1			3		2		2	
CO5	1	1	1		1			1			3				2	

12CE64	ENVIRONMENTAL ENGINEERING – II		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VI			
Category	Core					
Prerequisites:	12CE54- Environmental Engineering –I					
AIM:	The aim of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena for successful design, operation and maintenance of sewage treatment plants.					
Course Objectives:	• To estimate sewage generation and design sewer system including sewage pumping stations • To understand the characteristics and composition of sewage, self-purification of streams • To perform basic design of the unit operations and processes that are used in sewage treatment					
Course Outcomes:	1. Describe about wastewater treatment units and their importance in domestic areas. 2. Summarize the plumbing system in buildings. 3. Illustrate the various primary treatment unit operations in a wastewater treatment plant. 4. Explain the biological and secondary wastewater treatment methods. 5. Illustrate the self purification of surface water bodies, biogas recovery and land disposal of sludge.					

UNIT I	**PLANNING FOR SEWERAGE SYSTEMS**	**9**
Sources of wastewater generation – Effects – Estimation of sanitary sewage flow – Estimation of storm runoff – Factors affecting Characteristics and composition of sewage and their significance – Effluent standards – Legislation requirements.		
UNIT II	**SEWER DESIGN**	**9**
Sewerage – Hydraulics of flow in sewers – Objectives – Design period - Design of sanitary and storm sewers – Small bore systems - Computer applications – Laying, joining & testing of sewers – appurtenances – Pumps – selection of pumps and pipe drainage -. Plumbing System for Buildings – One pipe and two pipe system.		
UNIT III	**PRIMARY TREATMENT OF SEWAGE**	**9**
Objective – Unit Operation and Processes – Selection of treatment processes – Onsite sanitation - Septic tank, Grey water harvesting – Primary treatment – Principles, functions design and drawing of screen, grit chambers and primary sedimentation tanks – Operation and Maintenance aspects.		
UNIT IV	**SECONDARY TREATMENT OF SEWAGE**	**9**
Objective – Selection of Treatment Methods – Principles, Functions, Design and Drawing of Units - Activated Sludge Process and Trickling filter, other treatment methods – Oxidation ditches, UASB – Waste Stabilization Ponds – Reclamation and Reuse of sewage – Recent Advances in Sewage Treatment – Construction and Operation & Maintenance of Sewage Treatment Plants. Case Studies.		
UNIT V	**DISPOSAL OF SEWAGE AND SLUDGE**	**9**
Standards for Disposal - Methods – dilution – Self purification of surface water bodies – Oxygen sag curve – Land disposal – Sewage farming – Deep well injection – Soil dispersion system - Sludge characterization – Thickening – Sludge digestion – Biogas recovery – Sludge Conditioning and Dewatering – disposal – Advances in Sludge Treatment and disposal.		
		TOTAL: 45 PERIODS

TEXT BOOKS
. Garg, S.K., Environmental Engineering Vol. II, Khanna Publishers, New Delhi, 2003. . Punmia, B.C., Jain, A.K., and Jain.A., Environmental Engineering, Vol.II, Lakshmi Publications, Newsletter, 2005.
REFERENCES
1. Manual on Sewerage and Sewage Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1997. 2. Wastewater Engineering – Treatment and Reuse, Tata Mc.Graw-Hill Company, New Delhi, 2003.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	3	2	2		1	1					1	2			1
CO2	2	3	2	3	2	1	2					1	2			2
CO3	2	3	2	3	2	1	2					1	2			2
CO4	2	3	2	2	1	1	2					1	2			2
CO5	2	3	2	2	1	1	2					1	2			2

12CE65	RAILWAYS, AIRPORTS AND HARBOUR ENGINEERING		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VI			
Category	Core					
Prerequisites:	12CE45- Highway Engineering					
AIM:	The aim of this course is to make the students aware of railways, airports and harbor design and planning.					
Course Objectives:	• To study the planning, design, construction and maintenance of railway tracks. • To study the students acquire proficiency in the application of modern techniques in Railway Engineering. • To study conversant with the definition, purpose, location and materials of coastal structures.					
Course Outcomes:	1. Describe the Engineering Survey for track alignment. 2. Explain the Railway track construction, Maintenance, operation and Functions of rails and sleepers. 3. Describe the Airport layout and buildings, Airport zoning, Clearance over Highways and Railways 4. Explain Runway and taxiway markings, Lightings, Air traffic control. 5. Classify the harbour, Ports, Docks.					

UNIT I	**RAILWAY PLANNING AND DESIGN**	**9**
Role of Indian Railways in National Development – Railways for Urban Transportation – LRT & MRTS - Engineering Surveys for Track Alignment - Permanent Way, its Components and their Functions - Rails – Types – Sleepers- Ballastless Tracks - Geometric Design of Railway Tracks		
UNIT II	**RAILWAY TRACK CONSTRUCTION, MAINTENANCE AND OPERATION**	**9**
Points and Crossings - Design of Turnouts, Working Principle - Signalling, Interlocking and Track Circuiting - Construction & Maintenance – Conventional, Modern methods and Materials, Track Drainage - Track Modernisation –Level Crossings.		
UNIT III	**AIRPORT PLANNING AND DESIGN**	**9**
Role of Air Transport, Components of Airports - Airport Planning –Runway Design- Drainage - Taxiway Design – Geometric Design Elements, Minimum Separation Distances, Design Speed, Airport Drainage - Airport Zoning, Clearance over Highways and Railways		
UNIT IV	**AIRPORT LAYOUTS, VISUAL AIDS, AND AIR TRAFFIC CONTROL**	**9**
Airport Layouts – Airport Buildings – Primary functions, Planning Concept, Principles of Passenger Flow, Passenger Facilities - Visual Aids – Runway and Taxiway Markings, Wind Direction Indicators, Runway and Taxiway Lightings - Air Traffic Control – Basic Actions, Air Traffic Control Network - Helipads, Hangars, Service Equipments.		
UNIT V	**HARBOUR ENGINEERING**	**9**
Harbours, Ports, Docks, Tides and Waves, Littoral Drift, Sounding, Area, Depth, Satellite Ports - Requirements and Classification of Harbours - Site Selection & Investigation –Geological Characteristics, Winds & Storms, Position and Size of Shoals - Shore Considerations- Proximity to Towns/Cities, Utilities, Construction Materials, Coast Lines - Dry and Wet Docks, Planning and Layouts - Entrance, Position of Light Houses, Navigating - Terminal Facilities –Navigational Aids - Coastal Structures- Coastal Shipping, Inland Water Transport and Container Transportation.		
		TOTAL: 45 PERIODS

TEXT BOOK
1. Saxena Subhash C and Satyapal Arora, A Course in Railway Engineering, Dhanpat Rai and Sons, Delhi, 2006. 2. Khanna S K, Arora M G and Jain S S, Airport Planning and Design, Nemchand and Brothers, Roorkee, 2005.
REFERENCE(S)
. Rangwala, Railway Engineering, Charotar Publishing House, 1995. 2. Rangwala, Airport Engineering, Charotar Publishing House, 1996. 3. Oza.H.P. and Oza.G.H., "A course in Docks & Harbour Engineering". Charotar Publishing Co.1976. 4. J.S. Mundrey, "A course in Railway Track Engineering". Tata McGraw Hill, 2000. 5. S P Bindra, A Course in Docks and Harbour Engineering, Dhanpat Rai and Sons, New Delhi, 1993.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1		3		2	2			2				2	3	2	2	3
CO2		3		2	2			2				2	3	2	2	3
CO3		3		3	2			2				2	3	2	2	2
CO4		3		3	2			2				2	3	2	2	2
CO5		3		3	2		2	2				2	3	2	2	3

12CE66	ENVIRONMENTAL AND IRRIGATION ENGINEERING DRAWING		L	T	P	C
			0	0	4	2
Programme:	B.E. Civil Engineering	**Sem:**	VI			
Category	Core					
Prerequisites:	12CE64- Environmental Engineering-II(CR), 12CE54- Environmental Engineering –I, 12CE51- Irrigation Engineering					
AIM:	The aim of this course is to make the students familiar with the design of irrigation, water supply and sewage disposal structures.					
Course Objectives:	• At the end of this course student acquires the capacity to design and draw the environmental and public health engineering structures as well as irrigation engineering structures.					
Course Outcomes:	1. To learn the drawing standards. 2. Develop knowledge about different hydraulic structures. 3. Have practice on pumping station and sanitary facilities design and drawing. 4. Develop the knowledge about water treatment plants design and drawing. 5. Develop the knowledge about irrigation and environmental drawings.					

LIST OF EXPERIMENTS

Part A – Environmental Drawings

1. Slow sand filter
2. Rapid sand filter
3. Pumping station
4. House service connection for water supply and drainage.
5. Trickling filters
6. Septic tanks

Part B – Irrigation Drawings

1. Tank Surplus Weir
2. Tank Sluice with tower head
3. Aqueducts
4. Canal head works
5. Canal Regular
6. Canal escape

TOTAL: 45 PERIODS

TEXT BOOK(S)

1. Modi, P.N., "Environmental Engineering I & II", Standard Book House, Delhi – 6
2. Sathyanarayana Murthy "Irrigation Design and Drawing" Published by Mrs L.Banumathi, Tuni east Godavari District. A.P. 2004.

REFERENCE(S)

1. Peary, H.S., ROWE, D.R., Tchobanoglous, G., "Environmental Engineering", McGraw-Hill Book Co., New Delhi, 1995.
2. Metcalf & Eddy, "Wastewater Engineering (Treatment and Reuse)", 4th edition, Tata McGraw-Hill, New Delhi, 2003.
3. Garg S.K., "Irrigation Environmental Engineering and design StructuresI", Khanna Publishers, New Delhi, 17th Reprint, 2003.
4. Manual on Water Supply and Treatment, CPHEEO, Government of India, New Delhi, 1999

5. Manual on Sewerage and Sewage Treatment, CPHEEO, Government of India, New Delhi, 1993.
6. Sharma R.K. Irrigation Engineering and Hydraulic Structures Oxford and IBH Publishing co., New Delhi 2002.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2											2	3		
CO2	3	2		3									2	3		
CO3	3	2		3		2							2	3		
CO4	3	2		3		2							2	3		
CO5	3	2					3						2	3		

12CE67	ENVIRONMENTAL ENGINEERING LABORATORY		L	T	P	C
			0	0	3	2
Programme:	B.E. Civil Engineering	**Sem:**	VI			
Category	Core					
Prerequisites:	12CE64- Environmental Engineering-II(CR), 12CE54- Environmental Engineering –I					
AIM:	The aim of this course is to make the students to have a practical knowledge about the testing of water and municipal sewage.					
Course Objectives:	• This subject includes the list of experiments to be conducted for characterization of water and municipal sewage. At the end of the course. • The student is expected to be aware of the procedure for quantifying quality parameters for water and sewage.					
Course Outcomes:	1. Learn the standard testing & procedure. 2. Gain knowledge about water and municipal sewage. 3. Illustrate the tests to determine the characteristics of water sample. 4. Analyse the biological parameters for microorganisms present in water. 5. Estimate the various physical parameters of the water sample.					

LIST OF EXPERIMENTS

1. Sampling and preservation methods and significance of characterization of water and wastewater.
2. Determination of i) pH and turbidity ii) Hardness
3. Determination of iron & fluoride
4. Determination of residual chlorine
5. Determination of Chlorides
6. Determination of Ammonia Nitrogen
7. Determination of Sulphate
8. Determination of Optimum Coagulant Dosage
9. Determination of chlorination of water.
10. Determination of dissolved oxygen
11. Determination of suspended, volatile and fixed solids
12. B.O.D. test
13. C.O.D. test
14. Introduction to Bacteriological Analysis (Demonstration only)

TOTAL: 45 PERIODS

REFERENCE(S)

1. Sheety, M.S, Concrete Technology, Theory and Practice, S. Chand and Company Ltd, New Delhi, 2005.
2. Arora S.P. and Bindra S.P., Building Construction, Planning Techniques and Method of Construction, Dhanpat Rai and Sons, 1991. Standard methods for the examination of water and wastewater, APHA, 20th Edition, Washington, 1998
3. Garg, S.K., "Environmental Engineering Vol. I & II", Khanna Publishers, New Delhi
4. Modi, P.N., "Environmental Engineering Vol. I & II", Standard Book House, Delhi-67.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3						2								2	2
CO2		2		3											2	2
CO3	1	2		3									2		3	2
CO4	2	2		3									3		3	2
CO5		2		3									1		3	2

12HS61	ENGLISH FOR EMPLOYMENT – II		L	T	P	C
			0	0	2	1
Programme:	B.E. Civil Engineering	**Sem:**	III			
Category	Core					
Prerequisites:	12HS51- English for Employment – I					
AIM:	To Improve learners Communication Skill in English with the Professional English Examination Module					
Course Objectives:	• To impart Employment skill among the students • To improve Technical vocabulary related to work place • T o develop students job prospects through oral communication					
Course Outcomes:	1. Develop analytical skill and vocabulary. 2. Improve job prospects. 3. Predict the main idea of the topic and use verbal cues. 4. Develop negotiation skill. 5. Utilize documentation methodology.					

A) Reading 6

1. Reading for Gist
2. Reading for Structure and detail
3. Understanding General Points
4. Reading-Vocabulary and Texture
5. Structure and Discourse features
6. Understanding sentence structure

B) Writing 6

1. Describing figure from graphic input
2. Deriving conclusion from illustrations
3. Writing a Report-Describing/Summarizing
4. Explaining a context
5. Writing Apologies
6. Writing for giving assurance

C) Listening 6

1. Listening for Specific Information
2. Listening to Identify topic
3. Listening to a context
4. Listening to opinions expressed in a debate
5. Listening for Gist
6. Listening for making Inferences

D) Speaking 12

1. 'Mini-Presentation' on the given topic 6
2. Group Discussion 4
3. Expressing personal opinion about the Social Issues 2

Total=30 Periods

Text Book:
Business Benchmark Advanced Audio Cassettes BEC Higher, Guy Brook-Hart, 2 Audio cassettes, ISBN: 9780521672986
Business Benchmark Upper Intermediate Personal Study Book BEC and BULATS Edition, Guy Brook-Hart, PB, ISBN: 9780521672917

INTERNAL ASSESSMENT 100 MARKS
(100 Marks to be converted to 25)

***Note: Contents for the Internal and External Examinations should be considered only from The BUSINESS ENGLISH oriented Aricles/Extracts/Clips/Illustrations/Audio scripts.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1		3						2	3				2			1
CO2			2		3					2		3	2			2
CO3		1	2		3				1	2		3	2			2
CO4		2	2		3				2	2		3	2			3
CO5			2		3					2		3	2			2

12CE71	DESIGN OF REINFORCED CONCRETE & BRICK MASONRY STRUCTURES		L	T	P	C
			3	1	0	4
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category	Core					
Prerequisites:	12CE56- Design of RC Elements					
AIM:	To design reinforcement and size of concrete and brick masonry structures					
Course Objectives:	• To design of Reinforced Concrete Structures such as Retaining Wall, water tank • To design of Reinforced Concrete Structures such as Staircases, Flat slabs • To study the Principles of design pertaining to Box culverts, Mat foundation and Bridges.					
Course Outcomes:	1. Design dimension and reinforcement details for cantilever and counter fort type Retaining wall 2. Design staircases (ordinary and doglegged), Reinforced concrete wall and mat foundation; box culverts and road bridges in any real life situation 3. To get knowledge about the design and construction of flat slab. 4. Design of grid slab and its reinforcement details. 5. Apply principle of virtual work method to square, rectangular, circular and triangular slab in any real life situation and evaluate axially and eccentrically loaded brick walls in real time projects.					

UNIT-I	**RETAINING WALLS**	**9+3 hrs**
Design of cantilever and counter fort retaining walls		
UNIT-II	**WATER TANKS**	**9+3 hrs**
Design of staircases (ordinary and doglegged) – Design of Reinforced concrete walls – Principles of design of mat foundation, box culvert and road bridges		
UNIT-III	**SELECTED TOPICS**	**9+3 hrs**
Design of Flat Slab – Design of Grid Slab		
UNIT-IV	**SLABS**	**9+3 hrs**
Design of Flat Slab – Design of Grid Slab		
UNIT-V	**BRICK MASONRY**	**9+3 hrs**
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		
		TOTAL: 60 PERIODS

TEXT BOOK(S)

1. Purushothama raj.P.," Design of RC & Brick Masonry Structures"Lakshmi Publications Chennai,2012.
Krishna Raju, N., "Design of RC Structures", CBS Publishers and Distributors, Delhi, 2006

REFERENCE(S)

1.Mallick, D.K. and Gupta A.P., "Reinforced Concrete", Oxford and IBH Publishing Company
2. Syal, I.C. and Goel, A.K., "Reinforced Concrete Structures", A.H. Wheelers & Co. Pvt. Ltd., 1994
3. Ram Chandra.N. and Virendra Gehlot, "Limit State Design", Standard Book House.2004.
4. Dayaratnam, P, "Brick and Reinforced Brick Structures",Oxford & IBH Publishing House, 1997
5. Varghese, P.C., "Limit State Design of Reinforced Concrete Structures "Prentice hall of India Pvt Ltd New Delhi, 2007.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	2	1	1		1			1		2	3	1	2	1
CO2	2	2	1	1	1		1					1	3	1	1	1
CO3	2	1	1	1	1					1		1	3	1	1	1
CO4	3	2	2	1	1		1			1		2	3	1	2	
CO5	3	2	1	1	1		1			1		1	3	1	1	

12CE72	ESTIMATION AND QUANTITY SURVEYING		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category	Core					
Prerequisites:	12CE63- Construction Planning & Scheduling					
AIM:	This subject covers the various aspects of estimating of quantities of items of works involved in buildings, water supply and sanitary works, road works and irrigation works. This also covers the rate analysis, valuation of properties and preparation of reports for estimation of various items. At the end of this course the student shall be able to estimate the material quantities, prepare a bill of quantities, make specifications and prepare tender documents. Student should also be able to prepare value estimates.					
Course Objectives:	• To know the importance of preparing the types of estimates under different conditions • To know about the rate analysis and bill preparations • To study about the specification writing • To understand the valuation of land and buildings					
Course Outcomes:	1. Apply the different types of estimates in different types of building and other structures. 2. Carry out analysis of rates and bill preparation at different locations. 3. Describe the concepts for specification writing. 4. Carry out valuation of assets. 5. Describe the importance and preparation of reports for various structures.					

UNIT I	**ESTIMATE OF BUILDINGS**	**11 hrs**
Load bearing and framed structures – Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, residential building with flat and pitched roof – Various types of arches – Calculation of brick work and RCC works in arches – Estimate of joineries for panelled and glazed doors, windows, ventilators, handrails etc.		
UNIT II	**ESTIMATE OF OTHER STRUCTURES**	**10 hrs**
Estimating of septic tank, soak pit – sanitary and water supply installations – water supply pipe line – sewer line – tube well – open well – estimate of bituminous and cement concrete roads – estimate of retaining walls – culverts – estimating of irrigation works – aqueduct, syphon, fall.		
UNIT III	**SPECIFICATION AND TENDERS**	**8 hrs**
Data – Schedule of rates – Analysis of rates – Specifications – sources – Detailed and general specifications – Tenders – Contracts – Types of contracts – Arbitration and legal requirements.		
UNIT IV	**VALUATION**	**8 hrs**
Necessity – Basics of value engineering – Capitalized value – Depreciation – Escalation – Value of building – Calculation of Standard rent – Mortgage – Lease		
UNIT V	**REPORT PREPARATION**	**8 hrs**
Principles for report preparation – report on estimate of residential building – Culvert – Roads – Water supply and sanitary installations – Tube wells – Open wells.		
		TOTAL: 45 PERIODS

TEXT BOOK(S)
1 Dutta, B.N., "Estimating and Costing in Civil Engineering", UBS Publishers & Distributors Pvt. Ltd., 2003 Kohli, D.D and Kohli, R.C., "A Text Book of Estimating and Costing (Civil)", S.Chand & Company Ltd., 2004
REFERENCE(S)
PWD Data Book.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	1	2	1	2	1	1					2	3		3	1
CO2	2	1	2	1	2	1	1					3	2	1	1	2
CO3	1	1	1	2		1						3	2		2	
CO4	2	1					2				1	3	3	1	1	1
CO5	2	2		2		3						3	2		2	

12CE73	BASICS OF DYNAMICS AND SEISMIC DESIGN		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category	Core					
Prerequisites:	12CE62- Design of Steel Structures					
AIM:	To study dynamic and seismic forces due to earthquake and corresponding design of structures					
Course Objectives:	• To study basic elements of seismic and dynamic forces cause by earthquake • To calculate the response of structure due to earthquake. • To design RC building for mitigate effect of earthquake					
Course Outcomes:	1. Discriminate the basic elements in static, dynamic force, degree of freedom, motion equation and vibrations of mass. 2. Calculate Natural frequencies, Mode shapes for Two and multi degree of freedom system. 3. Describe the causes of earthquake and tectonic plate theory. To apply seismogram, magnitude and intensity of earthquake in real time situation. 4. Examine response of structures, Effect of soil properties, damping, Importance of ductility, Methods of introducing ductility into RC structures to overcome earthquake. 5. Design structure as per IS codes using base isolation techniques for mitigating effects of earthquake on structures.					

UNIT-I	THEORY OF VIBRATIONS	9
Concept of inertia and damping – Types of Damping – Difference between static forces and dynamic excitation – Degrees of freedom – SDOF idealisation – Equations of motion of SDOF system for mass as well as base excitation – Free vibration of SDOF system – Response to harmonic excitation – Impulse and response to unit impulse – Duhamel integral		
UNIT-II	**MULTIPLE DEGREE OF FREEDOM SYSTEM**	**9**
Two degree of freedom system – Normal modes of vibration – Natural frequencies – Mode shapes - Introduction to MDOF systems – Decoupling of equations of motion – Concept of mode superposition (No derivations).		
UNIT-III	**ELEMENTS OF SEISMOLOGY**	**9**
Causes of Earthquake – Geological faults – Tectonic plate theory – Elastic rebound – Epicentre – Hypocentre – Primary, shear and Raleigh waves – Seismogram – Magnitude and intensity of earthquakes – Magnitude and Intensity scales – Spectral Acceleration - Information on some disastrous earthquakes		
UNIT-IV	**RESPONSE OF STRUCTURES TO EARTHQUAKE**	**9**
Stresses and deformation in circular (solid and hollow shafts) – stepped shafts – shafts fixed at both ends – leaf springs – stresses in helical springs and deflection of springs		
UNIT-V	**DESIGN METHODOLOGY**	**9**
Stability and equilibrium of plane frames – types of trusses – analysis of forces in truss members method of joints, method of sections, method of tension coefficients		
		TOTAL: 60 PERIODS

TEXT BOOK(S)
1. Chopra, A.K., "Dynamics of Structures – Theory and Applications to Earthquake Engineering", Second Edition, Pearson Education, 2003.
2. Paz, M., "Structural Dynamics – Theory & Computation", CSB Publishers & Distributors, Shahdara, Delhi, 2000
REFERENCE(S)
1. Biggs, J.M., "Introduction to Structural Dynamics", McGraw–Hill Book Co., N.Y., 1964 2. Dowrick, D.J., "Earthquake Resistant Design", John Wiley & Sons, London, 1977, NPEEE Publications.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	1	2	1	1			1		1		1	3	2	1	1
CO2	2	2	1	2			1	1			1	1	3	1		1
CO3	2	1	1	1				1		1		1	2	3		
CO4	2	1	3	2	1						1	2	2	3	1	2
CO5	3	2	1	2	1						1	3	1	2		1

12CE74	PRESTRESSED CONCRETE STRUCTURES		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category	Core					
Pre requisite	12CE56- Design of RC Elements					
AIM:	The aim of this course is to make the students to familiar with the design concepts of prestressed concrete structure..					
Course Objectives:	• At the end of this course the student shall have a knowledge of methods of prestressing, advantages of prestressing concrete, the losses involved and the design methods for prestressed concrete elements under code provisions.					
Course Outcomes:	1. Explain the terminology related to pre-stressing systems 2. Analyse the sections using strength, stress load balancing concept and losses of prestressing. 3. Design a prestress concrete pipes and tanks. 4. Analyze the stress and estimate the deflection for composite construction. 5. Examine the general aspects involve in prestressed concrete bridges.					

UNIT I	**INTRODUCTION – THEORY AND BEHAVIOUR**	**9**
Basic concepts – Advantages – Materials required – Systems and methods of prestressing – Analysis of sections – Stress concept – Strength concept – Load balancing concept – Effect of loading on the tensile stresses in tendons – Effect of tendon profile on deflections – Factors influencing deflections – Calculation of deflections – Short term and long term deflections - Losses of prestress – Estimation of crack width		
UNIT II	**DESIGN CONCEPTS**	**9**
Beams – types of supports – simple and fixed, types of load – concentrated, uniformly distributed, varying distributed load, combination of above loading – relationship between bending moment and shear force – bending moment, shear force diagram for simply supported, cantilever and over hanging beams – Theory of simple bending – analysis of stresses – load carrying capacity of beams – proportioning of sections		
UNIT III	**CIRCULAR PRESTRESSING**	**9**
Design of prestressed concrete tanks – Pipes.		
UNIT IV	**COMPOSITE CONSTRUCTION**	**9**
Analysis for stresses – Estimate for deflections – Flexural and shear strength of composite members		
UNIT V	**PRE-STRESSED CONCRETE BRIDGES**	**9**
General aspects – pretensioned prestressed bridge decks – Post tensioned prestressed bridge decks		
		TOTAL: 45 PERIODS

TEXT BOOK(S)

. 1. Krishna Raju N., Prestressed concrete, Tata McGraw Hill Company, New Delhi 2008
Rajagopalan, N, "Prestressed Concrete", Alpha Science, 2002

REFERENCE(S)

1. . Ramaswamy G.S., Modern prestressed concrete design, Arnold Heinimen, New Delhi, 1990
2. Lin T.Y. Design of prestressed concrete structures, Asia Publishing House, Bombay 1995.
3. David A.Sheppard, William R. and Philips, Plant Cast precast and prestressed concrete – A design guide, McGraw Hill, New Delhi 1992.
4. Mallic S.K. and Gupta A.P., Prestressed concrete, Oxford and IBH publishing Co. Pvt. Ltd. 1997.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	3	2								2	3	1	1	1
CO2	2	2	2	1	1		1					1	3		2	
CO3	2	2	3	1			1					2	2		1	1
CO4	1	1		3								1	2		2	1
CO5	1	1	2			1						1	2	2	1	1

12CE75	COMPUTER AIDED DESIGN & DRAFTING LABORATORY		L	T	P	C
			0	0	4	2
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category	Core					
Prerequisites:	12CE71- Design of Reinforced Concrete & Brick Masonry Structures(CR), 12CE56-Design of RC Elements					
AIM:	The aim of this course is to make the students to familiar with the design concepts and computer aided structural drawings.					
Course Objectives:	• At the end of the course the student acquires hands on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.					
Course Outcomes:	1. Design and draw the RCC structures and steel structure. 2. Understand the reinforcement details from the drawing. 3. Design both RCC structures and steel structure. 4. Compare various shapes of water tank structures. 5. Construct different types of Girder Bridge.					

LIST OF EXPERIMENTS
1. 1 Design and draw the RCC structures 2. Understand the reinforcement details from the drawing. 3. Compare various shapes of water tank structures. 4. Construct different types of Girder Bridge. 5. Able to design and draw the column and footing.
TOTAL: 60 PERIODS

TEXT BOOK(S)
. Krishna Raju, "Structural Design & Drawing (Concrete & Steel)", CBS Publishers 2004. Punmia, B.C., Ashok Kumar Jain, Arun Kumar Jain, "Design of steel structures", Lakshmi publications Pvt. Ltd 2003.
REFERENCE(S)
1. Krishnamurthy, D., "Structural Design & Drawing – Vol. II", CBS Publishers & Distributors, Delhi 1992. 2. Krishnamurthy, D., "Structural Design & Drawing – Vol. III Steel Structures", CBS Publishers & Distributors, New Delhi 1992.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Observation (60%)	Record & Viva (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass:	100 [Min Pass:
Attendance	91% And Above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	3	3								3	3			
CO2	3	2	3	3								2	3			
CO3	3	2	2	2								3	2			
CO4	3	3	2	3								3	3	1		
CO5	3	2	2	2								2	2	1		

12CE76	DESIGN PROJECT		L	T	P	C
			0	0	4	2
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category	Core					
Prerequisites:	12F2Y5 Engineering Mechanics, 12CE36 Mechanics of Solids, 12CE42 Strength of Materials and 12CE56 Design of RC Elements.					
AIM:	The aim of the design project is to make the students to improve the design principles in any of the civil engineering discipline.					
Course Objectives:	• To study a design problem in any one of the disciplines of Civil Engineering • To study Design of an RC structure, Design of a waste water treatment plant, • To study Design of a foundation system, Design of traffic intersection etc.					
Course Outcomes:	1. Apply the knowledge of core subjects in civil engineering projects. 2. Understand the ethical and professional responsibilities as a Civil Engineer. 3. Understand the need for a continuous learning to be part with the continuously emerging field of engineering.					

OBJECTIVES

The objective of this course is to impart and improve the design capability of the student. This course conceives purely a design problem in any one of the disciplines of Civil Engineering; e.g., Design of an RC structure, Design of a waste water treatment plant, Design of a foundation system, Design of traffic intersection etc. The design problem can be allotted to either an individual student or a group of students comprising of not more than four. At the end of the course the group should submit a complete report on the design problem consisting of the data given, the design calculations, specifications if any and complete set of drawings which follow the design.

TOTAL: 60 PERIODS

EVALUATION PROCEDURE

The method of evaluation will be as follows:
1. Internal Marks: 20 marks (Decided by conducting 3 reviews by the guide appointed by the Institution)
2. Evaluation of Project Report: 30 marks (Evaluated by the external examiner appointed the University). Every student belonging to the same group gets the same mark
3. Viva voce examination: 50 marks (Evaluated by the internal examiner appointed by the HOD with the approval of HOI, external examiner appointed by the University and Guide of the course – with equal Weightage)

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	1	3	3	3		1			1		2	3	2	2	1
CO2			2	3	2					1		2	3	2	1	1
CO3	2	1	3	3	3		2			1		3	3	1	2	1

12CE81	PROJECT WORK	L	T	P	C

			0	**0**	**12**	**6**
Programme:	B.E. Civil Engineering	**Sem:**	VIII			
Category	Core					
Prerequisites:	------					
AIM:	The aim of the project work is to make the students to conceive knowledge in various civil engineering streams through experiments and computer applications.					
Course Outcomes:	1. Infer a contemporary issue in the field of engineering and design a methodology to solve the problem. 2. Gather knowledge in collecting data, analyzing and designing a feasible and effective solution to the problem under all realistic constraints. 3. Understand the impact of their solutions in a global, economic, environmental and societal context. 4. Understand the professional and ethical responsibilities while working as a team in finding a solution to real life Civil engineering problem. 5. Work as an individual as well as a team.					

OBJECTIVES	
The objective of the project work is to enable the students to work in convenient groups of not more than four members in a group on a project involving theoretical and experimental studies related to Civil Engineering. Every Project Work shall have a Guide who is a member of the faculty of Civil Engineering of 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. Each student shall finally produce a comprehensive report covering background information, literature Survey, problem statement, Project work details and conclusions. This experience of project work shall help the student in expanding his / her knowledge base and also provide opportunity to utilise the creative ability and inference capability.	
TOTAL: 60 PERIODS	
EVALUATION PROCEDURE	
1. Internal Marks: 20 marks (decided by conducting 3 reviews by the guide appointed by the Institution) 2. Evaluation of Project Report: 30 marks (Evaluated by the external examiner appointed the University). Every student belonging to the same group gets the same mark 3. Viva voce examination: 50 marks (evaluated by the internal examiner appointed by the HOD with the approval of HOI, external examiner appointed by the University and Guide of the course – with equal Weight age	

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	3	2	2	3			2	3			3	3	2	3	2
CO2	3	2	3	2	2			1	2			2	2	3	3	3
CO3	2	1	2	3	2			1	3			2	3	2	2	2
CO4	3	2	3	2	3			2	2			2	3	1	3	2
CO5	2	3	2	1	22			1	1			3	2	3	2	2

12CE7A	HYDROLOGY		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category :	Elective					
Prerequisites:	12CE51- Irrigation Engineering					
Aim:	The aim of the course is to make the students to familiar with the water management.					
Course Objectives:	• At the end of the semester, the student shall be having a good understanding of all the components of the hydrological cycle. • The mechanics of rainfall, its spatial and temporal measurement and their applications will be understood. • Simple statistical analysis and application of probability distribution of rainfall and run off shall also be understood. • Student will also learn simple methods of flood routing and ground water hydrology.					
Course Outcomes:	1. Describe about the spatial relationship, measurement, intensity and frequency of rainfall 2. Interpolate hydrographs 3. Summarize evapotranspiration process 4. Explain the flood routing, channel routing using various methods 5. Illustrate aquifers in groundwater hydrology					

UNIT-I	PRECIPITATION	9
Hydrologic cycle – Types of precipitation – Forms of precipitation – Measurement of Rainfall – Spatial measurement methods – Temporal measurement methods – Frequency analysis of point rainfall – Intensity, duration and frequency relationship – Probable maximum precipitation		
UNIT-II	**ABSTRACTION FROM PRECIPITATION**	**9**
Losses from precipitation – Evaporation process – Reservoir evaporation – Infiltration process – Infiltration capacity – Measurement of infiltration – Infiltration indices – Effective rainfall.		
UNIT-III	**HYDROGRAPHS**	**9**
Factors affecting Hydrograph – Base flow separation – Unit hydrograph – Derivation of unit hydrograph – S curve hydrograph – Unit hydrograph of different deviations - Synthetic Unit Hydrograph		
UNIT-IV	**FLOODS AND FLOOD ROUTING**	**9**
Flood frequency studies – Recurrence interval – Gumbel's method – Flood routing – Reservoir flood routing – Muskingum's Channel Routing – Flood control		
UNIT-V	**GROUND WATER HYDROLOGY**	**9**
Types of aquifers – Darcy's law – Dupuit's assumptions – Confined Aquifer – Unconfined Aquifer – Recuperation test – Transmissibility – Specific capacity – Pumping test – Steady flow analysis only.		
		TOTAL: 45 PERIODS

TEXT BOOK(S)
1. Subramanya, K., "Engineering Hydrology", Tata McGraw-Hill Publishing Co., Ltd., 2012 2. Chow, V.T. and Maidment, "Hydrology for Engineers", McGraw-Hill Inc., Ltd., 2006
REFERENCE(S)
1. Singh, V.P., "Hydrology", McGraw-Hill Inc., Ltd., 2000. 2. Raghunath, H.M., "Hydrology", Wiley Eastern Ltd., 2000

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2			2							2	2	3		
CO2	2	3	1	2								2	3	3		2
CO3		3	3		2							3	3	2		
CO4	2	3	3		2		3					2	2	2		
CO5	2	2		3	2		2					2	2	3		

12CE7B	REMOTE SENSING TECHNIQUES AND GIS		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category :	Elective					
Prerequisites:	12F2Z3- Engineering Physics-II, 12CE44- Surveying – II					
Aim:	The aim of this course is to make the students exposed to GIS and remote sensing techniques					
Course Objectives:	• To introduce the students to the basic concepts and principles of various components of remote sensing. • To provide an exposure to GIS and its practical applications in civil engineering.					
Course Outcomes:	1. Identify the EMR interaction of atmosphere and earth surface. 2. Explain the types of platforms and learn the pay load description of important earth resources satellites. 3. Apply the various image improvement techniques. 4. Analyse the basic components of GIS. 5. Learn the data compression techniques used in GIS and application of GIS used in civil engineering.					

UNIT-I	EMR AND ITS INTERACTION WITH ATMOSPHERE & EARTH MATERIAL	9
Definition of remote sensing and its components – Electromagnetic spectrum – wavelength regions important to remote sensing – Wave theory, Particle theory, Stefan-Boltzman and Wein's Displacement Law – Atmospheric scattering, absorption – Atmospheric windows – spectral signature concepts – typical spectral reflective characteristics of water, vegetation and soil.		
UNIT-II	**PLATFORMS AND SENSORS**	**9**
Types of platforms – orbit types, Sun-synchronous and Geosynchronous – Passive and Active sensors – resolution concept – Pay load description of important Earth Resources and Meteorological satellites – Airborne and space borne TIR and microwave sensors.		
UNIT-III	**IMAGE INTERPRETATION AND ANALYSIS**	**9**
Types of Data Products – types of image interpretation – basic elements of image interpretation - visual interpretation keys – Digital Image Processing – Pre-processing – image enhancement techniques – multispectral image classification – Supervised and unsupervised.		
UNIT-IV	**GEOGRAPHIC INFORMATION SYSTEM**	**9**
Introduction – Maps – Definitions – Map projections – types of map projections – map analysis – GIS definition – basic components of GIS – standard GIS softwares – Data type – Spatial and non-spatial (attribute) data – measurement scales – Data Base Management Systems (DBMS).		
UNIT-V	**DATA ENTRY, STORAGE AND ANALYSIS**	**9**
Data models – vector and raster data – data compression – data input by digitization and scanning – attribute data analysis – integrated data analysis – Modeling in GIS Highway alignment studies – Land Information System.		
		TOTAL: 45 PERIODS

TEXT BOOK(S)
1. Anji Reddy, M. (2008). Textbook of Remote Sensing and Geographical Information System. Second edn. BS Publications, Hyderabad. 2. Lo. C.P.and A.K.W.Yeung (2002). Concepts and Techniques of Geographic Information Systems. Prentice-Hall of India Pvt. Ltd., New Delhi. Pp:492.
REFERENCE(S)
1. Peter A.Burrough, Rachael A.McDonnell (2000). Principles of GIS. Oxford University Press. 2. Ian Heywood (2000). An Introduction to GIS. Pearson Education Asia. 3. Lillesand, T.M., Kiefer, R.W. and J.W.Chipman. (2004). Remote Sensing and Image Interpretation. V Edn. John Willey and Sons (Asia) Pvt. Ltd., New Delhi. Pp:763.5. Milan Sonka et aI, 'Image Processing, Analysis and Machine Vision', Brookes/Cole, Vikas Publishing House, 2nd edition, 1999.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	2			3		2						3	3		
CO2					3			3	3		1		3	2		
CO3					3		2	2	2		1		2	2		2
CO4					3						3		3	1		2
CO5					3								1	1		

12CE7C	ARCHITECTURE		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category:	Elective					
Prerequisites:	12CE63- Construction Planning & Scheduling					
Aim:	The aim of this course is to make the students familiar with the principles and application of architecture in buildings.					
Course Objectives:	• Demonstrate the basic knowledge on the principles of design of buildings relating to the environment and climate.					
Course Outcomes:	1. Conceptualize and coordinate designs, addressing social, cultural, environmental and technological aspects of architecture 2. Use basic architectural principles in the design of buildings, interior spaces and sites 3. Identify the stages of planning process and surveys in planning 4. Apply the town and country plan act and building by-laws. 5. Define the means of controlling the internal environment and provide standards of utility.					

UNIT-I	ARCHITECTURAL DESIGN	9
Architectural Design – an analysis – integration of function and aesthetics – Introduction to basic elements and principles of design.		
UNIT-II	**SITE PLANNING**	**9**
Surveys – Site analysis – Development Control – Layout regulations- Layout design concepts		
UNIT-III	**BUILDING TYPES**	**9**
Residential, institutional, commercial and Industrial – Application of anthropometry and space standards- Inter relationships of functions – Safety standards – Building rules and regulations – Integration of building services – Interior design		
UNIT-IV	**CLIMATE AND ENVIRONMENTAL RESPONSIVE DESIGN**	**9**
Man and environment interaction- Factors that determine climate – Characteristics of climate types – Design for various climate types – Passive and active energy controls – Green building concept		
UNIT-V	**DATA ENTRY, STORAGE AND ANALYSIS**	**9**
Planning – Definition, concepts and processes- Urban planning standards and zoning regulations- Urban renewal – Conservation – Principles of Landscape design		
		TOTAL: 45 PERIODS

TEXT BOOK(S)

1. Francis D.K. Ching, "Architecture: Form, Space and Order", VNR, N.Y., 2006.
2. Givoni B., "Man Climate and Architecture", Applied Science, Barking ESSEX, 2000

REFERENCE(S)

1. Edward D.Mills, "Planning and Architects Handbook", Butterworth London, 1995.
2. Gallian B.Arthur and Simon Eisner, "The Urban Pattern – City Planning and Design", Affiliated Press Pvt. Ltd., New Delhi, 1995.
3. Margaret Robert, "An Introduction to Town Planning Techniques", HutchinsoLondon , 1990.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3		3		2				2	3		1	1			3
CO2			3		2			2	1			1	3		1	2
CO3	2		3		1	3	1	3	1	1		1	3		2	1
CO4	2	3	3		1		3					2				3
CO5	2		3				3						3		2	

12MG71	TOTAL QUALITY MANAGEMENT		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category:	Elective					
Prerequisites:	12MG52- Principles of Management					
Aim:	The aim of this course is to make the students familiar with the principles in managing the quality.					
Course Objectives:	• At the end of this course the students can able to understand the principles of quality management, methods of implementing quality and to make aware of organizations to maintain the quality.					
Course Outcomes:	1. Analyze the various Industrial practices to achieve Quality 2. Develop Managerial and Entrepreneurial Skills. 3. Select suitable tools to audit quality standards 4. Develop strategy for achieving quality using FMEA and Benchmarking. 5. Summarize the ISO auditing and documentation process.					

UNIT-I	INTRODUCTION	9
Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.		
UNIT-II	**TQM PRINCIPLES**	**9**
Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention – Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen – Supplier partnership – Partnering, Supplier selection, Supplier Rating.		
UNIT-III	**TQM TOOLS & TECHNIQUES I**	**9**
The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.		
UNIT-IV	**TQM TOOLS & TECHNIQUES II**	**9**
Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Cost of Quality – Performance measures.		
UNIT-V	**QUALITY SYSTEMS**	**9**
Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT.		
		TOTAL: 45 PERIODS

TEXT BOOK(S)

1. Dale H.Besterfiled, et at., "Total Quality Management", Pearson Education Asia, 3rd Edition, Indian Reprint (2006).
1. 2. James R. Evans and William M. Lindsay, "The Management and Control of Quality",6th Edition, South-Western (Thomson Learning), 2005.

REFERENCE(S)

1. Oakland, J.S., "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford, 3rd Edition, 2003.
2. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India)Pvt. Ltd.,2006.

3. Janakiraman, B and Gopal, R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1						3		3	2	2	3	2			3	2
CO2						2		2	3	1	2	1			3	2
CO3					2	2		3	2	1	3	3			3	3
CO4								2	2	2	2	3			3	2
CO5								2	2	3	2	3			3	2

12CE7D	TRAFFIC ENGINEERING AND MANAGEMENT		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category:	Elective					
Prerequisites:	12CE45- Highway Engineering					
Aim:	The aim of this course is to make the students familiar with the principles in managing the quality					
Course Objectives:	• The students acquire comprehensive knowledge of traffic surveys and studies such as 'Volume Count', 'Speed and delay', 'Origin and destination', 'Parking', 'Pedestrian' and 'Accident surveys'. • They achieve knowledge on design of 'at grade' and 'grade separated' intersections. They also become familiar with various traffic control and traffic management measures.					
Course Outcomes:	1. Describe the Characteristics of Vehicles, Road Users and the Components of Traffic Engineering. 2. Examine about origin and destination, parking, pedestrian studies, accident studies and about basic principles of traffic flow. 3. Describe the design of Traffic signals, Signal co-ordination and Computer applications in Signal design 4. Apply the Principles of Intersection Design, Grade Separation and interchanges. 5. Describe the Traffic Management system and the Intelligent Transportation System (ITS).					

UNIT-I	INTRODUCTION	9
Significance and scope, Characteristics of Vehicles and Road Users, Skid Resistance and Braking Efficiency (Problems), Components of Traffic Engineering- Road, Traffic and Land Use Characteristics		
UNIT-II	**TRAFFIC SURVEYS AND ANALYSIS**	**9**
Surveys and Analysis - Volume, Capacity, Speed and Delays, Origin and Destination, Parking, Pedestrian Studies, Accident Studies and Safety Level of Services- Basic principles of Traffic Flow.		
UNIT-III	**TRAFFIC CONTROL**	**9**
Traffic signs, Road markings, Design of Traffic signals and Signal co-ordination (Problems), Traffic control aids and Street furniture, Street Lighting, Computer applications in Signal design		
UNIT-IV	**GEOMETRIC DESIGN OF INTERSECTIONS**	**9**
Conflicts at Intersections, Classification of 'At Grade Intersections, - Channallised Intersections - Principles of Intersection Design, Elements of Intersection Design, Rotary design, Grade Separation and interchanges - Design principles.		
UNIT-V	**TRAFFIC MANAGEMENT**	**9**
Traffic Management- Transportation System Management (TSM) - Travel Demand Management (TDM), Traffic Forecasting techniques, Restrictions on turning movements, Oneway Streets, Traffic Segregation, Traffic Calming, Tidal flow operations, Exclusive Bus Lanes, Introduction to Intelligent Transportation System (ITS).		
		TOTAL: 45 PERIODS

TEXT BOOK(S)
1. Kadiyali L R, Traffic Engineering and Transport Planning, Khanna Technical Publications, Delhi, 2004. 1. 2. Khanna K and Justo C E G, Highway Engineering, Khanna Publishers, Roorkee, 2006.
REFERENCE(S)
1. Indian Roads Congress (IRC) specifications: Guidelines and special publications on Traffic Planning and Management 2. Guidelines of Ministry of Road Transport and Highways, Government of India. 3. Subhash C.Saxena, A Course in Traffic Planning and Design, Dhanpat Rai Publications, New Delhi, 1989. 4. Transportation Engineering – An Introduction, C.Jotin Khisty, B.Kent Lall, Prentice Hall of India Pvt Ltd, 2006.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	3		2	2		3						2	3		
CO2	3	3		3	2								2	3		
CO3	2	2	2		3								2	3		1
CO4	3	2	3		2	1	2						2	3		
CO5	2	2	1	2					2					3	3	

12CE7E	WATER RESOURCES ENGINEERING		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category:	Elective					
Prerequisites:	12CE51- Irrigation Engineering					
Aim:	The aim of this course is to make the students to have a knowledge about water resources and its management.					
Course Objectives:	• The student is exposed to the different phases in Water Resources viz planning, collection of relevant data on water resources and also on National Water Policy. • Reservoir planning, management and economic analysis aspects are covered in detail.					
Course Outcomes:	1. Explain the various process of hydrologic cycle. 2. Interpret rainfall data, assess and estimate the water losses. 3. Learn the use of unit hydrograph, generate the same from the flood hydrograph and apply it for analysis of runoff from the catchment. 4. Design alluvial and lined canals. 5. Describe the various types and modes of irrigation and water					

UNIT-I	**GENERAL**	**9 hrs**
Water resources survey – Water resources of India and Tamilnadu – Description of water resources planning – Economics of water resources planning, physical and socio economic data – National Water Policy – Collection of meteorological and hydrological data for water resources development.		
UNIT-II	**NETWORK DESIGN**	**9 hrs**
Hydrologic measurements – Analysis of hydrologic data – Hydrologic station network – Station network design – Statistical techniques in network design.		
UNIT-III	**WATER RESOURCE NEEDS**	**9 hrs**
Consumptive and non-consumptive water use - Estimation of water requirements for irrigation, for drinking and navigation - Water characteristics and quality – Scope and aims of master plan - Concept of basin as a unit for development - Water budget and development plan.		
UNIT-IV	**RESERVOIR PLANNING AND MANAGEMENT**	**9 hrs**
Reservoir - Single and multipurpose – Multi objective - Fixation of Storage capacity –Strategies for reservoir operation - Sedimentation of reservoirs - Design flood-levees and flood walls - Channel improvement.		
UNIT-V	**ECONOMIC ANALYSIS**	**9 hrs**
Estimation of cost and Evaluation of Benefits - Discount rate - Discounting factors – Discounting techniques – Computer Applications**.**		
		TOTAL: 45 PERIODS

TEXT BOOK(S)
1. Linsley R.K. and Franzini J.B, "Water Resources Engineering", McGraw-Hill Inc, 2007. 2.Chaturvedi M.C., "Water Resources Systems Planning and Management", Tata McGraw-Hill Inc., New Delhi, 2008.
REFERENCE(S)
1. Goodman Alvin S., "Principles of Water Resources Planning", Prentice-Hall, 1984. 2. Maass et al. Design of Water Resources Systems, Macmillan, 1968. 3. Douglas J.L. and Lee R.R., "Economics of Water Resources Planning", Tata McGraw- Hill Inc. 2000. 4. Duggal, K.N. and Soni, J.P., "Elements of Water Resources Engineering", New Age International Publishers

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	2	3	2		2						2	3		
CO2	3	3	3	3	2							2	1	3		
CO3		3	3	2			2							3		1
CO4		3	3	1	1		1							3	2	
CO5	2				3		3				3	1			3	1

12CE7F	GROUND IMPROVEMENT TECHNIQUES		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category:	Elective					
Prerequisites:	12CE34- Building Materials and Construction Techniques					
Aim:	The aim of this course is to make the students to have knowledge about techniques to improve the strength of the soil to the building.					
Course Objectives:	• After this course, the student is expected to identify basic deficiencies of various soil deposits and students are in a position to decide various ways and means of improving the soil and implementing techniques of improvement.					
Course Outcomes:	1. Locate criteria to determine the applicability of each ground improvement method for a specific project and soil condition under consideration 2. Explain the concept of using consolidation and vertical drains for soft soil improvement. 3. Analyze the densification consolidation of soils. 4. Examine the types of reinforcement materials and use of Geotextiles 5. Define the grouting techniques and stabilisation of expensive soil.					

UNIT-I	INTRODUCTION	9
Role of ground improvement in foundation engineering - methods of ground improvement – Geotechnical problems in alluvial, laterite and black cotton soils -Selection of suitable ground improvement techniques based on soil condition.		
UNIT-II	**DRAINAGE AND DEWATERING**	**9**
Drainage techniques - Well points - Vaccum and electroosmotic methods - Seepage analysis for two dimensional flow-fully and partially penetrating slots in homogenous deposits (Simple cases only).		
UNIT-III	**INSITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS**	**9**
Insitu densification of cohesionless and consolidation of cohesive soils -Dynamic compaction and consolidation - Vibrofloation - Sand pile compaction - Preloading with sand drains and fabric drains – Stone columns – Lime piles - Installation techniques only - relative merits of various methods and their limitations.		
UNIT-IV	**EARTH REINFORCEMENT**	**9**
Concept of reinforcement - Types of reinforcement material - Applications of reinforced earth – use of Geotextiles for filtration, drainage and separation in road and other works.		
UNIT-V	**GROUT TECHNIQUES**	**9**
Types of grouts - Grouting equipment and machinery - Injection methods - Grout monitoring – Stabilisation with cement, lime and chemicals - Stabilisation of expansive soils.		
		TOTAL: 45 PERIODS

TEXT BOOK(S)

1. Purushothama Raj, P. "Ground Improvement Techniques", Firewall Media, 2005
2. Moseley M.P., Ground Improvement Blockie Academic and Professional, Chapman and Hall, Glassgow, 2002.

REFERENCE(S)

1. Jones J.E.P., Earth Reinforcement and Soil Structure, Butterworths, 1995.
2. Koerner, R.M., "Design with Geosynthetics", (3rd Edition) Prentice Hall, New Jersey, 2002
3. Jewell, R.A., "Soil Reinforcement with Geotextiles", CIRIA special publication, London, 1996
4. Das, B.M., "Principles of Foundation Engineering", Thomson Books / Cole, 2003.
5. Koerner R.M., "Construction and Geotechnical Methods in Foundation Engineering", McGraw-Hill, 1994.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2		2		2		1					2	2	3		
CO2	3		2		2							3	2	3		
CO3	3	2		2								1	1	3		
CO4	3	2					2		1			2		3		
CO5	2	2		2	1							2		3		

12CE7G	CONTRACT LAWS AND REGULATIONS		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category:	**Elective**					
Prerequisites:	12MG52- Principles of Management					
Aim:	The aim of this course is to make the students to have knowledge about laws and regulations on contracts.					
Course Objectives:	• At the end of the programme the students are able to know about the legal implications of contracts and detailed regulations about the contracts.					
Course Outcomes:	1. Define the Indian contracts Act and types of contract. 2. Evaluate the tender for Technical, Contractual and commercial point of view. 3. Explain the arbitration and the legal requirements for planning. 4. Examine the use of urban and rural land, land revenue codes and tax laws. 5. Describe the various labour acts.					

UNIT-I	CONSTRUCTION CONTRACTS	9
Indian Contracts Act – Elements of Contracts – Types of Contracts – Features – Suitability – Design of Contract Documents – International Contract Document – Standard Contract Document – Law of Torts.		
UNIT-II	**TENDERS**	**9**
Prequalification – Bidding – Accepting – Evaluation of Tender from Technical, Contractual and Commercial Points of View – Contract Formation and Interpretation – Potential Contractual Problems – World Bank Procedures and Guidelines – Transparency in Tenders Act.		
UNIT-III	**ARBITRATION**	**9**
Comparison of Actions and Laws – Agreements – Subject Matter – Violations – Appointment of Arbitrators – Conditions of Arbitration – Powers and Duties of Arbitrator – Rules of Evidence – Enforcement of Award – Costs		
UNIT-IV	**LEGAL REQUIREMENTS**	**9**
Insurance and Bonding – Laws Governing Sale, Purchase and Use of Urban and Rural Land – Land Revenue Codes – Tax Laws – Income Tax, Sales Tax, Excise and Custom Duties and their Influence on Construction Costs – Legal Requirements for Planning – Property Law – Agency Law – Local Government Laws for Approval – Statutory Regulations		
UNIT-V	**LABOUR REGULATIONS**	**9**
Social Security – Welfare Legislation – Laws relating to Wages, Bonus and Industrial Disputes, Labour Administration– Insurance and Safety Regulations – Workmen's Compensation Act – Indian Factory Act – Tamil Nadu Factory Act – Child Labour Act - Other Labour Laws		
		TOTAL: 45 PERIODS

TEXT BOOK(S)

1. Jimmie Hinze, Construction Contracts, Second Edition, McGraw Hill, 2010
2. Gajaria G.T., Laws Relating to Building and Engineering Contracts in India, M.M.Tripathi Private Ltd., Bombay, 1982

REFERENCE(S)

1. Tamilnadu PWD Code, 1986
2. Joseph T. Bockrath, Contracts and the Legal Environment for Engineers and Architects, Sixth Edition, McGraw Hill, 2000.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2		3			2	2	3				1	1			3
CO2	3		2			3		3		1	2		1			3
CO3						3		2		1	1					2
CO4						3		2								2
CO5						3		2	1	1	2					3

12CE7H	INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS		L	T	P	C
			3	0	0	3
Programme:	B.E Civil Engineering	**Sem:**	VII			
Category:	Elective					
Prerequisites:	12CE55- Geotechnical Engineering –II(CR), 12CE41- Geotechnical Engineering - I					
Aim:	The aim of this course is to make the students to have knowledge about dynamic response of soil for machines.					
Course Objectives:	• At the end of this program the, student is expected to assess the dynamic properties of soil and various design parameters required for the design of machine foundation as well as design of foundation for various reciprocating machines.					
Course Outcomes:	1. Classify the elements vibration with and without damping on SDOF. 2. Analyze waves, wave propagation in an elastic homogeneous isotropic medium 3. Determine dynamic properties of soil considering elastic property. 4. Design foundations for reciprocating machines, impact loads - rotary type machines. 5. Explain vibration isolation technique, foundation isolation and isolation Testing.					

UNIT I	INTRODUCTION	9
Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping		
UNIT II	**WAVES AND WAVE PROPAGATION**	**9**
Wave propagation in an elastic homogeneous isotropic medium- Raleigh, shear and compression waves-waves in elastic half space		
UNIT III	**DYNAMIC PROPERTIES OF SOILS**	**9**
Elastic properties of soils-coefficient of elastic, uniform and non-uniform compression – shear effect of vibration dissipative properties of soils-determination of dynamic properties of soil codal provisions		
UNIT IV	**DESIGN PROCEDURES**	**9**
Design criteria -dynamic loads - simple design procedures for foundations under reciprocating machines - machines producing impact loads - rotary type machines		
UNIT V	**VIBRATION ISOLATION**	**9**
Vibration isolation technique-mechanical isolation-foundation isolation-isolation by location isolation by barriers- active passive isolation tests.		
		TOTAL: 45 PERIODS

TEXT BOOKS

1. S.Prakesh & V.K Puri, Foundation for machines, McGraw-Hill 2004
2. Swamisaran, “Soil Dynamics and Machine Foundations”, Galgotia Publications Pvt. Ltd., 2002

REFERENCE(S)

1. Kramar S.L, “Geotechnical Earthquake Engineering”, Prentice Hall International series, Pearson Education (Singapore) Pvt. Ltd.
2. Kameswara Rao, “Dynamics Soil Tests and Applications”, Wheeler Publishing, New Delhi, 2003
3. Kameswara Rao, “Vibration Analysis and Foundation Dynamics”, Wheeler Publishing, New Delhi, 1998
4. IS code of Practice for Design and Construction of Machine Foundations, McGraw-Hill, 1996.
5. Moore P.J., “Analysis and Design of Foundation for Vibration”, Oxford and IBH, 1995.
6. Srinivasulu, P & Vaidyanathan, Hand book of Machine Foundations, McGraw-Hill, 1996

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	2										3			
CO2	2	3	1										2	1		
CO3	2			3	2								2	3		
CO4	3	2	3										3	1		
CO5	2	1		2	3								2		3	

12CE7I	ROCK ENGINEERING		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category :	Eletive					
Prerequisites:	12CE31- Applied Geology					
Aim:	The aim of this course is to make the students to have knowledge about mechanics of rocks.					
Course Objectives:	• Student gains the knowledge on the mechanics of rock and its applications in underground structures and rock slope stability analysis.					
Course Outcomes:	1. Classify the Geological and Index properties of rock system. 2. Discriminate basic elements in rock structure and behaviour under stress and strain. 3. Estimate stresses in rocks, influence of joints and their orientation in distribution of stresses. 4. Identify Simple engineering application, Underground openings, rock slopes, Foundations and mining subsidence. 5. Examine Rock bolt systems, rock bolt installation techniques and Testing..					

UNIT I	CLASSIFICATION AND INDEX PROPERTIES OF ROCKS	9
Geological classification – Index properties of rock systems – Classification of rock masses for engineering purpose.		
UNIT II	**ROCK STRENGTH AND FAILURE CRITERIA**	**9**
Modes of rock failure – Strength of rock – Laboratory and field measurement of shear, tensile and compressive strength – Stress strain behaviour in compression – Mohr-coulomb failure criteria and empirical criteria for failure – Deformability of rock.		
UNIT III	**INITIAL STRESSES AND THEIR MEASUREMENTS**	**9**
Estimation of initial stresses in rocks – influence of joints and their orientation in distribution of stresses – technique for measurements of insitu stresses.		
UNIT IV	**APPLICATION OF ROCK MECHANICS IN ENGINEERING**	**9**
Simple engineering application – Underground openings – Rock slopes – Foundations and mining subsidence.		
UNIT V	**ROCK BOLTING**	**9**
Introduction – Rock bolt systems – rock bolt installation techniques – Testing of rock bolts – Choice of rock bolt based on rock mass condition.		
		TOTAL: 45 PERIODS

TEXT BOOKS

1. Goodman P.E., “Introduction to Rock Mechanics”, John Wiley and Sons, 2006.
2. Brow E.T., “Rock Characterisation Testing and Monitoring”, Pergaman Press, 2000.

REFERENCES

1. Arogyaswamy R.N.P., “Geotechnical Application in Civil Engineering”, Oxford and IBH, 1991.
2. Hock E. and Bray J., “Rock Slope Engineering, Institute of Mining and Metallurgy”, 1991.
3. Stillborg B., “Professional User Handbook for rock Bolting”, Tran Tech Publications, 1996.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	2		1									2			
CO2	3			2	2								3			
CO3	2	3			2								3			
CO4	2	1	3										3			
CO5	2			2	3								3		1	

12CE7J	ENVIRONMENTAL IMPACT ASSESSMENT OF CIVIL ENGINEERING PROJECTS		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category:	Elective					
Prerequisites:	12CE64- Environmental Engineering-II, 12CE54- Environmental Engineering –I					
Aim:	The aim of this course is to make the students aware environmental effect of construction practice and its assessment.					
Course Objectives:	• This subject deals with the various impacts of infrastructure projects on the components of environment and method of assessing the impact and mitigating the same. The student is expected to know about the various impacts of development projects on environment and the mitigating measures.					
Course Outcomes:	1. Define the basics and importance of Environmental Impact Assessment. 2. Explain the Environmental Impact Statement and methods of EIA. 3. Examine the methodologies in EIA and Prediction Methods. 4. Explain the Environmental Management Plan. 5. Have broad education necessary to understand the impact of engineering solutions in global, economic, environmental and social context.					

UNIT I	**INTRODUCTION**	**9**
Impact of development projects under Civil Engineering on environment - Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) – EIA capability and limitations – Legal provisions on EIA		
UNIT II	**METHODOLOGIES**	**9**
Methods of EIA –Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives		
UNIT III	**PREDICTION AND ASSESSMENT**	**9**
Assessment of Impact on land, water and air, noise, social, cultural flora and fauna; Mathematical models; public participation – Rapid EIA		
UNIT IV	**ENVIRONMENTAL MANAGEMENT PLAN**	**9**
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		
UNIT V	**CASE STUDIES**	**9**
EIA for infrastructure projects – Bridges – Stadium – Highways – Dams – Multi-storey Buildings – Water Supply and Drainage Projects		
		TOTAL: 45 PERIODS

TEXT BOOKS

1. Canter, R.L., “Environmental Impact Assessment”, McGraw-Hill Inc., New Delhi, 2005.
2. John G. Rau and David C Hooten (Ed)., “Environmental Impact Analysis Handbook”, McGraw-Hill Book Company, 2000.

REFERENCES

1. “Environmental Assessment Source book”, Vol. I, II & III. The World Bank, Washington, D.C., 1991.
2. Judith Petts, “Handbook of Environmental Impact Assessment Vol. I & II”, Blackwell Science, 1999.
3. Shukla, S.K. and Srivastava, P.R., “Concepts in Environmental Impact Analysis”, Common Wealth Publishers, New Delhi, 1992.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1					3	3					2				3
CO2		3	2				3					2				3
CO3						3	2	1				2			1	3
CO4		2			2		3					2	1	1		3
CO5		2	2				3					1	1			3

12CE7K	INDUSTRIAL WASTE MANAGEMENT		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category	Elective					
Prerequisites:	12CE64- Environmental Engineering-II, 12CE54- Environmental Engineering –I					
Aim:	The aim of this course is to make the students aware of industrial waste and its proper disposal.					
Course Objectives:	• This subject deals with the pollution from major industries and methods of controlling the same. The student is expected to know about the polluting potential of major industries in the country and the methods of controlling the same.					
Course Outcomes:	1. Differentiate types of industries and industrial pollution. 2. Identify Waste management approach. 3. Construct waste treatment flow sheets for selected industries. 4. Compare Equalisation and Neutralisation. 5. Construct secure landfills.					

UNIT I	INTRODUCTION	9
Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes		
UNIT II	**CLEANER PRODUCTION**	**9**
Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications.		
UNIT III	**POLLUTION FROM MAJOR INDUSTRIES**	**9**
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		
UNIT IV	**TREATMENT TECHNOLOGIES**	**9**
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		
UNIT V	**HAZARDOUS WASTE MANAGEMENT**	**9**
Hazardous wastes - Physico chemical treatment – solidification – incineration – Secure land fills		
		TOTAL: 45 PERIODS

TEXT BOOKS	
1. W .W. Eckenfelder Jr., “Industrial Water Pollution Control”, McGraw-Hill Book Company, New Delhi, 2006. 2. T.T.Shen, “Industrial Pollution Prevention”, Springer, 2005.	
REFERENCES	
1. R.L.Stephenson and J.B.Blackburn, Jr., “Industrial Wastewater Systems Hand book”, Lewis Publisher, New Yark, 1998 2. H.M.Freeman, “Industrial Pollution Prevention Hand Book”, McGraw-Hill Inc., New Delhi, 1995. 3. Bishop, P.L., “Pollution Prevention: Fundamental & Practice”, McGraw-Hill, 2000. 4. M.N.Rao & A.K.Dutta, “Wastewater Treatment”, Oxford - IBH Publication, 1995.	

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1		2		1		2	3						1			3
CO2		2		2		1	3						1			3
CO3		2	3		2	2	3						2			3
CO4		2			3		2							1	1	3
CO5		1			2	2	3								1	3

12CE7L	AIR POLLUTION MANAGEMENT		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category:	Elective					
Prerequisites:	12GE31-Environmental Science and Engineering					
Aim:	The aim of this course is to make the students aware of air pollution and its management.					
Course Objectives:	• This subject covers the sources, characteristics and effects of air and noise pollution and the methods of controlling the same. The student is expected to know about source inventory and control mechanism.					
Course Outcomes:	1. Classify the sources of air pollutants and methods of controlling. 2. Identify the sources of sampling and techniques. 3. Illustrate the dispersion of pollutants and plume rise. 4. Compute the gaseous pollutant control by adsorption, absorption, condensation and combustion. 5. Define the environmental impact assessment and air quality and sources and control method of noise pollution.					

UNIT I	SOURCES AND EFFECTS OF AIR POLLUTANTS	9
Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.		
UNIT II	**DISPERSION OF POLLUTANTS**	**9**
Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate – Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications.		
UNIT III	**AIR POLLUTION CONTROL**	**9**
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.		
UNIT IV	**AIR QUALITY MANAGEMENT**	**9**
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		
UNIT V	**NOISE POLLUTION**	**9**
Sources of noise pollution – Effects – Assessment - Standards – Control methods – Prevention		
		TOTAL: 45 PERIODS

TEXT BOOKS

1. Rao M.N., and Rao H. V. N., Air Pollution Control, Tata-McGraw-Hill, New Delhi, 2005.
2. W.L.Heumann, Industrial Air Pollution Control Systems, McGraw-Hill, New Yark, 2003.

REFERENCES

1. Mahajan S.P., Pollution Control in Process Industries, Tata McGraw-Hill Publishing Company, New Delhi, 1991.
2. Peavy S.W., Rowe D.R. and Tchobanoglous G. Environmental Engineering, McGraw Hill, New Delhi, 1985.
3. Garg, S.K., "Environmental Engineering Vol. II", Khanna Publishers, New Delhi

4. Mahajan, S.P., "Pollution Control in Process Industries", Tata McGraw-Hill, New Delhi, 1991.
5. Anjaneyulu, D., "Air Pollution and Control Technologies", Allied Publishers, Mumbai, 2002.
6. Rao, C.S. Environmental Pollution Control Engineering, Wiley Eastern Ltd., New Delhi, 1996.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2				2	3									3
CO2	2	2			1	1	3					1				3
CO3	2		2			3	2		1				1			3
CO4	1					2	2		1						1	3
CO5	1					3	2		1							3

12CE7M	MUNICIPAL SOLID WASTE MANAGEMENT		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category	Elective					
Prerequisites:	12CE64- Environmental Engineering-II, 12CE54- Environmental Engineering –I					
Aim:	The aim of this course is to make the students to understand the method of managing the solid waste.					
Course Objectives:	• This subject covers the various sources and characterization of municipal solid wastes and the on-site/off-site processing of the same and the disposal methods. • The student is expected to know about the various effects and disposal options for the municipal solid waste.					
Course Outcomes:	1. Describe about the part of broader urbanization problems. 2. Identify operational guidelines for the efficient municipal solid waste management system 3. Explain the types of solid waste and its characteristics. 4. Summarize about the principle of solid waste management. 5. Analyse the public health and economic aspects of onsite storage and develop solutions for options under Indian conditions for collection and processing of wastes					

UNIT I	SOURCES AND TYPES OF MUNICIPAL SOLID WASTES	9
Sources and types of solid wastes - Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization; Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects; Public awareness; Role of NGOs; Legislation.		
UNIT II	**ON-SITE STORAGE & PROCESSING**	**9**
On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options.		
UNIT III	**COLLECTION AND TRANSFER**	**9**
Methods of Collection – types of vehicles – Manpower requirement – collection routes; transfer stations – selection of location, operation & maintenance; options under Indian conditions.		
UNIT IV	**OFF-SITE PROCESSING**	**9**
Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis - options under Indian conditions.		
UNIT V	**DISPOSAL**	**9**
Dumping of solid waste; sanitary landfills – site selection, design and operation of sanitary landfills – Leachate collection & treatment		
		TOTAL: 45 PERIODS

TEXT BOOKS
1. George Tchobanoglous et.al., “Integrated Solid Waste Management”, McGraw-Hill Publishers, 2004.
2. B.Bilitewski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, “Waste Management”, Springer, 2001.
REFERENCES
1. Manual on Municipal Solid Waste Management, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2000

2. R.E.Landreth and P.A.Rebers, "Municipal Solid Wastes – problems and Solutions", Lewis Publishers, 1997.
3. Bhide A.D. and Sundaresan, B.B., "Solid Waste Management in Developing Countries", INSDOC, 1993.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1						3	2									3
CO2			2			2	3			1			2			3
CO3						2	3			1						3
CO4						2	3			1						3
CO5			2		1	3	2						2			3

12CE7N	ECOLOGICAL ENGINEERING		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VII			
Category:	Elective					
Prerequisites:	12GE31-Environmental Science and Engineering					
Aim:	The aim of this course is to make the students aware of about various effects of industrialization on environment.					
Course Objectives:	• This subject deals with the scope and applications of ecological principles for wastewater treatment and reuse. • The student is expected to be aware of the various effects of industrialization on ecology and ecological based waste purification methods.					
Course Outcomes:	1. Differentiate Scope and applications of Ecological Engineering. 2. Describe Energy flow and nutrient cycling. 3. Construct Root Zone Treatment for wastewater. 4. Compare Ecological effects of exploration and production. 5. Construct integrated ecological engineering systems.					

UNIT I	**PRINCIPLES AND CONCEPTS**	**9**
Scope and applications of Ecological Engineering – Development and evolution of ecosystems – principles and concepts pertaining to species, populations and community		
UNIT II	**ECOSYSTEM FUNCTIONS**	**10 hrs**
Energy flow and nutrient cycling – Food chain and food webs – biological magnification, diversity and stability, immature and mature systems. Primary productivity – Biochemical cycling of nitrogen, phosphorous, sulphur and carbon dioxide; Habitat ecology - Terrestrial, fresh water, estuarine and marine habitats.		
UNIT III	**ECOLOGICAL ENGINEERING METHODS**	**9**
Bio monitoring and its role in evaluation of aquatic ecosystem; Rehabilitation of ecosystems through ecological principles – step cropping, bio-wind screens, Wetlands, ponds, Root Zone Treatment for wastewater, Reuse of treated wastewater through ecological systems.		
UNIT IV	**ECOLOGICAL EFFECTS OF INDUSTRIALISATION**	**9**
Ecological effects of exploration, production, extraction, processing, manufacture & transport.		
UNIT V	**CASE STUDIES**	**8 hrs**
Case studies of integrated ecological engineering systems		
		TOTAL: 45 PERIODS

TEXT BOOKS

1. Odum, E.P., "Fundamental of Ecology", W.B.Sauders, 2000.
2. Mitch, J.W. and Jorgensen, S.E., Ecological Engineering – An Introduction to Ecotechnology, John Wiley and Sons, 2002.

REFERENCES

1. Colinvaux, P., Ecology, John Wiley and Sons, 1996.
2. Etnier, C & Guterstam, B., "Ecological Engineering for Wastewater Treatment", 2nd Edition, Lewis Publications, London, 1996.
3. Kormondy, E.J., "Concepts of Ecology", Prentice Hall, New Delhi, 1996

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1						3	2			1						3
CO2						3	3									3
CO3						3	2			2						3
CO4				1		3	3									3
CO5						3	2									3

12CE8A	BRIDGE STRUCTURES		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VIII			
Category	Elective					
Prerequisites:	12CE56-Design of RC Elements					
AIM:	The aim of this course is to make the students to design the various types of bridges.					
Course Objectives:	• At the end of this course the student shall be able to choose appropriate bridge structure and design it for given site conditions.					
Course Outcomes:	1. Examine the highway bridges for IRC loading, cross girders and main girders. 2. Explain about Design of part type truss girder highway bridges 3. Describe the Design of solid slab bridges for IRC loading and tee beam bridges. 4. Apply the Design of balanced cantilever bridges and deck slab - Main girder 5. Explain the Design of prestressed concrete bridges and check for stresses at various sections.					

UNIT I	INTRODUCTION	9
Design of through type steel highway bridges for IRC loading - Design of stringers, cross girders and main girders - Design of deck type steel highway bridges for IRC loading - Design of main girders		
UNIT II	**STEEL BRIDGES**	**9**
Design of pratt type truss girder highway bridges - Design of top chord, bottom chord, web members - Effect of repeated loading - Design of plate girder railway bridges for railway loading - Wind effects - Design of web and flange plates - Vertical and horizontal stiffeners.		
UNIT III	**REINFORCED CONCRETE SLAB BRIDGES**	**9**
Design of solid slab bridges for IRC loading - Design of kerb - Design of tee beam bridges - Design of panel and cantilever for IRC loading		
UNIT IV	**REINFORCED CONCRETE GIRDER BRIDGES**	**9**
Design of tee beam - Courbon's theory - Pigeaud's curves - Design of balanced cantilever bridges - Deck slab - Main girder - Design of cantilever - Design of articulation.		
UNIT V	**PRESTRESSED CONCRETE BRIDGES**	**9**
Design of prestressed concrete bridges - Preliminary dimensions - Flexural and torsional parameters - Courbon's theory - Distribution coefficient by exact analysis - Design of girder section - Maximum and minimum prestressing forces - Eccentricity - Live load and dead load shear forces - cable zone in girder –Check for stresses at various sections - Check for diagonal tension - Diaphragms - End block - Short term and long term deflections.		
		TOTAL: 45 PERIODS

TEXT BOOKS

1. Johnson Victor D., “Essentials of Bridge Engineering”, Oxford and IBH Publishing Co., New Delhi, 2002.
2. Phatak D.R., “Bridge Engineering”, Satya Prakashan, New Delhi, 2000.

REFERENCES

1. Ponnuswamy S., “Bridge Engineering”, Tata McGraw-Hill, New Delhi, 1996.
2. Rajagopalan, N.Bridge Superstructure, Alpha Science International, 2006

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproject (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 86-90% - 8, 81-85% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(80-89), B(70-79), C(60-69), D(55-59), E(50-54), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	3	1	-	-	-	1	-	-	-	2	2	-	2	-
CO2	3	2	3	1	-	-	-	1	-	-	-	2	2	-	2	-
CO3	3	2	3	1	-	-	-	1	-	-	-	2	2	-	2	-
CO4	3	2	3	1	-	-	-	1	-	-	-	2	2	-	2	-
CO5	3	2	3	1	-	-	-	1	-	-	-	2	2	-	2	-

12CE8B	STORAGE STRUCTURES		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VIII			
Category:	Elective					
Prerequisites:	12CE62-Design of Steel Structures					
Aim:	The aim of this course is to make the students aware about the design of storage structures.					
Course Objectives:	• The main objective of this course is to impart the principles involved in designing structures which have to store different types of materials. • The student at the end of the course shall be able to design concrete and steel material retaining structures.					
Course Outcomes:	1. Differentiate longitudinal and transverse beams. 2. Identify Hoop tension and calculating shear forces and moments. 3. Construct square bunker and cylindrical silo. 4. Compare Top and bottom edge beams. 5. Construct of pre-stressed concrete circular water tanks.					

UNIT I	**STEEL WATER TANKS**	**12**
Design of rectangular riveted steel water tank – Tee covers – Plates – Stays –Longitudinal and transverse beams – Design of staging – Base plates – Foundation and anchor bolts – Design of pressed steel water tank – Design of stays – Joints – Design of hemispherical bottom water tank – side plates – Bottom plates – joints – Ring girder – Design of staging and foundation.		
UNIT II	**CONCRETE WATER TANKS**	**12**
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 underground tanks – Design of base slab and side wall – Check for uplift.		
UNIT III	**STEEL BUNKERS AND SILOS**	**7 hrs**
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.		
UNIT IV	**CONCRETE BUNKERS AND SILOS**	**7 hrs**
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		
UNIT V	**PRESTRESSED CONCRETE WATER TANKS**	**7 hrs**
Principles of circular prestressing – Design of prestressed concrete circular water tanks		
		TOTAL: 45 PERIODS

TEXT BOOKS
1. Krishna Raju N., Advanced Reinforced Concrete Design, CBS Publishers and Distributors, New Delhi, 1998.
REFERENCES
1. Rajagopalan K., Storage Structures, Tata McGraw-Hill, New Delhi, 1998.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	3	2	-	-	1	1	-	-	-	3	3	1	2	-
CO2	3	2	3	2	-	-	1	1	-	-	-	3	3	1	2	-
CO3	3	2	3	2	-	-	1	1	-	-	-	3	3	1	2	-
CO4	3	2	3	2	-	-	1	1	-	-	-	3	3	1	2	-
CO5	3	2	3	2	-	-	1	1	-	-	-	3	3	1	2	-

12CE8C	DESIGN OF PLATE AND SHELL STRUCTURES		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VIII			
Category:	Elective					
Prerequisites:	12CE71-Design of Reinforced Concrete & Brick Masonry Structures					
Aim:	The aim of this course is to make the students to analyze and design the plate and shell structures.					
Course Objectives:	• At the end of this course the student shall understand the rudimentary principles involved in the analysis and design of plates and shells.					
Course Outcomes:	1. Apply the structural mechanics approximations of membrane, plates and shells 2. Examine the equilibrium theories for analysis of plates and shell structures in Civil Engineering applications 3. Perform critical Analysis and Design of Typical Shell Structures 4. Define the various methods for analyzing grids for roofs and bridges. 5. Determine the static, dynamic and non-linear motion of membrane, plate and shell structures.					

UNIT I	THIN PLATES WITH SMALL DEFLECTION	9
Laterally loaded thin plates – governing differential equations – Simply supported and fixed boundary conditions		
UNIT II	**RECTANGULAR PLATES**	**9**
Simply supported rectangular plates – Navier's solution and Levy's method.		
UNIT III	**THIN SHELLS**	**9**
Classification of shells-structural actions – membrane theory		
UNIT IV	**ANALYSIS OF SHELLS**	**9**
Analysis of spherical dome – cylindrical shells – folded plates		
UNIT V	**DESIGN OF SHELLS**	**9**
Design of spherical dome – cylindrical shells – folded plates		
		TOTAL: 45 PERIODS

TEXT BOOKS

1. Bairagi N K, A text book of Plate Analysis, Khanna Publishers, New Delhi, 2005.
2. G.S. Ramaswamy, Design and Construction of Shell Structures, CBS Plublishers, New Delhi, 2001

REFERENCES

1. Szilard R, Theory and analysis of plates, Prentice Hall Inc, 1995
2. Chatterjee B. K., Theory and Design of Concrete Shells, Oxford & IBH, New Delhi, 1998
3. Billington D. P., Thin Shell Concrete Structures, McGraw-Hill, 1995.
4. S. Timoshenko & S. Woinowsky – Krieger, "Theory of Plates and Shells", McGraw Hill Book Company

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	3	1	1	-	1	1	-	-	-	1	3	-	1	1
CO2	3	2	3	1	1	-	1	1	-	-	-	1	3	-	1	1
CO3	3	2	3	1	1	-	1	1	-	-	-	1	3	-	1	1
CO4	3	3	3	1	1	-	1	1	-	-	-	1	3	-	1	1
CO5	3	2	3	1	1	-	1	1	-	-	-	1	3	-	1	1

12CE8D	TALL BUILDINGS		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VIII			
Category:	Elective					
Prerequisites:	12CE34- Building Materials and Construction Techniques					
Aim:	The aim of this course is to make the students to have knowledge about the design of tall buildings.					
Course Objectives:	• At the end of this course the student should have understood the problems associated with large heights of structures with respect to loads (wind and earthquake and deflections of the structure). • He should know the rudimentary principles of designing tall buildings as per the existing course.					
Course Outcomes:	1. Describe the development of high rise building structures. 2. Apply the behaviour of shear walls under lateral loading. 3. Explain the design of flat slab building structures and tubular system. 4. Examine the approximate design of Rigid Frame buildings. 5. Describe the deep beam systems and high rise suspension system of building structures.					

UNIT I	INTRODUCTION	9 hrs
The Tall Building in the Urban Context - The Tall Building and its Support Structure - Development of High Rise Building Structures - General Planning Considerations. Dead Loads - Live Loads-Construction Loads -Snow, Rain, and Ice Loads - Wind Loads-Seismic Loading – Water and Earth Pressure Loads - Loads - Loads Due to Restrained Volume Changes of Material - Impact and Dynamic Loads - Blast Loads -Combination of Loads.		
UNIT II	**THE VERTICAL STRUCTURE PLANE**	**9 hrs**
Dispersion of Vertical Forces- Dispersion of Lateral Forces - Optimum Ground Level Space - Shear Wall Arrangement - Behavior of Shear Walls under Lateral Loading. The Floor Structure or Horizontal Building Plane Floor Framing Systems-Horizontal Bracing- Composite Floor Systems The High - Rise Building as related to assemblage Kits Skeleton Frame Systems - Load Bearing Wall Panel Systems - Panel – Frame Systems - Multistory Box Systems.		
UNIT III	**COMMON HIGH-RISE BUILDING STRUCTURES AND THEIR BEHAVIOUR UNDER LOAD**	**9 hrs**
The Bearing Wall Structure- The Shear Core Structure - Rigid Frame Systems- The Wall - Beam Structure: Interspatial and Staggered Truss Systems - Frame - Shear Wall Building Systems - Flat Slab Building Structures - Shear Truss - Frame Interaction System with Rigid - Belt Trusses - Tubular Systems-Composite Buildings - Comparison of High - Rise Structural Systems Other Design Approaches Controlling Building Drift Efficient Building Forms – The Counteracting Force or Dynamic Response.		
UNIT IV	**APPROXIMATE STRUCTURAL ANALYSIS AND DESIGN OF BUILDINGS**	**9 hrs**
Approximate Analysis of Bearing Wall Buildings The Cross Wall Structure - The Long Wall MStructure The Rigid Frame Structure Approximate Analysis for Vertical Loading – Approximate Analysis for Lateral Loading - Approximate Design of Rigid Frame Buildings-Lateral Deformation of Rigid Frame Buildings The Rigid Frame - Shear Wall Structure - The Vierendeel Structure - The Hollow Tube Structure.		
UNIT V	**OTHER HIGH-RISE BUILDING STRUCTURE**	**9 hrs**
Deep - Beam Systems -High-Rise Suspension Systems - Pneumatic High -Rise Buildings - Space Frame Applied to High - Rise Buildings - Capsule Architecture.		
		TOTAL: 45 PERIODS

TEXT BOOKS
1. Bryan Stafford Smith and Alex Coull, " Tall Building Structures ", Analysis and Design, John Wiley and Sons, Inc., 2001.
2. Coull, A. and Smith, Stafford, B. " Tall Buildings ", Pergamon Press, London, 2007.

REFERENCES
1. LinT.Y. and Burry D.Stotes, " Structural Concepts and Systems for Architects and Engineers ", John Wiley, 1994.
2. Lynn S.Beedle, Advances in Tall Buildings, CBS Publishers and Distributors, Delhi, 1996.
4. Taranath.B.S., Structural Analysis and Design of Tall Buildings, Mc Graw Hill,1998.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	3	2	3	1	1	-	-	1	-	-	-	1	3	-	1	-
CO2	3	2	3	1	1	-	-	1	-	-	-	1	3	-	1	-
CO3	3	2	3	1	1	-	-	1	-	-	-	1	3	-	1	-
CO4	3	3	3	1	1	-	-	1	-	-	-	1	3	-	1	-
CO5	3	2	3	1	1	-	-	1	-	-	-	1	3	-	1	-

12CE8E	PREFABRICATED STRUCTURES		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VIII			
Category:	Elective					
Prerequisites:	12CE74-Prestressed Concrete Structure					
Aim:	The aim of this course is to make the students aware about the prefabricated building techniques.					
Course Objectives:	• At the end of this course the student shall be able to appreciate modular construction, industrialised construction and shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods using these elements.					
Course Outcomes:	1. Explain the prefabricated elements and the technologies used in fabrication and erection. 2. Identify the production technologies used to making prefabricated structures. 3. Design floors, stairs, roofs, walls and industrial buildings, 4. Examine the expansion & contraction joints in structural connection 5. Design the loads for considering abnormal effects such as earthquakes, cyclones, etc.					

UNIT I	INTRODUCTION	9
Need for prefabrication – Principles – Materials – Modular coordination – Standarization – Systems – Production – Transportation – Erection.		
UNIT II	**PREFABRICATED COMPONENTS**	**9**
Behavior of structural components – Large panel constructions – Construction of roof and floor slabs – Wall panels – Columns – Shear walls		
UNIT III	**DESIGN PRINCIPLES**	**9**
Disuniting of structures- Design of cross section based on efficiency of material used – Problems in design because of joint flexibility – Allowance for joint deformation.		
UNIT IV	**JOINT IN STRUCTURAL MEMBERS**	**9**
Joints for different structural connections – Dimensions and detailing – Design of expansion joints		
UNIT V	**DESIGN FOR ABNORMAL LOADS**	**9**
Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones, etc., - Importance of avoidance of progressive collapse.		
		TOTAL: 45 PERIODS

TEXT BOOKS

1. Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for construction and manufacturing, Academic Press Inc., 1994
2. Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH, 1971.

REFERENCES

1. Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 1978.
2. CBRI, Building materials and components, India, 1990

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

1	**Program Outcom2es (POs)**												**1**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	2	1	1	2	1	-	-	1	-	-	2	2	2	-	2	1
CO2	3	2	3	2	1	-	-	1	-	-	1	2	2	-	2	1
CO3	3	2	3	2	1	-	-	1	-	-	-	2	2	-	2	1
CO4	3	2	3	2	1	-	-	1	-	-	-	2	2	-	2	1
CO5	3	2	3	2	1	-	-	1	-	-	-	2	2	-	2	1

12CE8F	WIND ENGINEERING		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VIII			
Category:	Elective					
Prerequisites:						
Aim:	The aim of this course is to make the students to have knowledge about the design of building considering the effect of dynamic loads of wind.					
Course Objectives:	• At the end of this course the student should be able to appreciate the forces generated on structures due to normal wind as well as gusts. • He should also be able to analyze the dynamic effects created by these wind forces.					
Course Outcomes:	1. Determine the wind speed using the wind data collected. 2. Apply the concept of effects of wind on structures. 3. Determine the effects of wind on typical structures 4. Design the forces on multistorey buildings, towers and roof trusses. 5. Apply the concepts of wind tunnels on different model.					

UNIT I	INTRODUCTION	9
Terminology – Wind Data – Gust factor and its determination - Wind speed variation with height N– Shape factor – Aspect ratio – Drag and lift.		
UNIT II	**EFFECT OF WIND ON STRUCTURES**	**9**
Static effect – Dynamic effect – Interference effects (concept only) – Rigid structure – Aeroelastic structure (concept only).		
UNIT III	**EFFECT ON TYPICAL STRUCTURES**	**9**
Tail buildings – Low rise buildings – Roof and cladding – Chimneys, towers and bridges.		
UNIT IV	**APPLICATION TO DESIGN**	**9**
Design forces on multistorey building, towers and roof trusses.		
UNIT V	**INTRODUCTION TO WIND TUNNEL**	**9**
Types of models (Principles only) – Basic considerations – Examples of tests and their use.		
		TOTAL: 45 PERIODS

TEXT BOOKS

1. Peter Sachs, “Wind Forces in Engineering, Pergamon Press, New York, 2002.
2. Devenport A.G., “Wind Loads on Structures”, Division of Building Research, Ottowa, 2000.

REFERENCES

1. Wind Force on Structures – Course Notes, Building Technology Centre, Anna University, 1995.
2. Lawson T.V., Wind Effects on Buildings, Vols. I and II, Applied Science and Publishers, London, 1993.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSOs)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	-	-	2	-	-	-	1	-	-	1	1	-	-	1	-
CO2	1	1	-	1	-	-	-	1	-	-	-	1	1	-	1	-
CO3	3	2	1	1	-	-	-	1	-	-	-	1	1	-	1	-
CO4	3	3	3	1	-	-	-	1	-	-	-	1	2	-	1	-
CO5	1	2	1	1	1	-	-	1	-	-	-	1	1	-	1	-

12CE8G	COMPUTER AIDED DESIGN OF STRUCTURE		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VIII			
Category:	Elective					
Prerequisites:	12F1Z5- Computing Fundamentals and C Programming					
Aim:	The aim of this course is to make the students aware of software application in civil engineering.					
Course Objectives:	• The main objective of this programme is to train the student in the use of computers and creating a computer code as well as using commercially available software for the design of Civil Engineering structures.					
Course Outcomes:	1. Identify the hardware and software requirement for computer aided design of drawings. 2. Apply the concepts to develop codes for RCC structures. 3. Analyze and design R.C beam, column through computer programme 4. Apply the concepts to develop optimization programme 5. Apply the concepts of CPM, PERT and artificial intelligence.					

UNIT I	INTRODUCTION	9
Fundamentals of CAD - Hardware and software requirements -Design process – Applications and benefits.		
UNIT II	**COMPUTER GRAPHICS**	**9**
Graphic primitives - Transformations -Wire frame modeling and solid modeling –Graphic standards – Drafting packages		
UNIT III	**STRUCTURAL ANALYSIS**	**9**
Fundamentals of finite element analysis - Principles of structural analysis -Analysis packages and applications.		
UNIT IV	**DESIGN AND OPTIMISATION**	**9**
Principles of design of steel and RC Structures -Applications to simple design problems – Optimisation techniques - Algorithms - Linear Programming – Simplex method		
UNIT V	**EXPERT SYSTEMS**	**9**
Introduction to artificial intelligence - Knowledge based expert systems -Rules and decision tables – Inference mechanisms - Simple applications.		
		TOTAL: 45 PERIODS

TEXT BOOKS

1. Krishnamoorthy C.S.Rajeev S., “Computer Aided Design”, Narosa Publishing House, New Delhi, 2003
2. Harrison H.B., “Structural Analysis and Design”, Part I and II Pergamon Press, Oxford, 2000.

REFERENCES

1. Rao S.S., “Optimisation Theory and Applications”, Wiley Eastern Limited, New Delhi, 1977.
2. Richard Forsyth (Ed), “Expert System Principles and Case Studies”, Chapman and Hall, London, 1989.
3. Groover M.P. and Zimmers E.W. Jr., “CAD/CAM, Computer Aided Design and Manufacturing”, Prentice Hall of India Ltd, New Delhi, 1993.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSO)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1		3	2	3	2		1			2		1	2		3	2
CO2		3	2	3	2		1			1			1		2	3
CO3	1	3	2	3	3		1					1	1		2	2
CO4	1	3	2	3	3		1			2		1	1		3	2
CO5		3	2	3	3		1				2		2		1	2

12CE8H	INDUSTRIAL STRUCTURES		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VIII			
Category:	Elective					
Prerequisites:	12CE62-Design of Steel Structures					
Aim:	The aim of this course is to make the students to have a adequate knowledge about the industrial structures and its components.					
Course Objectives:	• This course deals with some of the special aspects with respect to Civil Engineering structures in industries. • At the end of this course the student shall be able to design some of the structures.					
Course Outcomes:	1. Describe the planning and functional requirements of Industrial structures 2. Learn about the design concepts and constructional aspects of Industrial structures 3. Analyse and evaluate the importance of various construction materials for Industrial constructions 4. Design portal frames, tower cranes and bracing system in Industrial buildings. 5. Analyse and design structural elements used in pre-cast construction including fabrication, erection and installation					

UNIT I	PLANNING	9
Classification of Industries and Industrial structures – General requirements for industries like cement, chemical and steel plants – Planning and layout of buildings and components.		
UNIT II	**FUNCTIONAL REQUIREMENTS**	**9**
Lighting – Ventilation – Acoustics – Fire safety – Guidelines from factories act.		
UNIT III	**DESIGN OF STEEL STRUCTURES**	**9**
Industrial roofs – Crane girders – Mill buildings – Design of Bunkers and Silos		
UNIT IV	**DESIGN OF R.C. STRUCTURES**	**9**
Silos and bunkers – Chimneys – Principles of folded plates and shell roofs		
UNIT V	**PREFABRICATION**	**9**
Principles of prefabrication – Prestressed precast roof trusses- Functional requirements for Precast concrete units		
		TOTAL: 45 PERIODS

TEXT BOOKS

1. Reinforced Concrete Structural elements – P. Purushothaman.
2. Pasala Dayaratnam – Design of Steel Structure – 2000.

REFERENCES

1. Henn W. Buildings for Industry, vols.I and II, London Hill Books, 1995.
2. Handbook on Functional Requirements of Industrial buildings, SP32 – 1986, Bureau of Indian Standards, New Delhi 1990.
3. Course Notes on Modern Developments in the Design and Construction of Industrial Structures, Structural Engineering Research Centre, Madras, 1982.
4. Koncz, J, Manual of Precast Construction Vol I & II Bauverlay GMBH, 1971.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSO)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1		3	2		2		2					1	1	2	1	3
CO2	1	2	3	1			2			2		1	2		3	1
CO3		1	3	2	1	1	1						3	1	2	2
CO4		1	3	2	1	1	1					1	2	1		2
CO5	1	1	3	2	2	2	3		1			1	1		1	3

12CE8I	SMART STRUCTURES AND SMART MATERIALS		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VIII			
Category:	Elective					
Prerequisites:	12CE34- Building Materials and Construction Techniques					
Aim:	The aim of this course is to make the students to understand about the applications of smart materials in structures.					
Course Objectives:	• This course is designed to give an insight into the latest developments regarding smart materials and their use in structures. • Further, this also deals with structures which can self adjust their stiffness with load.					
Course Outcomes:	1. Differentiate instrumented structures functions and response. 2. Identify strain measuring techniques using electrical strain gauges. 3. Construct Chemical and Bio-Chemical sensing in structural Assessment. 4. Compare Piezoelectric and Electrostrictive Material. 5. Construct Signal Processing and Control for Smart Structures.					

UNIT I	INTRODUCTION	9
Introduction to Smart Materials and Structures – Instrumented structures functions and response – Sensing systems – Self diagnosis – Signal processing consideration – Actuation systems and effectors.		
UNIT II	**MEASURING TECHNIQUES**	**9**
Strain Measuring Techniques using Electrical strain gauges, Types – Resistance – Capacitance – Inductance – Wheatstone bridges – Pressure transducers – Load cells – Temperature Compensation – Strain Rosettes.		
UNIT III	**SENSORS**	**9**
Sensing Technology–Types of Sensors – Physical Measurement using Piezo Electric Strain measurement – Inductively Read Transducers – The LVOT – Fiber optic Techniques. Chemical and Bio-Chemical sensing in structural Assessment – Absorptive chemical sensors – Spectroscopes – Fiber Optic Chemical Sensing Systems and Distributed measurement.		
UNIT IV	**ACTUATORS**	**9**
Actuator Techniques – Actuator and actuator materials – Piezoelectric and Electrostrictive Material – Magnetostructure Material – Shape Memory Alloys – Electro orheological Fluids– Electro magnetic actuation – Role of actuators and Actuator Materials.		
UNIT V	**SIGNAL PROCESSING AND CONTROL SYSTEMS**	**9**
Data Acquisition and Processing – Signal Processing and Control for Smart Structures – Sensors as Geometrical Processors – Signal Processing – Control System – Linear and Non- Linear.		
		TOTAL: 45 PERIODS

TEXT BOOKS

1. Brain Culshaw – Smart Structure and Materials Artech House – Borton. London-2006.
2. L. S. Srinath – Experimental Stress Analysis – Tata McGraw-Hill, 2005.

REFERENCES

1. J. W. Dally & W. F. Riley – Experimental Stress Analysis – Tata McGraw-Hill, 1998.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSO)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1		2	3	1	1		2			2		2		2		
CO2	1	2		3	3		1					1	1		3	2
CO3	1	1		3	3		1					1	1	2		2
CO4	1	1		3	2		1					1		2	3	
CO5	1	2		3	3		2			2		2	1		3	

12CE8J	FINITE ELEMENT TECHNIQUES		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VIII			
Category:	Elective					
Prerequisites:	12CE52- Structural Analysis – I, 12CE61- Structural Analysis - II					
Aim:	The aim of this course is to make the students to analyze any structure through finite element method.					
Course Objectives:	At the end of this course the student shall have a basic knowledge of finite element method and shall be able to analyze linear elastic structures that he has studied about in core courses, using finite element method.					
Course Outcomes:	1. Define the theoretical basis of the weighted residual Finite Element Method. 2. Implement the Galerkin residual weak formulation into the Finite Element Method for the solution of Ordinary and Partial Differential Equations 3. Select appropriate elements and formulate the structure accordingly to reproduce the real behaviour. 4. Compute the stiffness values of an 8-noded element. 5. Perform finite element analysis using 2-D triangular and rectangular elements.					

UNIT I	**INTRODUCTION – VARIATIONAL FORMULATION**	**9**
General field problems in Engineering – Modelling – Discrete and Continuous models – Characteristics – Difficulties involved in solution – The relevance and place of the finite element method – Historical comments – Basic concept of FEM, Boundary and initial value problems – Gradient and divergence theorems – Functionals – Variational calculus Variational formulation of VBPS. The method of weighted residuals – The Ritz method.		
UNIT II	**FINITE ELEMENT ANALYSIS OF ONE DIMENSIONAL PROBLEMS**	**10 hrs**
One dimensional second order equations – discretisation of domain into elements – Generalised coordinates approach – derivation of elements equations – assembly of elements equations – imposition of boundary conditions – solution of equations – Cholesky method – Post processing – Extension of the method to fourth order equations and their solutions – time dependant problems and their solutions – example from heat transfer, fluid flow and solid mechanics.		
UNIT III	**FINITE ELEMENT ANALYSIS OF TWO DIMENSIONAL PROBLEMS**	**10 hrs**
Second order equation involving a scalar-valued function – model equation – Variational formulation – Finite element formulation through generalised coordinates approach – Triangular elements and quadrilateral elements – convergence criteria for chosen models – Interpolation functions – Elements matrices and vectors – Assembly of element matrices – boundary conditions – solution techniques.		
UNIT IV	**ISOPARAMETRIC ELEMENTS AND FORMULATION**	**8 hrs**
Natural coordinates in 1, 2 and 3 dimensions – use of area coordinates for triangular elements in - 2 dimensional problems – Isoparametric elements in 1,2 and 3 dimensional Largrangean and serendipity elements – Formulations of elements equations in one and two dimensions - Numerical integration.		
UNIT V	**APPLICATIONS TO FIELD PROBLEMS IN TWO DIMENSIONALS**	**8 hrs**
Equations of elasticity – plane elasticity problems – axisymmetric problems in elasticity – Bending of elastic plates – Time dependent problems in elasticity – Heat – transfer in two dimensions – incompressible fluid flow		
		TOTAL: 45 PERIODS

TEXT BOOKS

1. Chandrupatla, T.R., and Belegundu, A.D., "Introduction to Finite Element in Engineering", Third Edition, Prentice Hall, India, 2003.
2. J.N.Reddy, "An Introduction to Finite Element Method", McGraw-Hill, Intl. Student Edition, 1985.

REFERENCES	
1. Zienkiewics, "The finite element method, Basic formulation and linear problems", Vol.1, 4/e, McGraw-Hill, Book Co. 2. S.S.Rao, "The Finite Element Method in Engineering", Pergaman Press, 2003. 3. C.S.Desai and J.F.Abel, "Introduction to the Finite Element Method", Affiliated East West Press, 1972.	

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	**Program Outcomes (POs)**												**Program Specific Outcomes (PSO)**			
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
CO1	1	2	3		1	2	2			1		2	1		2	1
CO2		1	3	2	2	1	1			1		1	1		2	3
CO3	1	2				3	2			1		1	2		1	2
CO4		2								2		1	2		3	2
CO5		2				3	2					1	1	1		2

12CE8K	REPAIR AND REHABILITATION OF STRUCTURES		L	T	P	C
			3	0	0	3
Programme:	B.E. Civil Engineering	**Sem:**	VIII			
Category:	Elective					
Prerequisites:	12CE34- Building Materials and Construction Techniques					
Aim:	The aim of this course is to make the students to assess the distressed building and find out the method of rehabilitation.					
Course Objectives:	To get the knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.					
Course Outcomes:	1. Explain the causes of deterioration of concrete and steel structures. 2. Apply the different non-destructive tests for assessment of deterioration of structures. 3. Identify repairing materials for strengthening of existing structures. 4. Examine the different methods of repairing concrete and steel structures. 5. Demonstrate the different methods of strengthening existing structures.					

UNIT I	DURABILITY AND DETERIORATION	9
Physical causes - Introduction - Durability - Causes of distress in concrete structures – Shrinkage – Freezing and thawing – Weathering - Crazing - Swelling – Abrasion, Erosion and Cavitations on concrete - Temperature changes - Formwork movement - Settlement and movement - Foundation settlement - Construction & design errors - Chemical causes - Chemical attack on the concrete - Hydrolysis and Leaching on the concrete - Salt weathering - Soft water attack/aggressive water attack - Crystallization of salts in pores - Sea water attack on the concrete - Biological attack on the concrete - Mechanism of miscellaneous chemical attack - Corrosion - Basic principle of corrosion - Corrosion mechanism & process - Damages due to corrosion - Codal provisions for different exposure conditions - corrosion protection techniques - Relative symptoms to causes of distress and deterioration.		
UNIT II	**DAMAGE ASSESSMENT**	**10 hrs**
Destructive testing systems - Introduction - Purpose of assessment - Rapid assessment - Monitoring - Investigation of damage - Damage assessment procedure - Evaluation of the cracks - Destructive testing system - assessment - assessment of existing concrete structures - NDT methods - Recent development on NDT instruments - Semi-Destructive testing systems - Penetration techniques - Permeability test - Test for determination of cement content - water content and water cement ratio - Chemical testing of concrete - Diagnostic methods for corrosion damage - Investigation strategies - Detailed test and inspection techniques - Determination of structural integrity and location of reinforcement - Determination of steel serviceability and condition - Determination of concrete quality and composition		
UNIT III	**REPAIR MATERIALS**	**10 hrs**
Selection and evaluation of repair materials - Introduction - Material selection - Classification of repair materials - Evaluation test for repair materials: Physical and mechanical strength test - Durability related tests - Miscellaneous tests - Test for surface quality and other tests - Function of repair materials - Patching materials - Resurfacing materials - Sealing materials - Water proofing materials - Bonding materials - Special repair materials – Chemical and mineral admixtures - Admixtures for rehabilitation – Polymeric materials - Organic polymers - Types of polymer concrete composites – Polymer repair materials – Fibre reinforced concrete – Behaviour of FRC with other fibres – Fibre reinforced polymer composites – FRP composite laminates – Ferrocement – SIFCON & SIMCON materials – Miscellaneous materials – Fulfils for the repair materials.		
UNIT IV	**REPAIR AND REHABILITATION**	**8 hrs**

Repair of cracks – Introduction – Durability of concrete repair– Evaluation of the repairs – Types and classification of repair – Methods of repair – Rehabilitation techniques - Replacement mortar – Replacement concrete - Replaced aggregate concrete – Shotcrete/Gunite – Grouting – Resin injection – Dry pack & Epoxy bonded dry pack – Sprayed concrete – Slab jacking technique – Tremie concrete – Chloride extraction and realkalisation of concrete – Cathodic protection – Member replacement - Strengthening techniques – Need for strengthening – Structure concrete strengthening – Strengthening with external reinforcements – Short spanning – External post tensioning – Section enlargement – Strengthening by SIMCON – Dam safety: Concrete repair techniques – Guidelines for seismic rehabilitation of existing buildings.

UNIT V	**MAINTENANCE AND DEMOLITION**	**8 hrs**
Necessity and classification of maintenance - Introduction – Necessitate of the maintenance – Inspection periods – Background of maintenance – Maintenance processes - Maintenance procedure - Building maintenance – Steel work maintenance – Wood work maintenance –Inspection of building – Routine building maintenance – Departmental procedure for repairs of buildings - Integral maintenance of building - Safety in maintenance and demolition - Safety in maintenance – Safety in building maintenance - Demolition management – Concrete demolition – Review of advanced demolition techniques.		
TOTAL: 45 PERIODS		

TEXT BOOKS

1. Dr.B.Vidivelli, Rehabilitation of Concrete Structures, Standard Publishers Distributors, 2007.
2. Denison Campbell, Allen and Harold Roper, Concrete Structures, Materials, Maintenance and Repair, Longman Scientific and Technical UK, 2001.
3. M.S.Shetty, Concrete Technology - Theory and Practice, S.Chand and Company, New Delhi, 2000.

REFERENCES

1. Santhakumar, A.R., Training Course notes on Damage Assessment and repair in Low Cost Housing , "RHDC-NBO" Anna University, July 1992.
2. Raikar, R.N., Learning from failures - Deficiencies in Design, Construction and Service - R&D Centre (SDCPL), Raikar Bhavan, Bombay, 1987.
3. N.Palaniappan, Estate Management, Anna Institute of Management, Chennai, 1992.
4. Lakshmipathy, M. etal. Lecture notes of Workshop on "Repairs and Rehabilitation of Structures", 29 - 30th October 1999.s
5. R.T.Allen and S.C.Edwards, Repair of Concrete Structures, Blakie and Sons, UK, 1987.

Evaluation Criteria & Marks	Continuous Assessment (25)			End Semester Examination	Total Marks
	Assess.Tests (60%)	Assign/Seminar/ Miniproj (30%)	Attendance (10%)		
	15	7.5	2.5	75 [Min Pass: 37]	100 [Min Pass: 50]
Attendance Mark	91% and above – 10, 85-90% - 8, 81-84% - 6, 76-80% - 4, 75% - 2				
Grade Criteria	S(90-100), A(81-89), B(71-80), C(61-70), D(56-60), E(50-55), U (<50)-Fail				

Course Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSO)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1		1	2	2	3	1	2			1		1	1		3	1
CO2		2		3	3	2	1			1		1	2		2	2
CO3		2	1		2		2			1		1	2		3	2
CO4	1			3		1						1	1		2	1
CO5	1		1	3	1	1						1		2	2	2