UNIVERSITY VISION AND MISSION

VISION

B.S. Abdur Rahman Institute of Science & Technology aspires to be a leader in Education, Training and Research in Engineering, Science, Technology and Management and to play a vital role in the Socio-Economic progress of the Country.

MISSION

• To blossom into an internationally renowned University
• To empower the youth through quality education and to provide professional leadership
• To achieve excellence in all its endeavors to face global challenges
• To provide excellent teaching and research ambience
• To network with global Institutions of Excellence, Business, Industry and Research Organizations
• To contribute to the knowledge base through Scientific enquiry, Applied Research and Innovation.
VISION AND MISSION OF 
THE DEPARTMENT OF CIVIL ENGINEERING

VISION
To be a leading school for Education, Training and Research in Civil Engineering for a better future and over-all Socio-Economic progress of the Country in a sustainable manner

MISSION

• To nurture Civil Engineers into ethically strong and responsible leaders to address Global challenges through Quality Education, Application oriented research, innovation, inspiration, motivation and sustainable growth.

• To enrich and enhance knowledge for the best practices in various disciplines of Civil Engineering through Collaborations with Global Institutions of Excellence, Industries and Research Organizations.
PROGRAMME EDUCATIONAL OBJECTIVES AND OUTCOMES
B.Tech. (Civil Engineering)

PROGRAMME EDUCATIONAL OBJECTIVES

• To provide fundamental knowledge in science and mathematics to understand civil engineering concepts.

• To equip with knowledge to plan, design, analyze, construct, maintain and manage civil engineering systems.

• To provide understanding of various codes and standards in the field of design and construction.

• To impart knowledge in theory and skills in practice on structural, geo-technical, geo-informatics, water resources, environmental and transportation engineering in solving civil engineering problems.

• To inculcate knowledge of sustainability in various aspects of civil engineering.

• To provide broad exposure on managerial, economic and ethical issues.

PROGRAMME OUTCOMES

On successful completion of the programme, the graduates will have

• Ability to apply knowledge of mathematics, science and engineering to solve problems related to civil engineering.

• Ability to design components of civil engineering systems to meet the requirements within constraints like economic, environmental, social, health & safety and sustainability.

• Ability to apply the techniques, skills and modern engineering tools necessary for civil engineering practice.

• Ability to communicate and function effectively in multi-disciplinary teams.

• Ability to understand the importance of professional and ethical responsibilities of engineers.
1.0 PRELIMINARY DEFINITIONS & NOMENCLATURE

In these Regulations, unless the context otherwise requires:

i) "Programme" means B.Tech. Degree Programme.

ii) "Branch" means specialization or discipline of B.Tech Degree Programme like Civil Engineering, Mechanical Engineering, etc.,

iii) "Course" means a theory or practical subject that is normally studied in a semester, like Mathematics, Physics, Engineering Graphics, Computer Practice, etc.,

iv) "University" means B.S.Abdur Rahman University.

v) "Dean (Academic Affairs)" means the Dean (Academic Affairs) of B.S. Abdur Rahman University.

vi) "Dean (Student Affairs)" means the Dean (Students Affairs) of B.S.Abdur Rahman University.

vii) "Controller of Examinations" means the Controller of Examination of B.S. Abdur Rahman University, who is responsible for conduct of examinations and declaration of results.

2.0 ADMISSION

2.1a) Candidates for admission to the first semester of the eight semester B.Tech. degree programme shall be required to have passed the Higher Secondary Examination of the (10+2) curriculum (Academic stream) prescribed by the appropriate authority or any other examination of any university or authority accepted by the University as equivalent thereto.

2.1b) Candidates for admission to the third semester of the eight semester B.Tech. programme under lateral entry scheme shall be required to have passed the Diploma examination in Engineering / Technology of the Department of Technical Education, Government of Tamil Nadu or any other examination of any other authority accepted by the University as equivalent thereto.
B.Tech. Civil Engineering

2.2 Notwithstanding the qualifying examination the candidate might have passed, the candidate shall also write an entrance examination prescribed by the University for admission. The entrance examination shall test the proficiency of the candidate in Mathematics, Physics and Chemistry on the standards prescribed for plus two academic stream.

2.3 The eligibility criteria such as marks, number of attempts and physical fitness shall be as prescribed by the University from time to time.

3.0 BRANCHES OF STUDY

3.1 Regulations are applicable to the following B.Tech. degree programmes in various branches of Engineering and Technology, each distributed over eight semesters with two semesters per academic year.

B.TECH. DEGREE PROGRAMMES:

1. Aeronautical Engineering
2. Automobile Engineering
3. Civil Engineering
4. Computer Science and Engineering
5. Electrical and Electronics Engineering
6. Electronics and Communication Engineering
7. Electronics and Instrumentation Engineering
8. Information Technology
9. Manufacturing Engineering
10. Mechanical Engineering
11. Polymer Engineering
12. Biotechnology
13. Cancer Biotechnology
14. Food Biotechnology

4.0 STRUCTURE OF THE PROGRAMME

4.1 Every Programme will have a curriculum with syllabi consisting of theory and practical courses such as,
B.Tech. Civil Engineering

i) Basic Sciences (BS)
ii) Humanities & Social Sciences (HS)
iii) Management Sciences (MS)
iv) Engineering Sciences Fundamentals (ESF)
v) Engineering Core Courses (EC)
vi) Professional Electives (PE)
vii) General Electives (GE)
viii) Workshop practice, laboratory work, industrial training, seminar presentation, project work, etc.

4.2 Each course is normally assigned certain number of credits: one credit per lecture period per week
one credit per tutorial period per week
one credit for two to three periods and two credits for four periods of laboratory or practical courses
one credit for two periods of seminar/project work per week
one credit for two weeks of industrial training

4.3 Each semester curriculum shall normally have a blend of lecture courses not exceeding seven and practical courses not exceeding four.

4.4 For the award of the degree, a student has to earn a minimum total credits specified in the curriculum of the relevant branch of study. This minimum will be between 175 and 185 credits, depending on the program.

4.5 The medium of instruction, examinations and project report shall be English, except for courses on languages other than English.

5.0 DURATION OF THE PROGRAMME

5.1 A student is ordinarily expected to complete the B.Tech. programme in eight semesters (six semesters in the case of a lateral entry scheme), but in any case not more than 14 continuous semesters reckoned from the date of first admission (12 semesters in the case of lateral entry student).

5.2 Each semester shall consist of a minimum of 90 working days or 450 periods.

5.3 Semester end examination will normally follow immediately after the last working day of the semester.
6.0 CLASS ADVISOR AND FACULTY ADVISOR

6.1 CLASS ADVISOR

A faculty member will be nominated by the HOD as Class Advisor for the whole class (2nd to 8th semester).

He/she is responsible for maintaining the academic, curricular and co-curricular records of all students throughout their period of study.

However, for the first semester alone the class advisors and faculty advisors will be nominated by first year coordinator.

6.2 FACULTY ADVISOR

To help the students in planning their courses of study and for general counseling on the academic programme, the Head of the Department of the students will attach a certain number of students to a faculty member of the department who shall function as Faculty Advisor for the students throughout their period of study. Such Faculty Advisor shall offer advice to the students on academic and personal matters, and guide the students in taking up courses for registration and enrolment every semester.

7.0 COURSE COMMITTEE

Common course offered to more than one discipline or group, shall have a "Course Committee", comprising all the faculty members 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 / Dean (Academic Affairs), depending on whether all the faculty members teaching the common course belong to the same department / different departments.

8.0 CLASS COMMITTEE

During first semester, a common Class Committee will be constituted for all branches by the Dean (Academic Affairs). During other semesters, separate Class Committees will be constituted by the respective Head of the Department of the students.

8.1 The first semester Class Committee composition will be as follows:

i) The first semester Coordinator shall be the Chairman of the class committee
B.Tech. Civil Engineering

ii) Course coordinators of all common courses.

iii) Faculty members of all individual courses.

iv) One male and one female first semester student of each class of B.Tech, program to be nominated by the first semester coordinator

v) All first semester class advisors and faculty advisors

8.2 The composition of the class committee for each branch of B.Tech, from 2nd to 8th semester, will be as follows:

i) One senior faculty member preferably not teaching to the concerned class, appointed as Chairman by the Head of the Department

ii) Faculty members of individual courses

iii) Two students, (preferably one male and one female) of the class per group of 30 students or part thereof, to be nominated by the Head of the Department, in consultation with the faculty advisors.

iv) All faculty advisors and the class advisor of the class

v) Head of the Department

8.3 The class committee shall meet at least thrice during the semester. The first meeting will be held within two weeks from the date of commencement of classes, in which the nature of continuous assessment for various courses and the weightages for each component of assessment will be decided for the first, second and third assessments. The second meeting will be held within a week after the date of first assessment report, to review the students' performance and for follow up action. The third meeting will be held within a week after the second assessment report, to review the students' performance and for follow up action.

8.4 During these three meetings the student members representing the entire class, shall meaningfully interact and express opinions and suggestions of the class students to improve the effectiveness of the teaching-learning process.

8.5 The class committee, excluding the student members, shall meet within 10 days from the last day of the semester end examination to analyze the performance of the students in all the components of assessments and decide the grades for students in each course. The grades for a common course shall be decided by the concerned course committee and shall be presented to the class committee(s) by the concerned course coordinator.
9.0 REGISTRATION AND ENROLMENT

9.1 Except for the first semester, every student shall register for the ensuing semester during a specified week before the semester end examination of the current semester. Every student shall submit a completed Registration form indicating the list of courses intended to be enrolled during the ensuing semester. Late registration with the approval of the Dean (Academic Affairs) along with a late fee will be permitted up to the last working day of the current semester.

9.2 From the second year onwards, all students shall pay the prescribed fees for the year on a specific day at the beginning of the semester confirming the registered courses. Late enrolment along with a late fee will be permitted up to two weeks from the date of commencement of classes. If a student does not enroll, his/her name will be removed from rolls.

9.3 The students of first semester shall register and enroll at the time of admission by paying the prescribed fees.

9.4 A student should have registered for all preceding semesters before registering for a particular semester.

10.1 CHANGE OF A COURSE
A student can change an enrolled course within 15 days from the commencement of the course, with the approval of the Dean (Academic Affairs), on the recommendation of the Head of the Department of the student.

10.2 WITHDRAWAL FROM A COURSE
A student can withdraw from an enrolled course at any time before the second assessment for genuine reasons, with the approval of the Dean (Academic Affairs), on the recommendation of the Head of the Department of the student.

11.0 TEMPORARY BREAK OF STUDY FROM A PROGRAMME
A student can avail a onetime temporary break of study covering the current semester and/or next semester period with the approval of the Head of the Institution at any time before the start of third assessment of current semester, within the maximum period of 14 or 12 semesters as the case may be. If any student is debarred for want of attendance or suspended due to any act of indiscipline it will not be considered as break of study.
A student availed break of study has to rejoin only in the same semester from where he left.

12.0 CREDIT LIMIT FOR ENROLMENT & MOVEMENT TO HIGHER SEMESTER

12.1 A student can enroll for a maximum of 30 credits during a semester including redo courses.

12.2 The minimum credit requirement to move to the higher semester is

- Not less than a total of 20 credits, to move to the 3rd semester
- Not less than a total of 40 credits, (20 for lateral entry) to move to the 5th semester
- Not less than a total of 60 credits, (40 for lateral entry) to move to the 7th semester

13.0 ASSESSMENT PROCEDURE AND PERCENTAGE WEIGHTAGE OF MARKS

13.1 Every theory course shall have a total of four assessments during a semester as given below:

<table>
<thead>
<tr>
<th>Assessment No.</th>
<th>Course Coverage in Weeks</th>
<th>Duration</th>
<th>Weightage of Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment 1</td>
<td>1 to 4</td>
<td>1.5 hours</td>
<td>15%</td>
</tr>
<tr>
<td>Assessment 2</td>
<td>5 to 8</td>
<td>1.5 hours</td>
<td>15%</td>
</tr>
<tr>
<td>Assessment 3</td>
<td>9 to 12</td>
<td>1.5 hours</td>
<td>15%</td>
</tr>
<tr>
<td>Attendance #</td>
<td>-</td>
<td>-</td>
<td>5%</td>
</tr>
<tr>
<td>Semester End Exam</td>
<td>Full course</td>
<td>3 hours</td>
<td>50%</td>
</tr>
</tbody>
</table>

# 76-80% - 1 Mark ; 81-85 – 2 Marks ; 86-90 – 3 Marks ; 91-95 – 4 Marks and 96-100 – 5 Marks

13.2 Appearing for semester end examination for each course is mandatory and a student should secure a minimum of 40% marks in each course in semester end examination for the successful completion of the course.

13.3 Every practical course will have 60% weightage for continuous assessment and 40% for semester end examination. However, a student should have secured a minimum of 50% marks in the semester end practical examination.
13.4 In the case of Industrial training, the student shall submit a report, which will be evaluated along with an oral examination by a committee of faculty members, constituted by the Head of the department. A progress report from the industry will also be taken into account for evaluation.

13.5 In the case of project work, a committee of faculty members constituted by the Head of the Department will carry out three periodic reviews. Based on the project report submitted by the student(s), an oral examination (viva-voce) will be conducted as the semester end examination, for which one external examiner, approved by the Controller of Examinations, will be included. The weightage for periodic review will be 50% and remaining 50% for the project report and Viva Voce examination.

13.6 Assessment of seminars and comprehension will be carried out by a committee of faculty members constituted by the Head of the Department.

13.7 The continuous assessment marks earned for a course during his/her first appearance will be used for grading along with the marks earned in the semester-end examination / arrear examination for that course until he/she completes.

14.0 SUBSTITUTE EXAMINATIONS

14.1 A student who has missed, for genuine reasons, a maximum of one of the four assessments of a course may be permitted to write a substitute examination. However, permission to take up a substitute examination will be given under exceptional circumstances, such as accident, admission to a hospital due to illness, etc. by a committee constituted by the Dean of School for that purpose.

14.2 A student who misses any assessment in a course shall apply in a prescribed form to the Head of the department / Dean within a week from the date of missed assessment. However the substitute tests and examination for a course will be conducted within two weeks after the last day of the semester-end examinations.

15.0 ATTENDANCE REQUIREMENT AND SEMESTER / COURSE REPETITION

15.1 A student shall earn 100% attendance in the contact periods of every course, subject to a maximum relaxation of 25% (for genuine reasons such as medical grounds or representing the University in approved events etc.) to become eligible to appear for the semester-end examination in that course, failing
B.Tech. Civil Engineering

which the student shall be awarded “I” grade in that course. If the course is a core course, the candidate should register for and repeat the course when it is offered next.

15.2 The faculty member of each course shall cumulate the attendance details for the semester and furnish the names of the students who have not earned the required attendance in that course to the class advisor. The class advisor will consolidate and furnish the list of students who have earned less that 75% attendance, in various courses, to the Dean (Academic Affairs) through the Head of the Department. Thereupon, the Dean (Academic Affairs) shall announce, course-wise, the names of such students prevented from writing the semester end examination in each course.

15.3 A student should register to re-do a core course wherein “I” or “W” grade is awarded. If the student is awarded, “I” or “W” grade in an elective course either the same elective course may be repeated or a new elective course may be taken.

15.4 A student who is awarded “U” grade in a course will have the option of either to write semester end arrear examination at the end of the subsequent semesters, or to redo the course during summer term / regular semester. Marks earned during the redo period in the continuous assessment for the course, will be used for grading along with the marks earned in the semester-end (redo) examination. If any student obtained “U” grade during summer term course, the marks earned during the redo period for the continuous assessment for that course will be considered for further appearance as arrears.

15.5 If a student with “U” grade prefers to redo any particular course fails to earn the minimum 75% attendance while doing that course, then he/she will be awarded “I” grade in that course.

15.6 The students who have not attended a single hour in all courses in a semester and awarded ‘I’ grade are not permitted to write the examination and also not permitted move to next higher semester. Such students should repeat all the courses of the semester in the next Academic year.

16.0 SUMMER TERM COURSES

16.1 A student can register for a maximum of three courses during summer term, if such courses are offered by the concerned department during the summer term. Students may also opt to redo such courses during regular semesters.
16.2 The Head of the Department, in consultation with the department consultative committee may arrange for the conduct of a few courses during the summer term, depending on the availability of faculty members during summer and subject to a specified minimum number of students registering for each of such courses.

16.3 However, in the case of students who have completed eighth semester, but having arrears in the earlier semesters in a maximum of two courses, summer courses may be offered, even if less than minimum students may register for the course.

16.4 The number of contact hours and the assessment procedure for any course during summer term will be the same as those during regular semesters except that there is no provision either for withdrawal from a summer term course or for substitute examination.

17.0 PASSING AND DECLARATION OF RESULTS AND GRADE SHEET

17.1 All assessments of a course will be made on absolute marks basis. However, the Class Committee without the student members shall meet within 10 days after the semester-end examination and analyze the performance of students in all assessments of a course and award letter grade. The letter grades and the corresponding grade points are as follows:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>10</td>
</tr>
<tr>
<td>A</td>
<td>9</td>
</tr>
<tr>
<td>B</td>
<td>8</td>
</tr>
<tr>
<td>C</td>
<td>7</td>
</tr>
<tr>
<td>D</td>
<td>6</td>
</tr>
<tr>
<td>E</td>
<td>5</td>
</tr>
<tr>
<td>U</td>
<td>0</td>
</tr>
<tr>
<td>W</td>
<td>--</td>
</tr>
<tr>
<td>I</td>
<td>--</td>
</tr>
<tr>
<td>AB</td>
<td>--</td>
</tr>
</tbody>
</table>
"W" denotes withdrawal from the course.

“I” denotes inadequate attendance and hence prevention from semester-end examination

“U” denotes unsuccessful performance in the course. “AB” denotes absence for the semester-end examination.

17.2 A student who earns a minimum of five grade points (‘E’ grade) in a course is declared to have successfully completed the course. Such a course cannot be repeated by the student.

17.3 The results, after awarding of grades, shall be signed by the Chairman of the Class Committee and Head of the Department and declared by the Controller of Examinations.

17.4 Within one week from the date of declaration of result, a student can apply for revaluation of his / her semester-end theory examination answer scripts of courses, on payment of prescribed fee, through proper application to Dean (Academic Affairs), who shall constitute a revaluation committee consisting of Chairman of the class committee as convener, the faculty member of the course and a senior member of faculty knowledgeable in that course. The committee shall meet within a week to revalue the answer scripts and submit its report to the Controller of Examinations for consideration and decision.

17.5 After results are declared, grade sheets shall be issued to each student, which will contain the following details. The list of courses enrolled during the semester including Summer term (redo) courses, if any, and the grade scored, the Grade Point Average (GPA) for the semester and the Cumulative Grade Point Average (CGPA) of all courses enrolled from first semester onwards. GPA is the ratio of the sum of the products of the number of credits of courses registered and the points corresponding to the grades scored in those courses, taken for all the courses, to the sum of the number of credits of all the courses in the semester, including summer courses if any.

If $C_i$ is the number of credits assigned for the $i^{th}$ course and $GPi$ is the Grade Point in the $i^{th}$ course

$$GPA = \frac{\sum_{i=1}^{n} (C_i)(GPi)}{\sum_{i=1}^{n} C_i}$$

Where $n$ = number of courses
The Cumulative Grade Point Average CGPA shall be calculated in a similar manner, considering all the courses enrolled from first semester.

“\textit{I}” and “\textit{W}” grades will be excluded for calculating GPA.

"\textit{U}", “\textit{I}”, "\textit{AB}" and "\textit{W}” grades will be excluded for calculating CGPA.

\textbf{17.6} After successful completion of the programme, the Degree will be awarded with the following classifications based on CGPA.

<table>
<thead>
<tr>
<th>Classification</th>
<th>CGPA</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Class with Distinction</td>
<td>8.50 and above and passing all the courses in first appearance an completing the programme within the normal 8 or 6 (for lateral entry) semesters</td>
</tr>
<tr>
<td>First Class</td>
<td>6.50 and above and completing the programme within a maximum of 10 or 8 (for lateral entry) semesters.</td>
</tr>
<tr>
<td>Second Class</td>
<td>All others</td>
</tr>
</tbody>
</table>

However, to be eligible for First Class with Distinction, a student should not have obtained \textit{U} and \textit{I} grade in any course during his/her study and should have completed the U.G. programme within a minimum period covered by the minimum duration plus authorized break of study, if any (clause 11). To be eligible for First Class, a student should have passed the examination in all courses within the specified minimum number of semesters reckoned from the student’s commencement of study plus two semesters. For this purpose, the authorized break of study will not be counted. The students who do not satisfy the above two conditions will be classified as second class. For the purpose of classification, the CGPA will be rounded to two decimal places. For the purpose of comparison of performance of students and ranking, CGPA will be considered up to three decimal places.
18.0 ELECTIVE CHOICE: OPTION TO DO PROJECT ALONE IN FINAL SEMESTER

18.1 Apart from the various elective courses listed in the curriculum for each branch of specialization, the student can choose a maximum of two electives from any other specialization under any department, during the entire period of study, with the approval of the Head of the parent department and the Head of the other department offering the course.

18.2 In the curriculum of eighth Semester, along with the project work, if two elective courses alone are listed, then the Dean (Academic Affairs) may permit a student, as per approved guidelines, on the recommendation of the Head of the department, to do a full semester major industrial project work. In such a case, the above two elective courses or any other two elective courses in lieu thereof have to be enrolled during any semester preceding or succeeding the project work, if offered.

19.0 PERSONALITY AND CHARACTER DEVELOPMENT

19.1 All students shall enroll, on admission, in any of the personality and character development programmes, NCC / NSS / NSO / YRC / Rotaract and undergo practical training.

• National Cadet Corps (NCC) will have to undergo specified number of parades.

• National Service Scheme (NSS) will have social service activities in and around Chennai.

• National Sports Organization (NSO) will have sports, games, drills and physical exercises.

• Youth Red Cross (YRC) will have social service activities in and around Chennai.

• Rotaract will have social service activities in and around Chennai.

20.0 DISCIPLINE

20.1 Every student is required to observe disciplined and decorous behavior both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the University.
20.2 Any act of indiscipline of a student, reported to the Dean (Student Affairs), through the HOD / Dean will be referred to a Discipline and Welfare Committee, nominated by the Vice-Chancellor, for taking appropriate action.

21.0 ELIGIBILITY FOR THE AWARD OF DEGREE

21.1 A student shall be declared to be eligible for the award of B.Tech. degree provided the student has:

i) successfully completed all the required courses specified in the programme curriculum and earned the number of credits prescribed for the specialization, within a maximum period of 14 semester (12 semesters for lateral entry) from the date of admission, including break of study.

ii) no dues to the Institution, Library, Hostels

iii) no disciplinary action pending against him/her.

21.2 The award of the degree must have been approved by the University.

22.0 POWER TO MODIFY

Notwithstanding all that has been stated above, the Academic Council has the right to modify the above regulations from time to time.
## CURRICULUM AND SYLLABI FOR B.TECH. CIVIL ENGINEERING
(Eight Semesters / Full Time)

### CURRICULUM

#### SEMESTER I

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Course Group</th>
<th>Course Code</th>
<th>Course Title</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>BS</td>
<td>MAB1181</td>
<td>Algebra, Geometry and Calculus</td>
<td>3</td>
<td>1</td>
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<td>4</td>
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<tr>
<td>2</td>
<td>HS</td>
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<tr>
<td>6</td>
<td>HS</td>
<td>SSB1182</td>
<td>Sociology, Ethics and Human Values</td>
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<td>3</td>
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<td>Physics Lab</td>
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<td>Chemistry Lab</td>
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<td>GEB1102</td>
<td>Basic Engineering Practices Laboratory</td>
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<td>2</td>
<td>1</td>
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<td>10</td>
<td>ESF</td>
<td>GEB1103</td>
<td>Computer Programming &amp; Applications</td>
<td>2</td>
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<td>2</td>
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* Any one language

#### SEMESTER II

<table>
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<th>Sl. No.</th>
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<th>Course Title</th>
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<th>P</th>
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<tbody>
<tr>
<td>1</td>
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23

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25

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**STRUCTURAL ENGINEERING & GEOTECHNICAL ENGINEERING**

**WATER RESOURCES & ENVIRONMENTAL ENGINEERING**

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B.Tech. Civil Engineering

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2. PE CEBX32 Building Services
3. PE CEBX33 Urban Engineering and Architecture
4. PE CEBX34 Principles of Architecture
5. PE CEBX35 Engineering Ethics
6. PE CEBX36 Entrepreneurship for Infrastructure Engineers
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<td>GEBX22</td>
<td>National Service Scheme</td>
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OBJECTIVES:
The course is aimed at

- developing the skills of engineering students in the basics of chosen topics of Mathematics that are imperative for effective understanding of engineering subjects.

- laying the foundation for learning further topics of Mathematics in higher semesters in a graded manner.

- enabling the learners to appreciate the important role of mathematical concepts in engineering applications.

**MODULE I MATRICES**


**MODULE II VECTOR ALGEBRA**


**MODULE III THREE DIMENSIONAL ANALYTICAL GEOMETRY**


**MODULE IV DIFFERENTIAL GEOMETRY**

B.Tech. Civil Engineering

MODULE V  MULTI-VARIATE FUNCTIONS  8


MODULE VI  ORDINARY DIFFERENTIAL EQUATIONS  8

Linear equations of second order with constant and variable coefficients – Simultaneous first order linear equations with constant coefficients – homogeneous equations of Euler’s type – method of undetermined coefficients, method of variation of parameters.

L – 45; T – 15; Total Hours– 60

TEXT BOOKS:

REFERENCES:
B.Tech. Civil Engineering

OUTCOMES:

On completion of the course the students will be able to

• solve Eigen value and Eigen vector problems
• solve three dimensional geometry problems.
• use differential calculus for solving problems pertaining to engineering applications.
B.Tech. Civil Engineering

ENB1181 ENGLISH L T P C
3 0 0 3

OBJECTIVES:

• To expose students to the concept of flipped learning.
• To discuss a range of vocabulary and enable students to use it in academic and technical contexts.
• To facilitate students’ effective use of speaking skill while exchanging ideas and making presentations.
• To help students develop listening skill for identifying accent and intonation and comprehending and analyzing the information.
• To develop reading comprehension skill and help them to infer explicit and implicit meanings.
• To hone their creative and academic writing skills.
• To expose them to the correct usage of language and help them to apply it appropriately.

MODULE I 8

L: Listening for specific information – Note-taking
S: Self introduction – Introducing one another
R: Skimming Technical passages
W: Process of writing – Writing short paragraphs

Language focus: Use of prefixes and suffixes, Simple tense forms

MODULE II 8

L: Guessing the meaning through Intonation
S: Exchanging opinions & Agreeing and disagreeing
R: Scanning – reading news paper articles for specific information
W: Argumentative writing – Letter to the editor

Language focus: Modals, Continuous and perfect tenses, Framing questions & Question tags
B.Tech. Civil Engineering

MODULE III

L- Listening to a specific topic & predicting the content
S – Getting into conversation- Gathering information
R - Reading between lines
W - Letter inviting a dignitary-Expository Writing
Language Focus: Homonyms & Collocation

MODULE IV

L: Listening to telephonic conversation, listening for specific information (Intensive)
S: Short presentations
R: Referential and Inferential reading
W:– Letter seeking permission for industrial visit
Language focus: Subject, Verb agreement & Euphemism

MODULE V

L: Listening to scientific podcasts – Cloze exercises
S: Personal narrations
R: Intensive reading – Interpreting graphical data.
W: Describing a process, Flow chart, Bar chart
Language focus: Passive forms, Connectives & Prepositions

MODULE VI

L: Appreciation and critical review of popular movie--The Incredibles
S: Discussion in groups - Three Idiots
R: Extensive reading – APJ Abdul Kalam’s Wings of Fire - Reading for critical appreciation
B.Tech. Civil Engineering

W: Writing slogans – Rewriting a story with a different ending

Language focus: If clause, Phrasal verbs & Idiomatic expressions

Total Hours: 45

REFERENCES:

OUTCOMES:
After completion of the course, students will have the ability to

• Explore new information from various sources and perform communicative tasks.
• Demonstrate their range of vocabulary in academic and technical contexts.
• Exchange ideas and make presentations.
• Identify, comprehend and respond to different intonation patterns.
• Infer meaning from reading texts.
• Create and construct different kinds of academic documents.
• Communicate effectively using grammatically correct expressions.
OBJECTIVES:
• To improve their proficiency in French language.
• To empower them for successful communication in their professional contexts.

DOSSIER 0 FENÊTRE SUR...

Contenus – l'alphabet - se presenter – les langues – les nationalités – les nombres de 0 à 60 – les adjectifs de nationalités – les verbes : s’appeler, être.

L’acte de parole

DOSSIER 1 LES UNS, LES AUTRES....


Demander quelque chose – les mois de l’année – les nombres de 70 à 99 – les articles indéfinis – l’adjectif interrogatif (quel, quelle)


L’acte de parole

DOSSIER 2 ICY/AILLEURS

Contenus – Parler de sa ville – Donner/ Demander des explications – les prépositions de lieu – articles contractés – pourquoi / parce que

Auberges de jeunesse et hôtels – s’informer sur un hébergement- quelques verbes et indications de direction – quelques formules de politesse.

Le code postal et les départements le libellé d’une adresse en France – Ecrire une carte postale – Dire le temps qu’il fait – les adjectifs démonstratifs - Formules pour commencer / terminer.

L’acte de parole
Contenus – Les animaux de compagnie les animaux préférés des Français - parler de sa profession – les professions - les activités sportifs - les noms animaux – les verbes : aimer, adorer, détester, faire, aller.

Nouveaux mode de rencontres – caractériser une personne (physique et psychologique) – les adjectifs qualificatifs – les pronoms toniques.


L’acte de parole

L’examen oral

Total Hours: 45

TEXT BOOK:
1. Alter EGO I – Goyal – Langers (0 – 5 Lessons)

OUTCOMES:
On completion of the course,
• The students will be able to deal with their clients effectively at global level.
• Their proficiency in French Language will have improved.
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**OBJECTIVES:**
- To read and write in Arabic language.
- To learn vocabulary of different fields
- To develop situational communication skills.

**MODULE I  PREPARATORY ARABIC**

- Introducing Arabic Alphabets.
- Listening and Reading.
- Audio & Video aided listening, Tajweed listening,
- Writing Arabic Alphabets (connected & unconnected).
- Introducing words.
- Reading simple sentences.
- Learning names of the things in and around the class room.
- Exercises.

**MODULE II  FUNCTIONAL ARABIC**

- Listening Arabic texts, stories and action verbs
- Communicating Simple sentences.
- Jumla' Ismiyya and Jumla' Fi'ilyya
- Situational Conversation:
  - Greetings, Introduction.
  - Classroom, College, Picnic.
  - Dining and Kitchen.
- Reading skills.
- Exercises
MODULE III  FUNCTIONAL ARABIC

Implication of effective listening.

Audio aids.

Writing Simple sentences.

Communicating ordinal and cardinal numbers.

Situational communication:
Playground, library.

Forms of plural – Sample sentences.

Introduction to tenses.

Exercises.

MODULE IV  FUNCTIONAL ARABIC

Communication:

Family, travel

Market, Prayer hall

Writing skills:

Note making.

Sequencing of sentences.

Developing answers from the questions.

Exercises.

MODULE V  TECHNICAL ARABIC

Importance of technical communication.

Reading and writing skills.

Audio & Video aided listening.

Introduction to Arabic terms related to administration.
B.Tech. Civil Engineering

Situation communication:

Air travel, Office administration, passport, visa.

Exercises.

MODULE VI TECHNICAL ARABIC

Situation communication:

Contractual work, machineries and equipments.

Computer, internet browsing.

Banking,

Exercises.

Total Hours: 45

TEXT BOOK:

1. Arabic for professionals and employees, Kilakarai Bukhari Aalim Arabic College, Chennai, India, 2013.

REFERENCES:

1. Arabic Reader for Non Arabs (Ummul Qura University, Makkah), Kilakarai Bukhari Aalim Arabic College, 2005.

OUTCOMES:

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

• Write correct sentences in Arabic.

• Communicate in Arabic at primary level in working situations in the fields of engineering and administration.
OBJECTIVES:

- To introduce basic physics concepts relevant to Engineering and Technology students.
- To get familiarize with solving problems in basic physics.
- To acquaint applications of physics for Engineering issues.

MODULE I PROPERTIES OF MATTER


MODULE II CRYSTAL PHYSICS


MODULE III QUANTUM PHYSICS


MODULE IV WAVE OPTICS

MODULE V  LASER & FIBRE OPTICS


MODULE VI  ULTRASONICS AND NDT


Total Hours: 45

TEXT BOOKS:

REFERENCES:
B.Tech. Civil Engineering


OUTCOMES:

At the end of the course, the students will be able to

• Apply the knowledge of properties of matter in Engineering Mechanics and Fluid Dynamics.
• Characterize Engineering materials
• Use Lasers for Fiber Optics Technology and Material Processing
• Do non-destructive testing using Ultrasonic Techniques
OBJECTIVES:
To make students conversant with the

- Water specification for potable and industrial purposes and various treatment methods.
- Different engineering materials, their physico-chemical properties and specific applications.
- Concept of electrochemistry, corrosion and theories of corrosion.
- Principles of spectroscopy and applications.
- Basic principles of green chemistry and the need for green processes in industries.

MODULE I  WATER TECHNOLOGY  8

MODULE II  ENGINEERING MATERIALS  8

Refractories: characteristics, classification – acid, basic and neutral refractories, properties – refractoriness, refractoriness under load, dimensional stability, porosity, thermal spalling – general method of manufacture of refractories, properties and uses of high alumina bricks, magnesite and zirconia bricks.

Nanomaterials: Definition – types of Nanomaterials; nanofilms, nanowires, carbon nanotubes, quantum dots and fullerenes (C60) – Size and shape
dependent optical, electrical, thermal and mechanical properties; Synthesis of nanomaterials – Top down and bottom up approach; Applications of nanomaterials – Catalysis, Electronics and Telecommunication, Medicines, Composites and Energy.

MODULE III ELECTROCHEMISTRY AND CORROSION

Construction of a cell – Standard and single electrode potential – electrochemical series – EMF and its measurement – Nernst equation, application and problems – Types of electrodes: standard hydrogen electrode, calomel electrode, ion selective electrode - glass electrode and determination of pH using glass electrode – polarization, overvoltage, decomposition potential (statements only) – Conductometric and potentiometric titrations.

Corrosion: Definition – Dry corrosion and Wet corrosion with mechanisms – Factors influencing corrosion.

MODULE IV CHEMISTRY OF POLYMERS


MODULE V SPECTROSCOPY


MODULE VI GREEN CHEMISTRY

Introduction – Significance – Industrial applications of green chemistry; Green technology – Latest green laboratory technique for saving experimental resources and infrastructural framework; Principles of green chemistry – R4M4
model (Reduce, Reuse, Recycle, Redesign; Multipurpose, Multidimensional, Multitasking, Multi-tracking) – Life cycle analysis technique (cradle to grave approach)

Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course, students will be able to

• estimate the degree of hardness and alkalinity in water and describe treatment methods for potable water.

• summarise the properties and uses of various engineering materials and choose the appropriate material for a given application.

• illustrate the different types of electrodes, calculate the emf and apply the electrochemistry principles to explain the mechanism of corrosion.

• describe the mechanism of polymerization and moulding techniques.

• explain the principles and instrumentation of various analytical techniques and adopt the suitable techniques for analysis of compounds / elements.

• outline the principles and significance of green chemistry.
OBJECTIVES:

- To introduce the students of all engineering programs, the basic concepts of engineering drawing, which is the basic communication medium for all engineers
- To provide an exposure to the appropriate standards for technical drawings
- To provide practical exposure on important aspects like drawing analytic curves, orthographic projections, section of solids, development of surfaces, pictorial views and free hand drawing
- To introduce computerized drafting

MODULE I  BASICS AND ENGINEERING CURVES  10

Drawing instruments, dimensioning, BIS conventions, types of lines, simple geometric constructions.

Conic sections: ellipse, parabola, hyperbola

Special curves: Cycloid, epicycloid, hypocycloid, involutes, helix

MODULE II  ORTHOGRAPHIC PROJECTION  8

Orthographic projection – first angle, third angle projection methods, free hand sketching of orthographic views of simple machine parts as per first angle projection. Projection of points. Commands and demonstration of drafting packages.

MODULE III  PROJECTION OF STRAIGHT LINES AND PLANES  10


MODULE IV  PROJECTION OF SOLIDS  10

Projection of solids: Axis inclined to one reference plane only - prism, pyramid, cone, cylinder – change of position and auxiliary projection methods.
B.Tech. Civil Engineering

MODULE V  SECTION OF SOLIDS AND DEVELOPMENT OF SURFACES  

10

Section of solids: prism, pyramid, cone, cylinder, and sphere – sectional views – true shape of sections - solids in simple position and cutting plane inclined to one reference plane only.

Development of surfaces: truncated solids - prism, pyramid, cone, cylinder, frustum of cone and pyramid.

MODULE VI  PICTORIAL PROJECTIONS  

12

Isometric projection: isometric scale - isometric projection and view of prism, pyramid, cylinder, cone, frustums and truncated solids.

Perspective projection: prism, pyramid, cylinder, frustums – visual ray and vanishing point methods.

Total Hours: 60

TEXT BOOK:

REFERENCES:

OUTCOMES:
Students who complete this course will be able to:
• draw various views of engineering components
• graphically communicate their concepts and ideas on new designs
OBJECTIVES:

- To describe the fundamental and basic concepts of Sociology.
- To illustrate how society evolved in India with changes in social strata.
- To explain the importance of groups, teams in industrial spheres.
- To develop the knowledge of social impact of economic liberalization and technology.
- To state some basic concepts on ethics, values and human rights.
- To develop social responsibility & human professional ethics.
- To recognize and determine the role of engineers in the economic and social development of the society.

MODULE I  FUNDAMENTALS OF SOCIOLOGY  8


MODULE II  SOCIOLOGY IN INDIAN CONTEXT  7


MODULE III  INDUSTRIAL SOCIOLOGY  7

Definition and perspectives – Industry in India – Social groups in industry – Behaviour pattern, Group Dynamics – team, enhancing group behaviour. Industrial Organization - formal and informal organizations, Line and staff organizations - functions.

MODULE IV  INDUSTRIAL – SOCIETY INTERFACE  8

B.Tech. Civil Engineering

MODULE V  ETHICS AND HUMAN VALUES  7

Ethics and values – Organizational values – personal worth, ethical behaviour, Professional ethics-professional rights and responsibilities, Whistle blowing, International ethics, Corruption.

MODULE VI  ENGINEERS AND SOCIETY  8


Total Hours: 45

REFERENCES:

8. Ram Ahuja, Social Problems in India,Rawat Publications ,New Delhi

OUTCOMES:
On successful completion of this course,

• Students will have exposure to the fundamentals and the basic concepts of Sociology.
• Students will have gained knowledge about the reality of the society.
• Students will be able to positively respond to the forces of change.
B.Tech. Civil Engineering

- Students will inculcate common interests of the group and adopt legitimate means to achieve them.
- Students will have knowledge about the impact of technology, modernization, and globalization.
- Students will be able to conform to the rules of the society and communicate effectively with the engineering community and with the society at large.
- Students will work effectively as individuals, in teams and in multi-disciplinary settings together with the capacity to undertake holistic development of the society.
OBJECTIVES:

• To understand the basic concepts of properties of matter, wave optics
• To understand the properties of ultrasonic and Laser.
• To understand the crystal growth technique.
• To correlate the experimental results with the theoretical values.

LIST OF EXPERIMENTS:
1. Tensional Pendulum- Determination of rigidity modulus of a given wire.
2. Determination of coefficient of viscosity of a liquid by Poiseuille’s method.
3. Determination of Young’s modulus of a beam using non – uniform bending method.
4. Determination of a thickness of a given wire – Air wedge.
5. Spectrometer- determination of wavelength of given source by using grating.
7. Determination of numerical aperture and acceptance angle of an optical fiber.
9. Growth of crystal by slow evaporation technique.
10. Determination of angle of divergence of Laser beam.
11. Photo electric effect experiment.

OUTCOMES:
On completion of this course, the student will know
• Properties of matter, wave optics and quantum physics
• Properties and application of Ultrasonic and Laser
• Principle and concept of crystal growth technique.
OBJECTIVES:
To make students conversant with the
• estimation of hardness and TDS in water samples.
• Construction of cell and determination of EMF.
• Estimation of pH of solutions.
• Verification of Beer Lambert’s law.

LIST OF EXPERIMENTS:
1. Estimation of hardness in domestic water.
2. Estimation of total dissolved solids (TDS) in domestic water
3. Construction and determination of emf of a cell.
4. Determination of single electrode potential.
5. Estimation of strong acid in the industrial effluents
6. Estimation of Fe2+ present in unknown sample – by Potentiometry
7. Verification of Beer-Lambert’s law and estimation of Cu2+ present in unknown sample.
9. Study of effect of inhibitors in free radical polymerization (Demo)

OUTCOMES:
At the end of the course, students will be able to
• estimate the degree of hardness and TDS in water samples.
• construct and calculate EMF of cell.
• apply the concept of Beer lamberts law.
OBJECTIVES:

- To provide a practical exposure to basic engineering practices like carpentry, fitting, plumbing, welding and making of simple electrical and electronic circuits
- To have an understanding on the use of various tools, instruments and methods
- To enable the students to appreciate the practical difficulties and safety issues

CIVIL ENGINEERING PRACTICE
1. Study of plumbing in general household and industrial systems
2. Making a small window frame with Lap and Mortise & Tenon Joints

MECHANICAL ENGINEERING PRACTICE
1. Fabrication of a small Table frame with Butt, Lap and Fillet Joints
2. Machining of a simple component like a table weight using lathe
3. Mould preparation for simple component

ELECTRICAL ENGINEERING PRACTICE
1. Comparison of incandescent, Fluorescent, CFL and LED lamps.
2. Study of Protection Circuits (small relay, fuse, MCB, HRC, MCCB, ECCB).
3. Familiarization of households Electrical Gadgets (Iron Box, Wet Grinder).
4. Understanding of Domestic and Industrial wiring.
5. Earthing and its significance.
6. Troubleshooting in Electrical Circuits.
7. Study of inverter fed UPS/Emergency lamp.

ELECTRONIC ENGINEERING PRACTICE
1. Identifications symbolic representation of active and passive electronic components
2. Soldering and tracing of electronic circuits and checking its continuity
3. Assembling of A.C. to D.C, D.C to A.C. Circuits in bread Board and Mini project
B.Tech. Civil Engineering

OUTCOMES:

Students who complete this course

• Should be able to appreciate the practical skills needed even in making of simple objects, assemblies and circuits

• Should be able to attend minor defects especially in items used in day to day life

• Should be aware of the safety aspects involved in using tools and instruments
OBJECTIVES:

- Expose fundamental concepts and techniques in computer programming
- Give coverage on application logic in programming
- Focus on solving practical problems based on analyzing, designing, and implementing computer programs

MODULE I  FUNDAMENTALS OF COMPUTERS  
Evolution – Generations - Classifications – Applications – Computer organization – Hardware in a typical computer – Identification - Booting – Booting error messages - Number system - Number system conversions

MODULE II  BASIC PROGRAMMING AND DEBUGGING  
Software types – Types of Operating systems - Software development steps – Information technology and internet - The programming tool - Structure of a basic program – Hello world program – Debugging it – Character set – Delimiters – Keywords, identifiers – Constants – Variables — Tools and help features – Comments in a program

MODULE III  INPUT AND OUTPUT  
Data types - Type conversions - Input/output: Formatted functions – Unformatted functions – Library functions – Debugging the code – Systems software: Compiler – interpreter- linker – loader - Finding the correct answer given a code snippet and justifying it

MODULE IV  PROBLEM SOLVING  

MODULE V  OPERATORS AND DECISION STATEMENTS  
Properties of operators – Priority of operators – Arithmetic relational logical and bitwise operators – If –if else- nested if else- go to- switch case – nested switch case – for loops – nested for loops – while loop – do-while loop – break and continue statement
MODULE VI  ARRAYS AND LOOP CONTROL STATEMENTS

Arrays – Initialization – Definition – Characteristics – One dimensional array – Two dimensional arrays - Multi dimensional arrays – Predefined streams - Operation with arrays – Sorting and searching – Structures – Operations on structures

LIST OF EXPERIMENTS:

1. Computer organization – Hardware in a typical computer Identification – Booting - error messages and what it means
2. Types of Operating systems – Windows and Linux
3. Structure of a basic program - Hello world program – Debugging it
4. Data types Type conversions
5. Input/output: Formatted functions – Unformatted functions – Library functions
6. Properties of operators – Priority of operators – Arithmetic relational logical and bitwise operators
7. If – if else- nested if else- go to- switch case – nested switch case – for loops – nested for loops – while loop – do-while loop – break and continue statement
8. Arrays – Operation with arrays
9. Sorting and searching

Total Hours: 60

TEXTBOOKS:


OUTCOMES:

Students who complete this course will be able to:

• Apply Modular design, logic flow and data abstraction in programming paradigm.
• Use the concepts of constructs, functions, I/O and algorithms in the programming environment.
• Develop simple real time applications using the programming constructs and algorithms
OBJECTIVE:
The aim of the course is to

- train the students in additional areas of Engineering Mathematics, necessary for grooming them into successful engineers. The topics will serve as basic tools for specialized studies in many engineering fields, significantly in fluid mechanics, field theory and communication engineering.

MODULE I  DOUBLE INTEGRALS  
Double integration – Cartesian and Polar coordinates – change of order of integration – area as a double integral — change of variables between Cartesian and polar coordinates.

MODULE II  TRIPLE INTEGRALS AND SPECIAL FUNCTIONS  
Triple integration in Cartesian coordinates - change of variables between cartesian, cylindrical and spherical polar coordinates - Beta and Gamma functions.

MODULE III  VECTOR INTEGRATION  
Line, surface and volume integrals – Green’s, Gauss Divergence and Stoke’s theorems (without proof) – verification and evaluation of integrals using them.

MODULE IV  ANALYTIC FUNCTION  
Analytic function - Necessary and Sufficient condition (Proof not included) – Cauchy-Riemann equations in polar coordinates - properties of analytic function – determination of analytic function – conformal mapping (w = z+a, az and 1/z) and bilinear transformation.

MODULE V  COMPLEX INTEGRATION  
Statement and application of Cauchy’s integral theorem – Cauchy’s integral formula – Taylor’s series and Laurent’s series expansion – singularities - classification – residues - Cauchy’s residue theorem – contour integration – Unit circle and semi circular contours (excluding poles on the real axis).
Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange’s linear equation – Linear partial differential equations of second and higher order with constant coefficients.

L – 45; T – 15; Total Hours- 60

TEXT BOOKS:

REFERENCES:

OUTCOMES:
On completion of the course the students will be able to

• solve integrals of higher orders.
• apply vector calculus for solving engineering problems.
• solve complex differentiation and integration problems related to engineering.
• formulate practical problems in terms of partial differential equations, solve them and physically interpret the results.
OBJECTIVES

- To make the student conversant with the concept of corrosion, types and prevention
- To introduce the sources of energy need for future
- To learn the different building materials and the chemistry involved in it
- To know the different polymeric materials and their classifications and applications
- To learn the concept of bonding and chemical kinetics

MODULE I  CHEMICAL BONDING AND KINETICS  8

Types of bonds-ionic, covalent, dative, metallic, hydrogen bonds and van der Waals forces. VB theory - hybridization - VSEPR model and molecular shapes. MO theory - Energy levels - bond order - bond energy - bonding in homonuclear diatomic molecules.

Kinetics – introduction - basic concept - rate of the reactions - rate equation - rate constant – order – molecularity. Kinetic equations (1st and 2nd order reactions only) - Arrhenius equations - effect of temperature on rate (and problems) - Collision theory

MODULE II  CORROSION  7

Chemical corrosion – types - difference between chemical and electrochemical corrosion - different oxides - pilling-Bedworth rule - Electrochemical corrosion - types: galvanic, differential aeration corrosion (crevice, pitting, pipeline and wire fence) - stress corrosion - microbial corrosion - corrosion control: Cathodic protection - sacrificial anode and impressed current cathodic methods - selection of metals and design - corrosion inhibitors

MODULE III  PROTECTIVE COATING  8

Treatment of metal surface-inorganic coating-metallic coating-hot dipping-cladding-cementation-electroplating-electrolessplating-chemical conversion coatings-chromate,phosphate,oxide coatings-anodising-organic coating-paint-constituents and functions of paints-mechanism of drying oil and paints-
B.Tech. Civil Engineering

- varnishes-lacquiers-special paints-fire retardant-water proof-temperature indicator-luminous paints

**MODULE IV ENERGY SOURCES**

- Batteries-primary and secondary batteries-dry cell-alkaline battery-lead acid,Ni-Cd and Li-TiS2 batteries-fuel cells-hydrogen oxygen fuel cells-nuclear fission process-characteristics of nuclear fission-chain reaction-nuclear energy-components and functions of nuclear reactor-solar cells-dye sensitized solar cells-wind, tidal and geothermal energy

**MODULE V BUILDING MATERIALS**


**MODULE VI POLYMERS**


**Total Hours: 45**

**TEXT BOOKS:**


**REFERENCES:**

B.Tech. Civil Engineering


OUTCOMES:

At the end of the course, the students will be able to

• analyse the concepts of corrosion, types of corrosion and their prevention methods
• explore the renewable sources for future usage
• classify the different building materials and chemical reactions involved in the process.
• process electroplating over metals and electroless plating over non metals.
• construct a simple cell.
• synthesize thermosetting and thermo plastic polymers.
OBJECTIVES:

- To identify and present the basic concepts of demand, supply and equilibrium.
- To explain the types and concepts of national income and inflation.
- To illustrate the fundamental concepts of money, banking and exchange.
- To create an awareness about the industrial sector, markets and trade and their contribution to economic development.
- To describe the five year plans, budget, fiscal policy and taxation.
- To discuss Indian economy and justify the role of engineers in economic development.

MODULE I  INTRODUCTION  8

Classification of economy – open and closed economy – Sectors of economy – Basic principles of Microeconomics – supply, demand and equilibrium, Elasticity of demand – Pricing models.

MODULE II  NATIONAL INCOME DETERMINATION  7

National income concepts – GNP, GDP, disposable income; Aggregate demand and aggregate supply, Macroeconomic equilibrium - Concepts of MPS, APS, MPC APC, Inflation – Price indices - WPI, CPI and Inflation control.

MODULE III  MONEY AND BANKING  7

Role and functions of money - Monetary System - Money market - Role of Central Bank - Monetary policy - Commercial banks - Development banks - Capital market and Debt market.

MODULE IV  INDUSTRY, LABOUR MARKET AND TRADE  7

Public and Private sectors, Contribution to the National economy - Industrial policy - Labour market - Trade: Domestic and International trade.

MODULE V  BUDGET, POLICIES AND INDICATORS  8

Economic development – Five year plans, Macroeconomic indicators - Central budget - Government tax- revenue and non-tax revenue, Government
expenditures - plan and non-plan expenditures – Fiscal policy – The impact of the budget on the economy.

Module VI  ECONOMIC GROWTH AND THE ROLE OF ENGINEERS  8


Total Hours: 45

REFERENCES:
14. Pindyck, Rubinfeld and Mehta, Microeconomics, Pearson.
B.Tech. Civil Engineering

OUTCOMES:

On successful completion of this course,

- Students will have an exposure to the basic concepts of microeconomics and macroeconomics.
- Students will be able to identify the concepts of national income and inflation.
- Students will be able to apply the knowledge of money, banking and exchange in their real life situations.
- Students will have gained knowledge in government budget, economic planning and its implementation.
- Students will have an overview of the economic reforms introduced in Indian economy.
- Students will be able to analyze the importance of economics and apply the knowledge they have gained in their professional pursuits.
OBJECTIVES:

• To impart knowledge about the basic laws of statics and dynamics and their applications in problem solving

• To acquaint with scalar and vector approaches for representing forces and moments acting on particles and rigid bodies and their equilibrium

• To give an exposure on inertial properties of surfaces and solids

• To provide an understanding on the concept of work energy principle, friction, kinematics of motion and their relationship

MODULE I  VECTOR APPROACH TO MECHANICS 7


MODULE II  EQUILIBRIUM OF PARTICLE 6

Forces in space - Equilibrium of a particle in space - Equivalent systems of forces – Principle of transmissibility – Single equivalent force

MODULE III  EQUILIBRIUM OF RIGID BODY 6

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 –Examples

MODULE IV  PROPERTIES OF SURFACES 8

Determination of Areas – 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 – Physical relevance - Rectangle, triangle, circle from integration
B.Tech. Civil Engineering

- T section, I section, Angle section, Hollow section by using standard formula
- Parallel axis theorem and perpendicular axis theorem – Polar moment of inertia.

MODULE V  LAWS OF MOTION  10

- Impulse and Momentum – Impact of elastic bodies.

MODULE VI  FRICTION  8

Introduction to friction- types of friction- Laws of Coloumb friction- Frictional
force – simple contact friction – Rolling resistance – ladder friction

L – 45; T – 15; Total Hours- 60

REFERENCES:

2. Hibbeler, R.C., Engineering Mechanics, Vol. 1 Statics, Vol. 2 Dynamics,

OUTCOMES:

On completion of this course students:

• should be able to resolve forces, moments and solve problems using various
  principles and laws
• should be able to understand the concept of equilibrium, kinetics and kinematics
  and capable of formulating the governing equations to practical problems
  and provide solutions for those equations entice Hall, 1996.
OBJECTIVE:

- The objective of the course is to equip the students with fundamental knowledge in Geology. It enables the civil engineers to identify the minerals & rocks in the field and understand engineering implications of certain conditions related to the area of construction which is essentially geological in nature.

MODULE I PHYSICAL GEOLOGY 7

Branches and scope of geology – Earth Internal structure – Earth processes -Weathering, volcanism, earthquake and plate tectonics

MODULE II MINERALOGY 8

Elements of Crystallography and Mineralogy –Properties – Physical properties of minerals – Study of the minerals and their uses – Quartz, Feldspar, Hypersthene, Augite, Hornblende, Muscovite, Biotite, etc.

MODULE III PETROLOGY 8

Rocks- Classification of rocks – Distinction between igneous, sedimentary and metamorphic rocks – Engineering properties of different types of rocks

MODULE IV STRUCTURAL GEOLOGY 7


MODULE V GEOLOGY FOR CIVIL ENGINEERING 7

Geological conditions necessary for construction of Tunnels, dams, reservoirs, bridges, runways, roads and buildings – Geophysical investigations

MODULE VI MISCELLANEOUS APPLICATIONS 8

Landslides – Causes and Preventions - Remote sensing applications Study of air photos and satellite images – Interpretation for Civil Engineering Projects – Coastal erosion and coastal preventions

Total Hours : 45
B.Tech. Civil Engineering

TEXT BOOKS:


REFERENCES:


OUTCOME :

• At the end of the course, the students will be able to determine the existence of hard bed rocks, depth and inclination with the surface and the mechanical properties of the bed rocks along and across the proposed site. The students will also be able to detect presence, nature and frequency of the weak structures.
OBJECTIVE:

- To impart the students, overview knowledge of various construction materials such as stone, brick, timber, bitumen, cement, steel etc with respect to type, mechanical properties and applications in Industry. The students also gain knowledge about different construction practices adopted in the site.

MODULE I  STONE AND CLAY PRODUCTS 7

Stones - Classification of rocks - Properties – Selection of stones for different uses. - Clay products - Bricks - Manufacture - IS classifications -Properties and testing - Types of bricks. - Tiles - Manufacture, properties and uses - Types of tiles ; Ceramic products

MODULE II  TIMBER AND BITUMINOUS MATERIALS 7

Timber - Defects - Seasoning - Decay - Preservation - Plywood, fibre board, particle board- bituminous materials –Types and Properties of Bitumen - Bituminous concrete for pavement application

MODULE III  CEMENT, STEEL AND MISCELLANEOUS MATERIALS 8


MODULE IV  BUILDING CONSTRUCTION - OVERVIEW 8


MODULE V  CONSTRUCTION PRACTICES 8

Brick and stone masonry - Types of stone masonry - Cavity walls - Concrete
B.Tech. Civil Engineering

construction - Batching, mixing, placing, compacting and curing of concrete - form work - Precast concrete - Prestressed concrete - Self compacting concrete

MODULE VI BUILDING COMPONENTS 7

Floors and flooring – Types of floors – Roofs and roofings – Types of roofs – roofing materials ; Doors, windows and ventilators – Different types ; Finishing works – Plastering, pointing, painting.

Total Hours : 45

TEXT BOOKS:

REFERENCES:

OUTCOME:
• At the end of the course, the students will acquire appreciable knowledge on various construction materials used in the industry and their properties including application areas. They also possess sufficient knowledge about various construction practices adopted in the Industry.
OBJECTIVES:

• To help students identify content specific vocabulary and learn its usage.
• To teach them formal and informal expressions in business communication.
• To expose them to reading for specific purposes, especially in business contexts.
• To expose them to the process of different kinds of formal writing.
• To train them in using the nuances of writing in corporate correspondence.
• To train them in writing effective applications with résumé and reports.

MODULE I 4

Introduction - process of writing – ABC of academic and professional writing – Instructions and recommendations - Reading business related texts for specific information.

MODULE II 4

Format and conventions of writing email, memo & fax.

Writing email (Case study), memo, fax, agenda and minutes of the meeting (using mobile applications)

MODULE III 6

Format and conventions of writing agenda and minutes of the meeting Letter Writing--Calling for an interview & letter of inquiry

MODULE IV 6

Writing letter of application and Résumé - Different types – Functional, Chronological Writing one’s résumé using Wikispaces

MODULE V 6

Reporting an incident, writing a feasibility report, and progress report & discipline specific reports
B.Tech. Civil Engineering

Reading a case study (industry specific) – collaborative writing using Wikispaces

MODULE VI

Writing Statement of purpose—Assessing one’s strengths and weaknesses & self and peer evaluation of strengths.

Total Hours: 30

REFERENCES:


OUTCOMES:

On completion of the course, the students will have the ability to

• Create different types of academic and professional documents by using the three stages of writing.
• Identify content specific vocabulary and also use them in appropriate contexts.
• Use formal and informal expressions in real life situations.
• Demonstrate reading skills with reference to business related texts.
• Compose written correspondence effectively in work place contexts.
• Write effective letter of applications, résumé and reports.
OBJECTIVE:

The objective of the laboratory course is to make the student understand the fundamental and basic principles of Engineering drawing and also the basic commands of a popular drafting package.

MODULE I COMPUTER AIDED DRAFTING (2-D) 5

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. Drawing of a simple steel truss.

MODULE II TEXTS, SYMBOLS & DIMENSIONS 5

Text – Multiline Text – Text Properties – Symbols – Dimensioning – Linear, Angular etc. Drawing of a Title Block with necessary text and projection symbol.

MODULE III LINES & CURVES 5

Lines – Curves – Different methods of drawing curves
Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)
Drawing of curves like parabola, spiral, Square involutes using spline or cubic spline.

MODULE IV SECTIONAL VIEWS 5

Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.
Drawing front view, top view and side view of objects from the given pictorial views (e.g. Simple and 2-storied Building views, Objects with hole and curves).
Drawing sectional views of prism, pyramid, cylinder, cone, etc,

MODULE V PROJECTIONS 5

Drawing isometric projection of simple objects.

Creation of a Perspective view of building for given position of an observer.
MODULE VI  INTRODUCTION TO CAD 3-D

Basic 3D software commands - Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-D model.

Total Hours : 30

TEXT BOOKS:

REFERENCES:
1. IS 962 : 1989, Code of Practice For Architectural and Building Drawings

OUTCOME:
• At the end of the course, students will be able to draw simple drawings in CAD software applying the basic rules of Engineering drawing.
OBJECTIVES:
• To learn to estimate the amount of metal ion present in the soil
• To learn the corrosion, prevention and the kinetics
• To learn to measure the cell potential
• To learn to estimate the alkalinity of the cement
• To learn to synthesize the polymers and to study the properties

LIST OF EXPERIMENTS:
1. Estimation of copper in the given ore
2. Electroplating (Cu, Ni, etc.)
3. Electrolessplating
4. Determination of corrosion rate in the presence and absence of the inhibitors
5. Determination of half cell potential.
6. Determination of cell potential by Pogendorf method
7. Preparation of polymers (Urea formaldehyde, Nylon-6,6, etc.)
8. Determination of molecular weight and the degree of polymerization of given polymer

OUTCOMES:
• The student learnt to analyze the quality of water and soil involved in the construction
• The student learnt the types of corrosion and their prevention
• The student learnt to synthesize the thermoplastic and thermosetting polymers and to study the properties.
MAB2181  TRANSFORMS AND APPLICATIONS  L  T  P  C

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OBJECTIVES:
The course aims to

- develop the skills of the students in the areas of boundary value problems and transform techniques.
- acquire knowledge on different transforms like Laplace Transform, Fourier Transform and Z Transform.

MODULE I  LAPLACE TRANSFORM  8

MODULE II  FOURIER SERIES  7

MODULE III  BOUNDARY VALUE PROBLEMS  8
Classification of second order quasi linear partial differential equations – Solutions of one dimensional wave equation – One dimensional heat equation – Steady state solution of two-dimensional heat equation (Insulated edges excluded) – Fourier series solutions in Cartesian coordinates.

MODULE IV  FOURIER TRANSFORM  7

MODULE V  Z-TRANSFORM AND DIFFERENCE EQUATIONS  7
Applications of Laplace Transform in solving linear ordinary differential equations - Second order with constant coefficients, Simultaneous First order equations—Applications of Z–transform in solving difference equations using Z–transform.

L – 45; T – 15; Total Hours- 60

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course, the students will be able to
• solve Engineering problems in the area of heat conduction, communication systems, electro-optics and electromagnetic theory using different Transforms.
• solve Boundary value problems encountered in engineering practices.
OBJECTIVES:
The aim of the course is to introduce basic biological concepts to the engineering students to promote cross-breeding of ideas. In particular,

- To provide an overview of cell structure and function.
- To give basic idea on biochemistry related to biological aspects.
- To introduce genes, their structure, inheritance and about living organisms.
- To give an understanding on metabolism, respiration, etc.
- To inform students of engineering about the interface of biology and engineering.

MODULE I BASICS OF CELL STRUCTURE AND FUNCTION 7
Cells as unit of life – basic chemistry of cell – cell structure and functions – Prokaryotic and Eukaryotic cells, cell wall, plasma membrane, endoplasmic reticulum, nucleus, chromosomes - cell division – mitosis, meiosis.

MODULE II BIOCHEMISTRY 8

MODULE III GENETICS 7

MODULE IV MICROBIOLOGY 8
Microbiology – basis of microbial existence – microbial diversity – classification and nomenclature of micro-organisms- impact of microorganisms in industry,

**MODULE V  METABOLISM**


**MODULE VI  BIOLOGY AND ENGINEERS**


Total Hours : 45

**REFERENCES:**


**OUTCOMES:**

After finishing this course students will be able to

- understand basics of biological processes, composition of cell contents
- understand applications of microbes in industrial manufacturing of proteins, antibodies and antibiotics.
- understand cloning and genetic engineering
- identify the genes in different genome (plants, microbes, animals, human) and compare the genes by bioinformatics approaches
OBJECTIVES:

• To provide knowledge on the basics of material strength and its behaviour.
• To enrich understanding of stress-strain behaviour for various loading conditions and stress development in structural elements.
• To impart knowledge to analyse the two dimensional plane trusses.

MODULE I  STRESS, STRAIN AND DEFORMATION OF SOLIDS  8


MODULE II  STRESSES IN BEAMS  8

Beams – Types of transverse loading on beams– Shear force and Bending moment in Cantilever beams, Simply supported beams and Over hanging beams – Theory of simple bending – Bending stress distribution - Shear stress distribution.

MODULE III  DEFLECTION OF BEAMS  8

Double Integration method – Macaulay’s method – Area moment method - Conjugate Beam method for computation of slopes and deflection in determinate beams.

MODULE IV  TORSION  7

Theory of simple torsion – Stresses and deformation in circular and hollow shafts – Stepped shafts – Shafts fixed at both ends – Stresses and deflection of Leaf springs and helical springs.

MODULE V  BIAXIAL STRESSES  7

Principal Stresses, strain and maximum shear stresses - Analytical and Graphical methods - Stresses in thin circular cylinder under internal pressure – Volumetric Strain - Combined loading.

L – 45; T – 15; Total Hours- 60

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course, the student will
- be able to draw bending moment, shear force and axial force diagrams for statically determinate beams.
- have the capability to determine the stresses and member forces for plane frames.
- be able to solve the practical problems using relevant concepts.
# CEB2102 MECHANICS OF FLUIDS

**L T P C**

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<thead>
<tr>
<th>Module</th>
<th>Title</th>
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<tbody>
<tr>
<td>I</td>
<td>Fluid Properties and Pressure Measurement</td>
<td>8</td>
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<tr>
<td>II</td>
<td>Fluid Statics</td>
<td>8</td>
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<tr>
<td>III</td>
<td>Fluid Kinematics</td>
<td>7</td>
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<tr>
<td>IV</td>
<td>Fluid Dynamics and Flow Through Pipes</td>
<td>8</td>
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<tr>
<td>V</td>
<td>Boundary Layer</td>
<td>7</td>
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**OBJECTIVES:**

- To impart understanding of key concepts and fundamental principles pertaining to fluid behavior, both in static and flowing conditions.
- To provide sufficient knowledge to analyze and design engineering systems and devices involving fluids and flow.
- To enhance student’s interest in fluid phenomena and its applications.

**MODULE I  FLUID PROPERTIES AND PRESSURE MEASUREMENT**

- Dimensions and units - Properties of Fluids - ideal and real fluid - Definition of pressure - Pressure at a point - Pascal’s law - Absolute and Gauge pressure - Measurement of pressure - Simple and differential Manometer theory and problems - pressure gauges.

**MODULE II  FLUID STATICS**

- Hydrostatic law - Definition of total pressure, Center of pressure, Metacentric height, buoyant force - Equation for hydrostatic force and depth of center of pressure on plane surfaces (vertical and inclined) - Problems on hydrostatic force on vertical, inclined and curved submerged surfaces.

**MODULE III  FLUID KINEMATICS**

- Fluid Kinematics – velocity and acceleration- Stream, streak and path lines – Classification of flows – Continuity equation (one, two and three dimensional forms) – Stream and potential functions – flow nets and its properties.

**MODULE IV  FLUID DYNAMICS AND FLOW THROUGH PIPES**


**MODULE V  BOUNDARY LAYER**

- Definition of boundary layer – Thickness and classification – Displacement and momentum thickness – Separation of boundary layer – Development of laminar and turbulent flows in circular pipes.
MODULE VI SIMILITUDE AND MODEL STUDY

Dimensional Analysis – Rayleigh’s method, Buckingham’s Pi-theorem – Similitude and models-dimensionless numbers – Scale effect and distorted models.

L – 45; T – 15; Total Hours- 60

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course, the students will
• Be able to identify and formulate governing equations to practical problems related to fluid mechanics.
• Have the ability to apply the basic principles of fluid mechanics to fluid flow analysis and fluid flow measurement techniques.
OBJECTIVES:

- To impart adequate knowledge on concrete constituent materials, fresh and hardened properties of concrete and durability of concrete.
- To make students understand the concepts involved in concrete mix design as per Indian Standards and ACI Method.
- To give exposure to quality control procedures, testing of concrete specimens, special concretes and concreting methods.

MODULE I CONCRETE CONSTITUENT MATERIALS  

MODULE II PROPERTIES OF CONCRETE  
Fresh Concrete properties - Workability and its measurement, Factors affecting workability-Hardened concrete properties – Strength – Elasticity, shrinkage and creep of concrete.

MODULE III DURABILITY OF CONCRETE  
Strength and durability relationship – Volume change in concrete – Permeability – Cracks in concrete - Joints in concrete – Concrete subjected to high temperature – fire resistance, freeze-thaw, deicing effects of salts – Chemical Action – sulphate attack, alkali-aggregate reaction, acid attack- Concrete in Marine Environment – carbonation, chloride attack.

MODULE IV CONCRETE MIX DESIGN & QUALITY CONTROL  
B.Tech. Civil Engineering


MODULE V TEST METHODS AND EQUIPMENT 8

Inspection testing of fresh concrete – acceptance testing of hardened concrete – partially destructive and non-destructive testing.

MODULE VI SPECIAL CONCRETES & CONCRETING METHODS 7


Total Hours: 45

TEXT BOOKS:


REFERENCES:

B.Tech. Civil Engineering

OUTCOMES:

At the end of the course, students will be able to

1. perform concrete mix design as per Indian Standards and ACI Method.
2. determine fresh concrete and hard concrete properties as per procedures outline in Indian standards.
3. recognise various parameters influencing durability performance of RCC structure.
4. apply the knowledge gained on special concrete in different civil engineering applications and appreciate various connecting method adopted in site.
OBJECTIVES:

- To impart knowledge about the nature of surveying data, possible errors and the need for error control.
- To offer knowledge on surveying project fundamentals such as referencing systems, horizontal and vertical control and topographic mapping.
- To impart understanding on surveying data analysis, methods of data recording, display and storage.

MODULE I  INTRODUCTION TO SURVEYING

Basic definitions, objectives, divisions and Importance of Surveying to Engineers; Concept of Geoid and reference spheroids, coordinate systems, plane and geodetic surveys; Classification and principles of Surveying; Output of Survey – Maps, Plans, Scales, Conventional Signs and Symbols; Projections and Coordinate system

MODULE II  LINEAR MEASUREMENTS

Direct and indirect methods of Linear measurement; Tape and Compass – Basic Principles, types of instruments, Errors, Precautions, Chain and tape measurements, Ranging, Errors – Types, Precautions and Corrections; Field problems and their solutions.

MODULE III  ANGULAR MEASUREMENTS - HEIGHTS AND DISTANCES

Angular Measurements - Basic Definitions- meridians, declination-variations, local attraction, Theodolite – Different types and their salient parts, basic terms, fundamental lines, Temporary and Permanent Adjustments, Errors and Mistakes, Methods of Repetition and reiteration, Errors and mistakes, corrections and Accuracy. Tacheometry - Introduction, Basic definitions, Methods, Tacheometers, sub tense bar, fundamental principles; Stadia System-fundamentals, Anallactic lens; Subtence bar method, Errors Motion of Sun and Stars, Azimuth, Calculation of Azimuth using sun observations.

MODULE IV  DETERMINATION OF ELEVATION

Basic Definitions, Curvature & Refraction, Methods; Level – Types and salient
B.Tech. Civil Engineering

parts, working principle, Temporary and Permanent Adjustments, Errors and Mistakes, Leveling Staff, Differential leveling and field book note, Reciprocal Leveling; Profile leveling; Trigonometric leveling, Errors & Mistakes in leveling, Error propagation; Contouring- definition, characteristics, methods and applications.

MODULE V TRAVERSING, TRIANGULATION AND TRILATERATION 10

Plane Tabling - Merits and demerits, accessories; orientation and resection; methods of plane tabling; three point problem and solutions; errors in plane tabling Traversing, Triangulation and Trilateration - Purpose and classification of each; Horizontal and vertical control methods, balancing of traverses, adjustment of traverses and coordinate computation, Triangulation- network, strength of figures, field work, selection of stations, inter-visibility, satellite stations, measurements and computations; trigonometrical leveling. Errors, accuracy and adjustment of each.


MODULE VI PROJECT AND ENGINEERING SURVEYS 5

General requirements and specifications for engineering project surveys; Reconnaissance, preliminary location and surveys for highway, railway and canals; Setting out works – buildings, culverts and simple circular curves, correlation of underground and surface surveys

Total Hours: 45

TEXT BOOKS:

REFERENCES:


OUTCOMES:

At the end of the course, students will be able to

• explain nature of surveying data, identify errors and the need for error control.

• work on surveying project fundamentals involving referencing systems, establishment of horizontal and vertical control and topographic mapping.

• to the necessary correction and calculation for the surveying data.

• analyze surveying data by adopting systematic data recording, display and storage methods.
**ENB2181  ORAL COMMUNICATION**  

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**OBJECTIVES:**

- To empower students with soft skills for employability.
- To help students speak effectively.
- To expose them to a range of business contexts through podcasts for learning appropriate expressions and using them effectively.
- To enable them to make effective presentations.
- To help them learn persuasive and negotiating skills.
- To train them in deliberating on current affairs efficiently by participating in group discussions.
- To prepare them for job interviews.

**MODULE I**  

4  

Training in soft skills-Importance of Oral Communication, rubrics for evaluation, Verbal and non-verbal communication, One-minute presentations & Just a minute (JAM)

Paralinguistic features - Listening to short conversations and monologues for relevant information.

**MODULE II**  

6  

Role-play, Selling a product , marketing skills (Case study on advertisements)  
Listening to Business English podcast, Negotiation, persuasion and marketing skills

**MODULE III**  

4  

Deliberation on social and scientific issues & Debates (Peer and Faculty feedback)  
Viewing video samples on debates, TED Talks

**MODULE IV**  

4  

Pair work- Think, pair and share activity-analyzing & Problem solving Listening for specific information and taking short notes
MODULE V

Discussion etiquette - Assigning different roles in a GD (Peer and Faculty feedback)
Goal setting, Assessing one’s strengths and weaknesses & SWOC Analysis

MODULE VI

Mock interview (Peer and Faculty feedback) –
Types of Job Interview – Telephone Interview, Stress Interview (Case study)
Listening to interviews for understanding speakers’ opinions

Total Hours: 30

REFERENCES:


OUTCOMES:

On completion of the course, students will be able to

• Apply various soft skills to deal with any professional situation.
• Speak English intelligibly, fluently and accurately.
• Use a range of expressions appropriate to the situations.
• Make effective presentations.
• Use persuasive and negotiating skills for marketing products.
• Deliberate on current affairs with confidence.
• Participate effectively in group discussions and interviews.
OBJECTIVES:

- To enable students to understand and apply the basic principles of surveying
- To impart students training in the usage of various survey instruments such as chain, compass, plane table, leveling and theodolite for different application areas.

MODULE I  CHAIN SURVEYING  9

- Study of chain and its accessories - Ranging, chaining and Pacing - Chain traversing without cross staff - Chain traversing with cross staff.

MODULE II  COMPASS SURVEYING  9

- Study of Prismatic and Surveyor’s Compass - Triangulation problem - Compass traversing.

MODULE III  PLANE TABLING  12

- Plane Table – radiation method, Intersection Method, Three Point Problem, Mechanical Method, Three Point Problem and Trial and Error Method

MODULE IV  LEVELLING  12

- Fly Leveling - Longitudinal Sectioning - Cross Sectioning

MODULE V  INTRODUCTION TO THEODOLITE  3

- Demonstration of theodolite

Total Hours: 45

TEXT BOOKS:


REFERENCES:

OUTCOMES:
At the end of the course, students will be able to

• undertake different surveying works and identify the proper instruments for execution.
• execute surveying for different application needs by identifying and controlling errors.
OBJECTIVES:

- To provide adequate knowledge on properties of various construction materials such as cement, fine aggregate, coarse aggregate, bricks and tiles through conducting tests as per Indian Standards.
- To impart knowledge on validation of materials for construction application.

MODULE I STANDARDS AND TEST PROCEDURE

Relevant Indian Standards for testing cement, steel, fine aggregate, coarse aggregate, bricks and tiles.

MODULE II TESTS ON CEMENT

Type of cement - grade of cement - fineness and standard consistency - initial and final setting time - specific gravity - soundness test.

MODULE III TESTS ON FINE AGGREGATE

Particle size distribution (Sieve analysis) - classification as per Indian standards - silt content - specific gravity - water absorption - density.

MODULE IV TESTS ON COARSE AGGREGATE

Particle size distribution (Sieve analysis) - specific gravity - density - water absorption - flakiness index

MODULE V TESTS ON BRICKS AND TILES


Total Hours: 45

REFERENCES:


B.Tech. Civil Engineering


4. IS 2386-Part I-1963 Methods of Test for Aggregates for Concrete – Particle Size and Shape, Bureau of Indian Standards.

5. IS 2386-Part 3-1963 Methods of Test for Aggregates for Concrete – Specific Gravity, Density, Voids, Absorption and Bulking, Bureau of Indian Standards.


OUTCOMES:

At the end of course, students will be able to

- determine various properties of cement, steel, fine aggregate, course aggregate, bricks and tiles by conducting test as per Indian standards.
- able to recommend the suitability of construction material for different civil engineering applications.
B.Tech. Civil Engineering

CEB2107 CIVIL ENGINEERING DRAWING L T P C 0 0 3 1

OBJECTIVES:

- To enable the students to understand the fundamental and basic principles of building drawing
- To impart knowledge in basic commands of a drafting package.
- To provide training to plan and draw different views of buildings according to building rules.

MODULE I  INTRODUCTION TO BUILDING COMPONENTS  6

Building components – Substructure – Footings & Pedestals - Superstructure – Columns and Beams - Floors and Roofs - Walls - Lintels - Sunshades - Joineries etc.

MODULE II SIGN CONVENTIONS & MANUAL DRAWINGS  6

Drawing of conventional signs and symbols for basic engineering materials as per B.I.S - Methods of development of sectional views from building plans – Drawing of simple house plans.

MODULE III LOAD BEARING STRUCTURES  9

Buildings with load bearing walls – Plan , Elevation & Section of a Residential Building with masonry walls (Manual & CAD)

MODULE IV R.C.C. FRAMED STRUCTURES  9

Different types of residential buildings – Plan & Sectional views of a RCC building using CAD

MODULE V INDUSTRIAL BUILDING  9

Drawing sectional View of an Industrial Building using CAD – North light roof Structure.

MODULE VI SERVICE PLANS  6

Electrical, plumbing, gas lines for a residential building as per B.I.S

Total Hours: 45
B.Tech. Civil Engineering

TEXT BOOKS:


REFERENCES:


OUTCOME:

• At the end of the course, students will be able to plan and draw different views of building according to building rules manually and by using software packages.
OBJECTIVE:

- This course gives a complete procedure to solve problems in engineering numerically, where analytical method fails to give solution.

MODULE I  SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS 7


MODULE II  INTERPOLATION AND APPROXIMATION 7

Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton’s forward and backward difference formulas.- Relations between operators (E, \(\nabla\), \(\mu\), \(\Delta\), \(\Delta^2\))

MODULE III  NUMERICAL DIFFERENTIATION AND NUMERICAL INTEGRATION 8


MODULE IV  INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL EQUATIONS 8


MODULE V  NUMERICAL SOLUTIONS OF ORDINARY DIFFERENTIAL EQUATIONS 8

Millne’s Predictor and Corrector Method – Adam’s Predictor-Corrector Method
- Finite difference methods for two – point Boundary Value problems for Ordinary Differential Equations.

**MODULE VI  BOUNDARY VALUE PROBLEMS FOR PARTIAL DIFFERENTIAL EQUATIONS**

Finite difference solution of one dimensional heat equation by explicit and implicit methods – One dimensional wave equation and two dimensional Laplace and Poisson equations.

L – 45; T – 15; Total Hours- 60

**TEXT BOOK:**

**REFERENCES:**

**OUTCOMES:**
At the end of the course students will be able to

- solve system of equations and Eigen value problem of a matrix numerically.
- use interpolation and find intermediate values for given data.
- find numerical solution of differential equations in engineering problems.
OBJECTIVES:
To impart knowledge on the
• Application of energy principles in structures
• Basic concepts of indeterminate beams, columns and struts.
• Various theories of failures, unsymmetrical bending of beams and stresses in cylinders.

MODULE I ENERGY PRINCIPLES 8
Strain energy – strain energy in axial force – flexure, shear and torsion – Castigliano’s theorems –Application of energy theorems for computing deflections in beams and trusses – Maxwell’s reciprocal theorem – Betti’s theorem

MODULE II INDETERMINATE BEAMS 8
Static determinancy and indeterminancy of beams - Fixing moments for a fixed beam of uniform section, slope and deflection. Continuous Beams: Analysis, Reaction at the supports, and Effect of sinking of supports.

MODULE III COLUMNS AND STRUTS 7
Classification of Columns - Euler’s theory of long columns – Critical loads for prismatic columns with different end conditions - Rankine-Gordon formula - Eccentrically loaded columns.

MODULE IV THEORIES OF FAILURE 7
Theories of failure – strain energy and distortion energy theories – Application in analysis of stress, load carrying capacity and design of members.

MODULE V BENDING OF CURVED BARS AND UNSYMMETRICAL BENDING 8
Stresses on Curved beams for simple solid sections – Winkler Bach formula-Unsymmetrical bending of beams - Symmetrical and unsymmetrical sections
Stresses in Thick cylinders subjected to internal and external pressure and compound cylinders - Stresses and strains in thin spherical shell

Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course, students will
• be able to explain the various energy principles and theorems.
• be able to analyzed behavior of indeterminate structures
B.Tech. Civil Engineering

• have the capability to solve axially loaded members for buckling under different boundary conditions.

• be able to demonstrate the development of stresses and strains in thick cylinders and thin spherical shells.
OBJECTIVES:

- To familiarize the students with the flow through open channels and working of hydraulic machines such as various types of turbines and pumps.

MODULE I FLOW MEASUREMENTS


MODULE II FLOW IN OPEN CHANNELS

Definition of open channels –classification -types of flow -Geometric properties of open channels- Uniform flow in open channels-Chezy’s and Manning’s formulae- Most economical open channels- Derivation of conditions for rectangular, triangular, trapezoidal and circular sections -Specific energy-definitions- specific energy curve- conditions for minimum specific energy and maximum discharge- Critical flow calculations.

MODULE III VARIED FLOW


MODULE IV IMPACT OF JET ON VANES

Introduction to Impulse – momentum equation and its applications- Derivation for Force exerted by a jet on a fixed target, moving target, curved vane and on a series of curved vanes- Concept of velocity triangles- Equation for work done & efficiency.
B.Tech. Civil Engineering

MODULE V  PUMPS

Centrifugal pump –work done and efficiency- minimum speed to start the pump – multistage Pumps – Jet and submersible pumps - Positive displacement pumps - reciprocating pump – working principle - work done- slip - flow separation conditions - air vessels - indicator diagram and its variation - savings in work done – characteristic curves- Introduction to rotary pumps

MODULE VI  TURBINES

Turbines - classification - radial flow turbines - axial flow turbines – Impulse and Reaction turbines - draft tube theory - performance of turbines - similarity laws

L – 45; T – 15; Total Hours- 60

TEXT BOOKS:


REFERENCES:

B.Tech. Civil Engineering

OUTCOMES:

At the end of the course, students will

• have the ability to analyze the flow characteristics in open channel.
• be able to analyse the performance of a hydraulic machine.
OBJECTIVES:
• To impart knowledge on quantity, quality, treatment & distribution of drinking water
• To provide understanding on quantity, quality, collection & conveyance, treatment and disposal of domestic sewage.
• To expose students to house plumbing techniques and house sanitation

MODULE I WATER QUANTITY & QUALITY 8
Water Supply Engineering – Quantity of water, types of water demand, fluctuation in demand, factors affecting consumption, forecasting population – design period. Sources of water – surface water sources, intakes, ground water sources

MODULE II WATER TREATMENT & DISTRIBUTION 8

MODULE III WASTEWATER ENGINEERING 8
Introduction to Sanitary & Sewerage systems, Wastewater flows, and characteristics, Wastewater collection systems, Estimation and variation of wastewater flows. Treated wastewater reclamation and reuse, wastewater preliminary, primary, secondary and tertiary treatment processes. Screens, grit chambers & their design, sedimentation, coagulation, flocculation.

MODULE IV ADVANCED WASTEWATER TREATMENT 7
Theory of activated sludge process, extended aeration systems, trickling filters, aerated lagoons, stabilization ponds, oxidation ditches etc. Introduction to Duckweed Pond, Vermiculture and root zone technology for wastewater treatment, concept of anaerobic contact process, anaerobic Filter, anaerobic fixed film reactor, fluidized bed and expanded bed reactors and up flow anaerobic sludge blanket (UASB) reactor.
Module V  Waste Water Disposal & Sludge Handling

Disposal of treated waste water on land and in water bodies, ocean discharge, agricultural irrigation, ground water recharge, problems - Sludge characterization – Thickening – Sludge digestion – Biogas recovery – Sludge Conditioning and Dewatering – disposal – Advances in Sludge Treatment and disposal.

Module VI  Water Supply and Drainage in Buildings


L – 45; T – 15; Total Hours- 60

Text Books:


References:

B.Tech. Civil Engineering

OUTCOMES:

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

• plan water supply scheme and sanitation scheme for waste water.
• design house plumbing system and sanitation system.
OBJECTIVE:

- To impart basic knowledge on highway engineering, geometric design of highways, highway materials, hill roads, traffic management and airport engineering.

MODULE I  INTRODUCTION TO HIGHWAY ENGINEERING  7

Role of Transportation Engineering; Modes of transportation- Their importance and limitations; Importance of Highway Transportation; Highway Planning- Principle of Highway Planning, Road development and Financing, Privatization of Highways, Highway Alignment Requirements, Engineering Surveys for Highway locations.

MODULE II  GEOMETRIC DESIGN OF HIGHWAYS  8

Cross section elements, Width, Camber, Design Speed, Sight distances, Requirements and Design of horizontal and Vertical Alignments; Different type of Road; Pavement construction- Types of Pavement, Earth work, Sub grade, Water bound macadam, Bituminous Macadam, Earthen Roads, Bituminous Surfacing: Rigid Pavement Joints.

MODULE III  HIGHWAY MATERIALS  7

Material Characterization, Test of Sub grade soil, Aggregates and Bituminous Materials, Bituminous Mix design; Pavement Design- Flexible and Rigid; Highway Drainage- Surface Drainage and Sub-soil drainage; Maintenance and Strengthening.

MODULE IV  HILL ROADS  7

Introduction: Importance of hill roads, problems specific to hill road construction; geometric design, alignment survey, Geometry of hill roads, geometric standards; construction: formation cutting, protective structures, cross drainage works; maintenance: drainage, landslides, snow clearance, Curve layout in hill Road.

MODULE V  TRAFFIC ENGINEERING  8

Highway traffic Characteristics, Traffic parameters and inter relationship, traffic
module VI AIRPORT ENGINEERING

Introduction: Advantages and limitations of air transportation. Aeroplane component parts and important technical terms. Airport planning: Aircraft characteristics, which influence judicious and scientific planning of airports, Selection of sites, survey and drawings to be prepared for airport planning. Airport layout: Characteristics of good layout, runway configuration, airport obstruction, location of terminal buildings, aprons and hangers. Zoning requirements regarding permissible heights of constructions and landing within the airport boundary. Runways and taxiways: Runway orientation, wind coverage, use of wind rose diagram, basic runway length, corrections for elevation, temperature and gradient as per ICAO and FAA recommendation. Airport classification by ICAO.

REFERENCES:


Total Hours: 45
B.Tech. Civil Engineering

OUTCOMES:

At the end of the course student will

• gain knowledge on highway engineering, and geometric design of highways.
• be able to identify suitable materials for highway and perform mix design.
OBJECTIVES:

• To describe the Indian Constitution and Governance of our country.
• To explain human rights, local and International and redressal mechanism.
• To discuss the important aspects of corporate laws.
• To state the importance of industrial and labour laws of our country.
• To present the laws on contracts and arbitration.
• To state the importance of laws related to intellectual property.

MODULE I  INDIAN CONSTITUTION


MODULE II  GOVERNANCE AND POWERS VESTED

Union executive, Legislature – Union – State and union territories, Union and state relations, powers vested with parliament and state legislature, emergency provisions - People’s Representatives Act – Election Commission – Election for parliament and state legislature, Judiciary.

MODULE III  HUMAN RIGHTS


MODULE IV  CORPORATE AND LABOUR LAWS

MODULE V  CONTRACTS AND ARBITRATION.  


MODULE VI  LAWS RELATED TO IPR  


Total Hours: 45

REFERENCES:

OUTCOMES:

On successful completion of the course

• Students will ‘be able to apply the basic concepts of Indian Constitution, Governance and power in their real life situation.
B.Tech. Civil Engineering

• Students will have developed knowledge in judiciary, human rights, cultural, social and political rights.

• Students will have synthesized knowledge about the corporate and labour laws, contracts, arbitration and laws related to Intellectual Property Rights.
OBJECTIVES:
• To enable the students to develop communication skills for verbal communication in the work place.

TOPICS OUTLINE:
This course is practical oriented one and exercises will be given to the students group users /individually depending upon the aspect considered. The following aspect will form the broad outline content of the syllabi. The exercises will be designed by the faculty member and coordinated by the overall course coordinator.

LAB ACTIVITIES:
• Introduction: Soft skills definition, examples
• Verbal communication: Case study, communication and discussion o Prepared speech
  o Impromptu speech
  o Debate: Case studies - Attitude and Behavior: role play and exploration o Ability to ask for help – communication and team work
• Manners and etiquette
  o Organization and Planning
  o Time keeping
  o Conduct in workplace o Conscientiousness o Work output
  o Professionalism
  o Motivation
• Ownership of tasks
• Adaptability/flexibility

ASSESSMENT:
The assessment will be continuous and portfolio based. The students must produce the record of the work done through the course of the semester in
B.Tech. Civil Engineering

the individual classes. The portfolio may consist of a) the individual task outline and activities, b) worked out activities c) Pre-designed sheets which may be provided by the Faculty member. The portfolio will be used by the Faculty member for assessment. The course coordinator in consultation with the course committee shall decide at the beginning of the semester, the number of exercises, method of assessment of each and the weightage for the end semester assessment.

OUTCOMES:

The students should be able to:

• develop verbal communication skills
• debate with other students confidently
• communicate effectively their ideas
OBJECTIVES:

- To impart training in making precise measurements using theodolite, by different methods.
- To offer training to measure heights and distances of various features by different methods using theodolite and tacheometer surveying.
- To expose students in setting out works, field astronomy and EDM.

MODULE I  THEODOLITE SURVEYING  15

1. Introduction to Surveying Lab II
2. Measurement of Horizontal Angle by Direct Method
3. Measurement of Horizontal Angle by the Method of Repetition
4. Measurement of Horizontal Angle by Method of Reiteration
5. Measurement of Vertical Angles – Direct Method

MODULE II  HEIGHTS AND DISTANCES  15

3. Determination of Constants of a Tacheometer
4. Determination of Distance using a Tacheometer – Stadia System – at an Angle of Elevation or Depression
5. Determination of Distance using a Tacheometer – Tangential System

MODULE III  SETTING OUT WORKS  9

1. Foundation Marking
2. Simple Curves
3. Transition Curves

MODULE IV  FIELD ASTRONOMY  3

1. Study of Motion of the Sun
2. Determination of Azimuth
B.Tech. Civil Engineering

MODULE V  EDM  3

1. Demonstration of working of EDM
2. Demonstration of working of GPS

Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course, the students will be able to
• use the theodolite and tacheometer surveying for various field applications such as horizontal angles, vertical angles, distance and height measurements.
• set out simple curves and perform foundation marking.
• use field astronomy, EDM and GPS for field surveying.
OBJECTIVES:

- To impart adequate knowledge on properties and behaviour of steel specimens such as hardness, impact resistance, young's modulus, modulus of rigidity and stiffness by conducting tests as per standard procedure.
- To impart understanding about stiffness and modulus of rigidity of real time spring components and method to find young's modulus of wood.

MODULE I INDIAN STANDARDS & TEST PROCEDURES 6

Indian Standards for conducting tension test on metal - Test procedure for determining impact strength, young's modulus, stiffness and modulus of rigidity on metal specimen; and young's modulus of wood.

MODULE II MECHANICAL PROPERTIES OF METAL 15

Hardness of metal by Rockwell and Brinell hardness tests - Impact strength of metal by Izod and Charpy method - Properties of steel rebar by tension test

MODULE III BEHAVIOUR OF MATERIALS UNDER LOAD 15

Stress-strain behaviour of steel rebar and Young's modulus by conducting tension test - Verification of Maxwell reciprocal theorem by conducting bending test on simply supported beam and cantilever beam - Stiffness and Modulus of rigidity of steel specimen by torsion test - Load-deflection behaviour of wood under static bending test to find young's modulus

MODULE IV TESTS ON SPRING 9

Stiffness and modulus of rigidity of open coil spring by compression test - Stiffness and Rigidity modulus of closed coil spring by tension test.

Total Hours: 45

REFERENCES:

1 IS 1521-1972, Method for Tensile Testing of Steel Wire, Bureau of Indian Standards.

2 IS 1786-1985, Specification for High Strength Deformed Steel Bars and Wires for Concrete Reinforcement, Bureau of Indian Standards.

OUTCOMES:
At the end of course, students will

- be able to determine properties of materials such as hardness, impact resistance, young’s modulus, modulus of rigidity and stiffness by conducting tests as per standard procedure.
- have the ability to find stiffness and modulus of rigidity of spring components and young's modulus of wood.
OBJECTIVES:

• To enable the students to learn the fundamental principles of fluid mechanics through experimentation.

• To develop skills for analyzing experimental data, designing and conducting experiments.

MODULE I MEASUREMENT OF FLOW THROUGH TANKS, PIPES AND OPEN CHANNEL 15

Determination of co-efficient of discharge for Orifice and Mouthpiece fitted in a tank by constant head method and variable head method - Determination of co-efficient of discharge for Venturimeter, Orifice meter - Determination of co-efficient of discharge for Notches.

MODULE II MEASUREMENT OF LOSSES IN PIPES 6

Study on friction losses in pipes - minor losses in pipes.

MODULE III PERFORMANCE CHARACTERISTICS OF PUMPS 15

Study on performance characteristics of Jet pump, Centrifugal pump, reciprocating pump and submersible pump.

MODULE IV PERFORMANCE CHARACTERISTICS OF TURBINES 9

Study on performance characteristics of Pelton turbine and Francis turbine.

Total Hours : 45

REFERENCES:


B.Tech. Civil Engineering

OUTCOMES:

At the of the course, students will be able to

• measure the fluid flow through tanks, pipes and open channel; and measure losses in pipes.
• to analyze the performance of different types of pumps and turbines.
OBJECTIVES:

- To impart knowledge on the various structural systems and general behavior of structures.
- To impart knowledge on analysis of determinate and indeterminate structures to determine structural reactions, member forces, deflections using various methods.
- To expose students to analyze the structure using influence lines.

MODULE I  CONCEPTS OF STRUCTURAL ANALYSIS  5
Equations of Equilibrium, Displacements, Compatibility, Boundary Conditions, Principles of Superposition, Degrees of Freedom, Determinate and indeterminate Structures

MODULE II  DEFLECTION OF DETERMINATE STRUCTURES  8
Deflections of pin-jointed plane frames and rigid plane frames - Principles of virtual work - Williot diagram - Mohr's correction

MODULE III  SLOPE DEFLECTION METHOD  8
Continuous beams and rigid frames (with and without sway) - Symmetry and antisymmetry - Simplification for hinged end - Support displacements.

MODULE IV  MOMENT DISTRIBUTION METHOD  8
Stiffness and carry-over factors - Distribution and carryover of moments - Analysis of continuous Beams - Plane rigid frames with and without sway - Naylor's simplification.

MODULE V  MOVING LOADS AND INFLUENCE LINES  8
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 – Application of Muller Breslau’s principle to determinate beams and continuous beams.

Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course, student will
• be able to analyse statically determinate beams, trusses and frames by using various methods
• have the ability to analyze statically determinate and indeterminate structures
OBJECTIVES:
To impart knowledge to students on

- Significance of steel structures, structural steel sections for industry applications and limit state design concept.
- Design of bolted and welded connections.
- Design of compression members, tension members, beams and roof trusses as per IS 800 – 2007 codal provisions.

MODULE I  INTRODUCTION TO STEEL STRUCTURES  4

MODULE II  BOLTED AND WELDED CONNECTION  9

MODULE III  DESIGN OF TENSION MEMBERS  9
Types of sections - behaviour of tension members - Design strength due to yielding, rupture of critical section and block shear - IS 800 : 2007 codal provisions for design - importance of lug angle - concept of shear lag - Design tensile strength of plate, angle and roof truss member - Design of tension members - Design of tension splice

MODULE IV  DESIGN OF COMPRESSION MEMBERS  8
Types of members and forms - short column, long column and buckling phenomenon - slenderness ratio - effective length - buckling class - IS 800 :

MODULE V DESIGN OF BEAMS

Importance and functions - behaviour of steel beams - IS 800 codal provisions - design of simply supported beams - web crippling and web buckling - design of laterally unsupported beams - built up beams - beams subjected to biaxial bending - Design of plate girder - bolted and welded type - intermediate and bearing stiffeners - web splices sand.

MODULE VI ROOF TRUSSES


L – 45; T – 15; Total Hours- 60

TEXT BOOKS:

REFERENCES:
OUTCOMES:

At the end of the course, students will be able to

• apply limit state design concept for structural steel sections used for industry applications.

• design bolted and welded connections for the given loading conditions, design compression members, tension members, beams and roof trusses for industry needs as per IS 800 - 2007 codal provisions.
OBJECTIVES:

• To familiarize students with geotechnical terminology and concepts commonly encountered in engineering practice.

• To expose the students to fundamentals of soil mechanics with emphasis on soil, its origin and behavior under load.

MODULE I INTRODUCTION TO SOIL

Nature of Soil - Problems with soil - Phase relation - sieve analysis - sedimentation analysis - Atterberg limits - classification for engineering purposes - BIS Classification System

MODULE II SOIL WATER AND WATER FLOW

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.

MODULE III STRESS DISTRIBUTION IN SOIL

Stress distribution in soil media - Boussinesque formula - stress due to line load, circular and rectangular loaded area - approximate methods - Use of influence charts - Westergaard equation for point load.

MODULE IV COMPACTION AND CONSOLIDATION

Soil compaction - factors affecting compaction - field compaction methods and monitoring. Terzaghi’s one dimensional consolidation theory - governing differential equation - laboratory consolidation test - Field consolidation curve.

Components of settlement - Immediate and consolidation settlement.

MODULE V SHEAR STRENGTH

Shear strength of cohesive and cohesion less soils - Mohr - Coulomb failure theory - Saturated soil and unsaturated soil (basics only) - 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 behavior of clay and sand.

**TEXT BOOKS:**

**REFERENCES:**

**OUTCOMES:**
At the end of this course, the student will
- be able to perform classification of soil for engineering purposes and determine engineering properties of soil.
- have the capability to do soil compaction in the field.
- be able to determine settlement and shear strength characteristics of soil and slope stability.
OBJECTIVES:

• To impart basic knowledge on railway engineering, geometric design of railways, railway signals and docks & harbour engineering.

• To provide understanding on urban transportation planning and modern urban transportation.

MODULE I INTRODUCTION TO RAILWAY ENGINEERING 7

Railways: Role of Railway Transportation, Advantages and Disadvantages of Railway Transportation, Elements of permanent track way: Rails, Rail Gauges, Sleepers, Ballast, Rail Joints, Fittings, Principal of Traction: Tractive Effort, Train resistances

MODULE II GEOMETRIC DESIGN OF RAILWAYS 7

Elements of Geometric Design: Gradients and Grade compensation on Curves, Cant, Transition Curve, Vertical curve, Sub grade and Embankments: Cutting, Level, Function, Formation of sub grade, Materials used, Slope and Stability of Embankment, Points and Crossings: Turnouts, Diamond crossings, Crossovers, Stations and Yards

MODULE III RAILWAY SIGNALS & MAINTENANCE 7

Signals: Signaling and interlocking, Necessity, Mechanical Devices, Detectors, Stretcher bar, Point lock, Slotting of signals, Connecting Devices, Temperature compensation, Track Drainage, Safety in Railways, Modernization of Track for High Speeds, Modern Methods for Track Maintenance, Railway Expenses, Rates and Fares.

MODULE IV HARBOUR ENGINEERING 8

Role of water transportation, Basic consideration- Ocean Winds, Waves, Tides, Wharf, Pier, Harbour, Port, Layout of Harbour, Port entrance, Construction and operation of Lock gates, Dock: Wet, dry and floating docks, Break water-different types, dredging.
B.Tech. Civil Engineering

MODULE V URBAN TRANSPORTATION PLANNING 8

Urban Transportation Planning Process, Urban Travel and Transportation Systems Characteristics, Function and form of urban structures, services, classification of urban centres, growth patterns, Travel Demands Forecasting—trip generation, trip distribution, modal split and trip assignment, urban transport problems, Transport Behavior of Individuals and Households, Land use/Transportation systems, land value and congestion, access and business migration

MODULE VI MODERN URBAN TRANSPORTATION 8

Introduction to Urban Freight Transportation and Urban Mass Transportation Systems. Characteristics of buses, bicycle, para transit, rapid transit, Traffic Restraint Techniques and methods. Classification, mass and rapid transit system, Introduction to Intelligent Transportation System (ITS), Public Transport policy, intermediate. Introduction to BRT, Mono rail, sky bus, metro projects, grade separated interchanges such as flyovers, underpasses, overpasses, concept of Integrated Inter Model transit system

Total Hours: 45

REFERENCES:

B.Tech. Civil Engineering

OUTCOMES:

At the end of the course, student will

• be able to perform geometric design of railways, railway signals and design of railways and track maintenance.

• be able to design a harbour layout with all facilities.

• be able to perform travel demand forecasting and plan the transportation systems.
OBJECTIVES:

- To explore the salient features and processes that characterise the rocks, soils, water and their interconnectivity with the atmosphere through bio element cycling
- To rationalise the biological environment at the level of cell, the population, the community, ecosystem and the biome
- To get sensitized with the impacts of human activity on the natural environment and with the methods to conserve it
- To study the impacts of human activity on water and air and to identify the steps to conserve
- To find out an unique solution for the environmental crisis in the developing and developed countries
- To learn about the assessments of the impacts with the help of NGOs and public and to proceed to a sustainable living

MODULE I PHYSICAL ENVIRONMENT


Atmosphere – structure and composition – weather and climate – tropospheric airflow

Hydrosphere – water budget – hydrological cycle – Rainwater and precipitation, River Water and solids, Lake Water and stratification, Seawater and solids, soil moisture and groundwater.

Bioelement cycling – The Oxygen cycles – the carbon cycle – the nitrogen cycle – the phosphorous cycle – the sulfur cycle sodium, potassium and magnesium cycles.
Cellular basis of life – prokaryotes and eukaryotes – cell respiration – photosynthesis – DNA and RNA – genetically modified life


Biological communities - Five major interactions: competition, predation, parasitism, mutualism and commensalism – Concepts of habitat and niche – natural selection – species richness and species diversity – ecological succession and climax.


Biological resources – nature and importance – direct damage – introduced species – Habitat degradation, loss and fragmentation – Values of biodiversity – hotspots of biodiversity, threats to biodiversity- endangered and endemic species of India- conservation of biodiversity, in-situ and ex-situ conservation

Land Utilization – past patterns of land use – Urban and Industrial development – deforestation, salinisation, soil erosion, and desertification – Modern Agriculture and Impacts


Atmospheric pollution – primary and secondary pollutants – anthropogenic, xenobiotic, synergism, sources and sink, residence time, levels and impacts of major pollutants – processes leading to smog, acid rain, global warming, stratospheric ozone depletion - Noise pollution and abatement.

MODULE V IMPACTS ON ENERGY AND CONSERVATION, ENVIRONMENTAL CRISIS

Energy – Renewable and non renewable energy resources – thermal power plants – nuclear fuels, fossil fuels, solar energy, wind energy, wave energy, tidal energy, ocean thermal energy, hydropower, geothermal energy, biomass energy

Environment crisis – state of environment in developed and developing countries- managing environmental challenges for future – disaster management, floods, earthquake, cyclone and landslides.

MODULE VI ENVIRONMENTAL IMPACT ASSESSMENT AND SUSTAINABILITY

Environmental Impact Assessment – Impacts: magnitude and significance – steps in EIA – methods – precautionary principle and polluter pays principle – role of NGOs and Public – value education –Environment protection act (air, water, wild life) and forest Conservation act

Concept of Sustainability – Sustainable Development – Gaia Hypothesis - Traditional Knowledge for sustainability.

Total Hours: 45

TEXT BOOKS:


REFERENCES:

B.Tech. Civil Engineering


OUTCOMES:

After the completion of the course the student should be able

• To differentiate the rock and the soil and to recognise the pivotal importance of bio element cycling

• To examine the biological environment both at the microscopic and biome levels

• To analyse the role played by the urban and industrial development that change the pattern of land use

• To judge the level of air and water pollution

• To discriminate renewable energy from non renewable energy and to discuss about the environmental crisis prevailing

• To assess the human impacts on environment and to appreciate the sustainable living
OBJECTIVES:
• To prepare the students for building their competencies and career building skills.

TOPICS OUTLINE:
This course is practical oriented one and exercises will be given to the students group users /individually depending upon the aspect considered. The following aspect will form the broad outline content of the syllabi. The exercises will be designed by the faculty member and coordinated by the overall course coordinator.

LAB ACTIVITIES:
• Preparation for the placement
  o Group discussions: Do’s and Don’ts – handling of Group discussions – What evaluators look for.
  o Interview – awareness of facing questions – Do’s and Don’ts of personal interview.
  o Selection of appropriate field vis-à-vis personality / interest.
  o Preparation of Resume–Objectives, profiles vis-à-vis companies requirement.
  o Enabling students to prepare for different procedures / levels to enter into any company – books / websites to help for further preparation.
  o Technical interview – how to prepare and face it.

• Workplace skills
  o Presentation skills o Oral presentations
  o Technical presentations o Business presentations o Technical writing
  o Interpersonal relationships – with colleagues - clients – understanding one’s own behavior – perception by others.

ASSESSMENT:
As the course is practical one, it will be assessed using a portfolio based assessment. The students must in consultation with the Faculty member, plan
B.Tech. Civil Engineering

a portfolio of evidence for the above mentioned activities. The students must develop a résumé or résumés that promote own ability to meet specific job requirements and plan their portfolio in a format appropriate to industry they wish to target. The case studies will contain direct observation of the candidate developing career plans, résumés and skills portfolio, reflect written or oral questioning to assess knowledge and problem-solving activities to assess ability to align career aspirations with realistic career goals. The course coordinator in consultation with the course committee will decide the number of exercises and mark to be awarded for each beside the weightage for the end semester assessment.

OUTCOMES:
The course will help the students to
• develop team work skills
• take part effectively in various selection procedures followed by the recruiters.
OBJECTIVES:

- To provide sufficient knowledge on concrete mix design, properties of fresh and hardened concrete, testing and quality assurance of materials used for Highway Engineering as per Indian Standards.

MODULE I  STANDARDS

Indian Standards for Mix design, fresh and hardened concrete properties. Indian Road Congress guidelines for Highway materials: Material selection - Material testing - Limiting values.

MODULE II  CONCRETE MIX DESIGN

Concrete mix design as per Indian Standards for the given parameters - Casting of concrete and strength assessment.

MODULE III  FRESH CONCRETE PROPERTIES

Workability of concrete: Slump test, compaction factor test, flow table test and Vee-Bee consistometer test.

MODULE IV  HARDENED CONCRETE PROPERTIES

Compressive strength test on cubes and cylinder specimen - flexural strength test on concrete prism - splitting tensile strength test on concrete cylinder.

MODULE V  AGGREGATES FOR HIGHWAY APPLICATION

Proportioning of combined aggregates (Sieve analysis) - Impact strength - crushing strength - abrasion resistance - water absorption.

MODULE VI  PROPERTIES OF BITUMEN

Grade of Bitumen - Penetration - Softening point - Ductility - Specific gravity. Binder content in bituminous mixture - Marshal stability test.

Total Hours: 45
REFERENCES:


3. IS 516-1968, Methods of Test for Strength of Concrete, Bureau of Indian Standards, New Delhi.

4. IS 1199-1959, Methods of Sampling and Analysis of Concrete, Bureau of Indian Standards, New Delhi.


10. IS 1205-1978, Determining softening point of bitumen, Bureau of Indian Standards, New Delhi.


OUTCOMES:

At the end of course work, students will be able to

• perform concrete mix design as per Indian standards

• assess the fresh and hardened concrete properties by conducting tests as per Indian standards

• determine the properties of materials used in highway engineering.
OBJECTIVE:

- To impart knowledge on soil mechanics concepts through hands on training in fundamental experiments as per Indian standards.

MODULE I  TESTS ON PHYSICAL PROPERTIES OF SOILS  9

Grain size distribution by Sieve analysis and Hydrometer analysis, Specific gravity of soil grains, Relative density of sands and Atterberg limits test.

MODULE II  TESTS ON UNIT WEIGHT OF SOIL  9

Field density test (Core cutter and sand replacement methods)

MODULE III  PERMEABILITY TESTS  9

Permeability determination (constant head and falling head methods)

MODULE IV  COMPACTION AND CONSOLIDATION TESTS  9

Determination of moisture - density relationship using Standard Proctor Compaction test. One dimensional consolidation test (Determination of coefficient of consolidation only)

MODULE V  SHEAR STRENGTH TESTS  9

Determination of shear strength parameters - Direct shear test on cohesion less soil, Unconfined compression test on cohesive soil, Triaxial compression test.

Total Hours: 45

REFERENCES:


OUTCOMES:
At the end of the laboratory course, the students will able to
• prepare a soil report for the given site conditions indicating the types of soil and its engineering characteristics.
OBJECTIVES:

- To impart the skill & knowledge to assess the physical, chemical and biological characteristics of water & wastewater.

MODULE I  WATER QUALITY STANDARDS & SAMPLING TECHNIQUES  9


MODULE II  PHYSICAL ANALYSIS  9

Temperature, Color, Odor, Taste, Turbidity, pH, Conductivity, Total Solids, Total Suspended Solids, Total Dissolved Solids, Total Volatile Solids, Total fixed Solids, Jar Test for Coagulant

MODULE III  INORGANIC OR CHEMICAL ANALYSIS  9

Hardness, Calcium, Magnesium, Chloride, Sulphate, Fluoride, Alkalinity, Nitrate,

Phosphate, Residual Chlorine & Available Chlorine

MODULE IV  ORGANIC ANALYSIS  9

Dissolved Oxygen, Biological Oxygen Demand, Chemical Oxygen Demand, Phenols, Oil & grease, Pesticides, Nitrate

MODULE V  TOXIC METALS  6

Copper, Chromium, Cadmium, Zinc, Lead, Mercury, Iron, Manganese (AAS)

MODULE VI  BACTERIOLOGICAL ANALYSIS (DEMO)  3

Total Coliform, Feecal Coliform

Total Hours : 45
REFERENCES:


OUTCOMES:

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

• determine the suitability of water for various purposes
• determine the different characteristics of wastewater
<table>
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<th>Course Code</th>
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<tr>
<td>CEB3211</td>
<td>STRUCTURAL ANALYSIS - II</td>
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**OBJECTIVES:**

- To enable students to analyze the various types of arches and suspension bridges.
- To provide in-depth knowledge on structural mechanics with emphasis on matrix methods for analysis of beams and framed structures.
- To provide knowledge on the concepts of plastic theory to analyze beams and rigid frames.
- To give exposure to finite element method.

**MODULE I  FLEXIBILITY MATRIX METHOD**  
Primary structure - Compatibility conditions - Analysis of indeterminate beams, pin-jointed frames, rigid jointed frames.

**MODULE II  MATRIX STIFFNESS METHOD**  

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

**MODULE IV  SUSPENSION BRIDGES**  
Analysis of suspension bridges – Unstiffened cables and cables with three hinged stiffening girders – Influence lines for three hinged stiffening girders

**MODULE V  PLASTIC ANALYSIS OF STRUCTURES**  
MODULE VI  FINITE ELEMENT METHOD

Introduction - Discretisation of a structure - Displacement functions – Truss element - Beam element - Triangular elements

L – 45; T – 15; Total Hours- 60

TEXT BOOKS:

REFERENCES:

OUTCOMES:
On successful completion of the course, students will
• have the ability to analyse arches and suspension bridges.
• be able to analyse beams, trusses and frames by using matrix methods.
• be able to perform plastic analysis of structures.
• gain knowledge on finite element method.
OBJECTIVES:

- To introduce the fundamental concepts of reinforced concrete with emphasis on design of rectangular and flanged beams, slabs, columns and footings.
- To impart knowledge to analyze and design reinforced concrete structural members under bending, shear, and/or axial loads as per Indian Standards.
- To give exposure to the design of staircases.

MODULE I DESIGN CONCEPTS

Concept of elastic method, ultimate load method and limit state method – Advantages of Limit State method over other methods – Limit State philosophy as per IS Code recommendations.

MODULE II DESIGN OF BEAMS


MODULE III DESIGN OF SLABS

Behaviour of slabs spanning in one and two directions - Design of one way simply supported and continuous slabs - Design of two-way slabs for various edge conditions.

MODULE IV DESIGN OF COMPRESSION MEMBERS

Classification of columns – Behaviour of RC columns - Design of short columns under axial compression, combined axial compression with uniaxial and biaxial bending.

MODULE V DESIGN OF FOOTINGS

Types of footings – Pressure distribution under footings – Code requirements for design of footings – Design of axially and eccentrically loaded square and rectangular footings – Design of combined rectangular footings.

L – 45; T – 15; Total Hours- 60

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course, students will be able to

• analyze the behaviour of reinforced concrete members subjected to flexure, shear and axial loading.
• design reinforced concrete elements such as beams, slabs, columns and staircases in accordance to IS codal provisions.
OBJECTIVES:

• To impart knowledge on site investigation, design of shallow and deep foundations, retaining walls and slopes.

• To provide knowledge to determine bearing capacity of soil and settlement of foundation under load.

MODULE I SITE INVESTIGATION AND SELECTION OF FOUNDATION 7

Scope and objectives- Methods of exploration-averaging and boring- Water boring and rotary drilling-Depth of boring-Spacing of bore hole - Sampling- Representative and undisturbed sampling - Sampling techniques- Split spoon sampler, Thin tube sampler, Stationary piston sampler-Bore log report - Penetration tests (SPT and SCPT)-Data interpretation (Strength parameters and Liquefaction potential)- Selection of foundation based on soil condition.

MODULE II SHALLOW FOUNDATION 7

Introduction-Location and depth of foundation- Codal provisions - bearing capacity of shallow foundation on homogeneous deposits- Terzaghi’s formula and BIS formula - factors affecting bearing capacity-problems - Bearing Capacity from insitu tests (SPT, SCPT and plate load) - Allowable bearing pressure.

MODULE III FOOTINGS AND RAFTS 7

Types of foundation - Contact pressure distribution below footings & raft - Isolated and combined footings- types- proportioning - mat foundation - types - use - proportioning - floating foundation.

MODULE IV SETTLEMENT OF FOUNDATIONS 8

Settlement - Components of settlement - Determination of settlement of foundations on granular and clay deposits - Allowable settlements - Codal provision - Methods of minimizing settlement, differential settlement.

MODULE V PILES 8

Types of piles and their function - Factors influencing the selection of pile-
B.Tech. Civil Engineering

Load carrying capacity of single pile in granular and cohesive soil - Static formula - dynamic formulae (Engineering news and Hiley’s) - Capacity from insitu tests (SPT and SCPT) - Negative skin friction- uplift capacity- Group capacity by different methods (Feld’s rule, Converse Labarra formula and block failure criterion)- Settlement of pile groups - Interpretation of pile load test - Forces on pile caps - under reamed piles - Capacity under compression and uplift.

MODULE VI RETAINING WALLS

Plastic equilibrium in soils – active and passive states – Rankine’s theory – cohesion less and cohesive soil - Coulomb’s wedge theory – condition for critical failure plane - Earth pressure on retaining walls of simple configurations – Graphical methods (Rebhann and Culmann) - pressure on the wall due to line load – Stability of retaining walls.

Total Hours : 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

At the end of the course, students will be able to

• plan a site investigation programme.
• design shallow and deep foundations, retaining walls and slopes.
• determine bearing capacity of soil and settlement of foundation under load.
OBJECTIVES:

- To give an exposure to principles of management and organizational structures.
- To introduce concepts of operation and material management.
- To provide an understanding of management of human resources.
- To impart some basic knowledge on marketing, pricing and selling.
- To give an overview of accounting and management of finance.

MODULE I  PRINCIPLES OF MANAGEMENT  7

Functions of management - Planning - Organizing - Staffing - Direction - Motivation - Communication - Coordination - Control, organizational structures - Line - Line and staff - Matrix type, functional relationships - Span of control, Management by Objectives (MBO) - Forms of Industrial ownership.

MODULE II  OPERATIONS MANAGEMENT  8

Introduction to operations management - Functions of production/operations management - Types of production, Overview of facility location - Lay out planning, introduction to production planning and control, work study, quality assurance, lean manufacturing and six sigma, plant maintenance and management.

MODULE III  MATERIALS MANAGEMENT  8

Materials Planning - Types of inventory, Purchasing function - Source selection - Negotiation - Ordering, Stores management - Functions - Types of stores - Overview of inventory control, Introduction to newer concepts: MRP-I – MRPII - ERP - JIT.

MODULE IV  HUMAN RESOURCE MANAGEMENT  7

B.Tech. Civil Engineering

MODULE V  MARKETING MANAGEMENT  7

MODULE VI  FINANCIAL MANAGEMENT  8

Total Hours: 45

REFERENCES:

OUTCOMES:
After doing the course,
• the students would have gained basic knowledge of the concepts of management and the functions of management.
• the students would have learnt fundamentals of the functional areas of management viz., operations management, materials management, marketing management, human resources management and financial management.
OBJECTIVES:

• The main objective of this practical course is to provide hands on experience in preparation of structural design and drawings for concrete and steel structures using latest software.

MODULE I BEAMS 9

Analysis and Design of continuous beam subjected to various loading systems.

MODULE II PLANE FRAMES 9

Analysis and Design of plane frames with two bay five-storey (G+4).

MODULE III SPACE FRAMES 9

Analysis and Design of space frames with single bay two-storey (G+1).

MODULE IV FOUNDATION AND STAIRCASE 9

Design of foundation for the space frames with single bay two storeys (G+1). Design of staircase with single bay two-storey (G+1).

MODULE V TRUSSES 9

Analysis and Design of steel roof truss frame for industrial buildings.

Total Hours: 45

REFERENCES:

B.Tech. Civil Engineering

OUTCOMES:

At the end of the laboratory course, the students will

• be able to analyse and design steel /concrete structural components and prepare relevant structural drawings as per I.S Specifications using latest software.
GENERAL GUIDELINES:

- Seminar is an important component of learning where the student gets acquainted with preparing and presentation of a technical report.

- The students are advised to collect peer reviewed journal papers relevant to their proposed project work and prepare a report in consultation with a faculty having expertise in that field.

- Presentation schedules will be prepared by the course faculty in line with the academic calendar.

- The students shall be required to present a technical report in PPT and submit a relevant report.

- At the end of each presentation, the class students are encouraged to ask questions to clarify their queries and finally the course faculty gives his/her comments to improve the quality in subsequent presentations.

- The marks will be awarded based on technical content, report preparation and presentation skills and in depth knowledge of the student in the subject.

- The marks awarded shall be intimated to the students at the completion of one cycle of presentation by all the students and communicated to the Class Advisor in the specified format.

- Each student shall be given at least two opportunities to exhibit his/her presentation skills.
OBJECTIVES:

- To impart the skill & knowledge to execute real-time survey and soil investigations.

MODULE I  TOPOGRAPHY & CONTOURING

Preparation of Elevation Contour Map & Digital Elevation Model

MODULE II  PROFILE LEVELING

Preparation of Longitudinal Profile & Cross-sectional Profiles for a new road alignment and computation of Volume of Cutting and filling required.

MODULE III  CARTOGRAPHY

Preparation of Map for a small area & reporting the statistics of the area

MODULE IV  TACHOMETRIC TRAVERSING

Determination of shortest distance between two points and its gradient by tachometric traversing

MODULE V  SETTING OUT WORKS

i. Setting out of a Curve for a new road or rail alignment
ii. Marking of foundation for a multi-storey building

MODULE VI  SOIL INVESTIGATION

Conduction of SPT, Plate Load Test, Preparation of Bore log & Soil Profile

Total Hours: 45

OUTCOME:

- At the end of the course, the student will be able to execute real-time survey works and prepare soil investigation reports for various civil engineering projects.
OBJECTIVES:

- To provide knowledge on basic concepts of prestressed concrete, analysis of stresses, losses of prestress, transmission of prestress and deflection of prestressed concrete members.
- To impart knowledge to analyze and design prestressed concrete flexural members.
- To give exposure to prestressed concrete in composite construction and special structures.

MODULE I BASIC CONCEPTS & ANALYSIS OF STRESSES 8

MODULE II LOSSES OF PRESTRESS AND DEFLECTION IN MEMBERS 7
Losses of prestress – Deflections of prestressed concrete members – Factors influencing deflections – Effect on tendon profile on deflections – Short term and long term deflections as per codal provisions.

MODULE III DESIGN OF PSC MEMBERS 8
Flexural strength – Strain compatibility method – Simplified procedures as per codes – Shear and Principal Stresses – Ultimate shear resistance of PSC members – Design of shear reinforcement – Design of PSC sections for flexure.

MODULE IV TRANSMISSION OF PRESTRESS 6
Transmission of prestress in pre-tensioned members – Bond and transmission length – End zone reinforcement – Anchorage zone stresses – Stress distribution – Design of anchorage zone reinforcement.

MODULE V COMPOSITE CONSTRUCTION 8
Concept of circular prestressing – Design of prestressed concrete pipes and cylindrical water tanks - Prestressed concrete poles, piles, sleepers, pressure vessels.

Total Hours : 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course, students will be able to

• appreciate the basic concepts of prestressed concrete, development of stresses, losses in prestress, transmission of prestress and deflection of prestressed concrete members.
• design prestressed concrete flexural members.
• recognize the significance of prestressed concrete in composite construction and special structures such as pipes, water tanks, sleepers, pressure vessels etc.
OBJECTIVES:

- To impart knowledge on various methods of estimation of buildings, roads, and irrigation structures
- To introduce the concepts of rate analysis and tendering process.
- To provide understanding on valuation engineering and report preparation.

MODULE I  METHODS OF ESTIMATION

Types of estimates – Units of measurements – Methods of estimates – Advantages.

MODULE II  ESTIMATE OF BUILDINGS

Load bearing and framed structures - Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, Various types of arches - Calculation of brick work and RCC works in arches - Estimate of joineries for panelled and glazed doors, windows, ventilators, handrails.

MODULE III  ESTIMATE OF WATER SUPPLY AND SANITARY INSTALLATIONS

Sanitary and water supply installations- Estimating of septic tank, soak pit - Water supply pipe line - Sewer line - Tube well - Open well

MODULE IV  ESTIMATE OF OTHER STRUCTURES

Estimate of bituminous and cement concrete roads - Estimate of retaining walls -Culverts

MODULE V  RATE ANALYSIS, SPECIFICATION AND TENDERS

Data- Schedule of rates- Analysis of rates- Specifications- Sources- Detailed and general specifications- Tenders- Contracts-Types of contracts-Arbitration and legal requirements.

MODULE VI  VALUATION & REPORT PREPARATION

Necessity - Basics of value engineering - Capitalized value - Depreciation -
B.Tech. Civil Engineering


Total Hours: 45

TEXT BOOK:

REFERENCE:

OUTCOMES:
At the end of the course the students will be able to

• estimate different items of work for buildings, road works, irrigation structures etc.

• practice the concepts, tools and techniques of quantity surveying
OBJECTIVES:

- To impart knowledge on planning of construction projects, scheduling of activities using network diagrams, estimating cost of project, controlling the cost of project by creating cash flows and budgeting.
- To give exposure to project information systems.

MODULE I  CONSTRUCTION PLANNING  7

Basic concepts in the development of construction plans-Choice of technology and construction method-Defining work tasks - Defining precedence relationships among activities-Estimating activity durations-Estimating resource requirements for work activities-Coding systems. Introduction to software’s used in construction management.

MODULE II  SCHEDULING PROCEDURES AND TECHNIQUES  8

Introduction - plan development process- scheduling-definition -types of construction schedules-scheduling techniques-CPM - Terms and definitions - Earliest and Latest times - different types of floats - significance- calculation of critical path method-PERT - terms and definitions - network and solving problems using PERT - standard deviation and probability calculation in PERT.

MODULE III  RESOURCE PLANNING  8

Materials: Quantity of materials - time of purchase- inventory control - terms and definitions - types of inventory -EOQ -reasons for maintain inventory - different tools for inventory.

Equipment: Classification of major construction equipment- planning and selecting of equipment- task consideration - cost consideration.

Labor : Classes of labor - cost of labor- labor schedule - optimum use of labor Resource oriented scheduling- Crashing and time/cost tradeoff

MODULE IV  COST CONTROL MONITORING AND ACCOUNTING  7

Cost – Types of Cost -Cost control problem-Project budget-Forecasting for activity cost control - Financial accounting systems and cost accounts-Control
B.Tech. Civil Engineering

of project cash flows-Schedule and budget updates-Relating cost and schedule information.

MODULE V QUALITY CONTROL & SAFETY DURING CONSTRUCTION 8

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.

MODULE VI ORGANIZATION & USE OF PROJECT INFORMATION 7

Project information- Types and use-Organizing information in databases-Centralized database management systems-Databases and application programs-Information transfer and flow.

Total Hours: 45

TEXT BOOKS:


REFERENCES:


OUTCOMES:

At the end of the course, students will

• be able to apply general principles of management in construction industry.
• gain knowledge on planning and control tools including their applications.
OBJECTIVE:

• To equip the students with fundamental principles and concepts underlying remote sensing and to make them aware of the technological developments in the geographical database management and its advantages.

MODULE I  FUNDAMENTALS OF REMOTE SENSING  


MODULE II  EMR INTERACTION WITH EARTH SURFACE FEATURES  


MODULE III  DIGITAL IMAGE PROCESSING  

Digital processing of satellite images: Geometric rectification, spatial and radiometric enhancement, edge detection, band ratio, false color composites, Principal component analysis, Spectral domain enhancement, Supervised and unsupervised classification for thematic map generation.

MODULE IV  MICROWAVE REMOTE SENSING  

Microwave Remote Sensing: Basic principles, spatial resolution of SAR system, geometric characteristics, and signature of earth features.
B.Tech. Civil Engineering

MODULE V MISCELLANEOUS REMOTE SENSING TECHNIQUES

Aerial photography, Stereo photo interpretation, Thermal radiation principles and thermal imaging, Radar transmission characteristics / Image interpretation, Passive microwave sensing / LIDAR.

MODULE VI GIS BASICS


Total Hours: 45

TEXT BOOKS:

REFERENCE:

OUTCOMES:
At the end of the course, the students will
• gain a broad insight about the fundamentals of remote sensing & GIS and EMR interactions.
• be able to interpret and identify the features from spectral and microwave images.
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<tr>
<td>CEB4105 IRRIGATION ENGINEERING</td>
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**OBJECTIVE:**

- To provide the basic knowledge on irrigation, crop water requirements, types of irrigation, irrigation structures and irrigation water management.

**MODULE I  INTRODUCTION** 8

Irrigation – Need and mode of irrigation – Merits and demerits of irrigation – Irrigation schemes- Crop and crop seasons - Irrigation efficiencies – Planning and Development of irrigation projects.

**MODULE II  WATER REQUIREMENTS OF CROPS** 8

Soil-moisture-irrigation relationship – consumptive use of water - Field capacity- Determination of depth and frequency of irrigation- Duty – Factors affecting duty- Duty Delta relationship – Determination of required channel capacity

**MODULE III  IRRIGATION METHODS** 7


**MODULE IV  DIVERSION AND IMPOUNDING STRUCTURES** 9


**MODULE V  CANAL IRRIGATION** 8

Alignment of canals – Classification of canals – Canal drops – Hydraulic design of drops – Cross drainage works – Hydraulic design aspects of cross drainage works – Canal Head works – Canal regulators – River Training works.

**MODULE VI  IRRIGATION WATER MANAGEMENT** 5

Need for optimisation of water use – Minimising irrigation water losses – On farm development works – Check dams- Percolation ponds – Participatory
B.Tech. Civil Engineering


Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course the students will
• be able to calculate crop water requirements, frequency of irrigation and design irrigation channels.
• gain knowledge about irrigation project schemes, its component structures and irrigation water management.
OBJECTIVES:

• To assess the ability pertaining to technical knowledge in a creative way to open ended problems.

• To provide opportunity to involve in analytical and/or design related to Civil Engineering in areas such as Structures, Geotechnical, Environmental, Transportation, Water Resources Engineering etc.

Total Hours: 45

GENERAL GUIDELINES

• The design project aims to provide a platform for students to exhibit their technical skills related to Civil Engineering in areas such as Structures, Geotechnical, Environmental, Transportation, Water Resources Engineering etc.

• The design project allows students to generalize, apply and synthesize the concepts learned over the duration of the course.

• This approach encourages students to work as a team and “learn by doing”, thereby develop the problem-solving skills which is fundamental to industry practice in the field of civil engineering.

• Students, working in groups of four, must identify the design project, narrow down the theme, identify the related activities, minute scheduling of activities with completion time, procurement of materials / equipments / collection of details; and orderly execution to achieve the desired objective.

• The faculty act as facilitator in helping students to acquire the technical knowledge and basic proficiency needed to perform different scheduled activities which comprise the project work.

OUTCOMES:

At the end of project work, students will

• have the ability to apply problem solving skills related to Civil Engineering practice.
B.Tech. Civil Engineering

• be equipped to solve real-world problems through challenging design projects with confidence

• have the ability to prepare technical reports, drawings and make technical presentations.
OBJECTIVE:

- To impart knowledge regarding design and drawing of different types of irrigation and environmental structures showing plan, elevation and sectional details.

MODULE I TANK IRRIGATION STRUCTURES 9
Design and Drawing of Tank surplus weirs and Tank sluices

MODULE II CROSS DRAINAGE STRUCTURES 9
Design and Drawing of Syphon aqueducts, Super passage, Canal regulator

MODULE III CANAL DROPS 9
Design and Drawing of Canal Drop- Notch type, Syphon Well Drop

MODULE IV SEDIMENTATION TANKS 9
Design and Drawing of rectangular and circular sedimentation tank, clarifier and model making

MODULE V FILTERS 6
Design and Drawing of Slow and Rapid sand filters and Trickling filters

MODULE VI WASTE WATER TREATMENT SYSTEM 3
Layout of Waste water Treatment unit - Unit operations and processes-flowchart-Model making

Total Hours: 45

TEXT BOOKS:
REFERENCES:


OUTCOME:

• At the end of the course, the student will be able to design and draw different irrigation and environmental structures.
OBJECTIVES:

- To familiarize the students about Geo-spatial technology as well as the basic concepts that derives the Geospatial technology.
- To impart hands on practice related to civil engineering using various GIS software’s.

MODULE I GEOGRAPHIC COORDINATE SYSTEM 3
Georeferencing and rectifying maps.

MODULE II DIGITIZATION OF MAP 6
Creation of GIS Data/Feature based digitization.

MODULE III CONVERSION 6
Convert data from one format to other format. 1. Raster to Vector and 2. Vector to Raster

MODULE IV DATABASE MANAGEMENT 6
Adding attributes, using joins and relates - Data Cleanup Tools.

MODULE V SHORTEST PATH ANALYSIS 6
Road network - Shortest path analysis

MODULE VI CREATING THEMATIC MAPS 6
Creating thematic maps such as landuse, soil and sewer networks.

MODULE VII SPATIAL ANALYSIS 6
Overlay and proximity analysis

MODULE VIII GOOGLE EARTH INTEGRATION 6
Converting data into KML file and overlaying in google Earth

Total Hours: 45
B.Tech. Civil Engineering

REFERENCE:


OUTCOME:

• At the end of the laboratory course, students will be able to use GIS tools in wide range of civil engineering applications.
OBJECTIVE:

• The Project aims to provide opportunity for the students to exhibit their capacity in executing a project work as a team which deals with analysis / design / experimental works related to civil engineering.

GENERAL GUIDELINES:

• The students will be given opportunity to select a project topic of his/her interest and advised to approach the faculty member with expertise in that field to appraise the project and get his/her willingness to guide the project.

• The information related to proposed topic and the faculty member willing to act as guide shall be informed to the course co-ordinator within the stipulated time. The project co-ordinator in consultation with Professor in-charge and Head of the Department shall give initial approval.

• In the project students are expected to identify a suitable topic, draw the need for present study and scope of the investigation, review at least 10 journal papers in the related field, formulate the experimental / analytical methodology and conduct preliminary studies.

• Detailed experimental investigation / in-depth analytical study / fabrication of equipment have to be performed in line with the scope of investigation.

• The students are expected to analyse the obtained results and discuss the same in an elaborate manner by preparing necessary charts / tables / curves to get an inference.

• The important conclusions need to be drawn and scope for further research also to be highlighted.

• The project co-ordinator shall arrange to conduct three reviews to ascertain the progress of the work and award the marks based on the performance.

• At the end, students should submit a report covering the various aspects of Project work. The typical components of the project report are Introduction, Need for present study, Scope of the Investigation, Literature review, Methodology / Experimental investigation / development of software packages,
B.Tech. Civil Engineering

Results & discussion of experimental and analytical work, Conclusions, References etc.

• The project co-ordinator shall arrange for final viva-voce examination to ascertain the overall performance in Project work.

Total Hours: 90

OUTCOME:

• At the end of the course, the students will be able to apply their knowledge base in civil engineering and utilize the creative ability and inference capability to solve real world problems.
OBJECTIVES:

• To impart knowledge on different types of bridges and culverts, investigation and planning procedures, design principles of various bridges using IRC Specifications, bearings, substructures and foundations.

MODULE I COMPONENTS, INVESTIGATIONS & SPECIFICATIONS 6

Components of a bridge structure - Inspection and site investigations for a bridge - Determination of linear waterway, design discharge and scour depth - Economical span - Types and choice of bridges - IRC loading for road bridges - General design considerations

MODULE II SLAB BRIDGES & CULVERTS 7

Slab Bridge - Distribution of concentrated loads by IRC - Load distribution by Courbon's Method – Skew slab Bridge, RC box culvert (single vent only)

MODULE III REINFORCED CONCRETE BRIDGES 10

Design of tee beam bridge – design of main girder and cross girders, Single span rigid frame bridge (barrel or slab type only), Continuous girder bridges and Balanced cantilever RC bridges – Design of articulations.

MODULE IV STEEL BRIDGES 7

Design principles of Plate Girder bridges, IRC specifications.

MODULE V PRESTRESSED CONCRETE BRIDGES 7

Types of Prestressed Concrete Bridges - Types of prestressing – Pretensioning and Post-tensioning - Design principles of Post-tensioned concrete bridges.

MODULE VI BEARING, SUBSTRUCTURE & FOUNDATIONS 8

Bearings – types, functions – simple problems – Substructures – Pier and
B.Tech. Civil Engineering


Total Hours: 45

TEXT BOOKS:

REFERENCES:
B.Tech. Civil Engineering

Section IV, Brick, Stone, Block Masonry, The Indian Road Congress, New Delhi.

10. IRC 18-2000, Design Criteria for Prestressed Concrete Road Bridges (Post-Tensioned Concrete), The Indian Road Congress, New Delhi.

11. IRC 5-1998, Standard Specifications and Code of Practice for Road Bridges, Section I – General Features of Design (Seventh Revision), The Indian Road Congress, New Delhi.

12. IRC 6-2010, Standard Specifications and Code of Practice for Road Bridges, Section II – Loads and Stresses (Fifth Revision), The Indian Road Congress, New Delhi.

13. IRC 21-2000, Standard Specifications and Code of Practice for Road Bridges, Section III – Cement Concrete (Plain and Reinforced) (Third Revision), The Indian Road Congress, New Delhi.


OUTCOMES:

At the end of the course, the students will be able to

• apply design principles of plate girder bridges and prestressed concrete bridges.

• design different bridge components using relevant IRC specifications.
OBJECTIVES:

- To provide basic understanding on the theory of vibrations, earthquake phenomena and its measurements.
- To impart knowledge pertaining to design of structures in seismic areas using IS codal provisions.
- To provide insight knowledge on the seismic retrofitting techniques of structures.

MODULE I THEORY OF VIBRATIONS 9


MODULE II ENGINEERING SEISMOLOGY 9


MODULE III SEISMIC BEHAVIOUR OF RC STRUCTURES 9


MODULE IV SEISMIC BEHAVIOUR OF STEEL STRUCTURES 7

Behaviour of flexural members for earthquake resistance – steel frames – steel panel zones – bracing members–connection design and joint behavior.

MODULE V DUCTILE DETAILING 6

MODULE VI SEISMIC RETROFITTING OF STRUCTURES


Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of this course, students will
• gain knowledge on the basic principles of structural dynamics.
• be able to perform design and detailing of structures for ductility.
• have knowledge on important aspects of seismic damage evaluation and their retrofitting techniques.
OBJECTIVES:

• To introduce the fundamental concepts of spatial structures and behaviour of roof structures, folded plates, shell structures and space frames.
• To expose the students to optimization techniques.

MODULE I ASPECTS OF SPACE STRUCTURES

Introduction to space structures - Types - Materials used - Advantages and disadvantages- Some important aspects of space structures - Single and multi layer grids.

MODULE II ROOF STRUCTURES

Cable suspended roof structures – Tensile membrane structures- Characteristics of pneumatic structures.

MODULE III FOLDED PLATES

Folded Plate structures, structural behaviour, types, design principles.

MODULE IV SHELL STRUCTURES

Classification of shells - Structural action - Membrane theory - Shells of revolution and shells of translation - Examples - Limitations of membrane theory.

MODULE V SPACE FRAMES

Space frames - Configuration - Types of nodes - General principles of design Philosophy - Behaviour- Analysis of space frames - Formex Algebra – Detailed design of space frames

MODULE VI OPTIMIZATION TECHNIQUES

Optimization by structural theorems - Maxwell, Mirchell and Heyman's Theorems for trusses and frames - Fully stressed design with deflection constraints - Genetic Algorithm.

Total Hours: 45
B.Tech. Civil Engineering

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course, the students will
• be able to analyse and apply design principles of roof structures, folded plates, shell structures and space frames including optimization techniques.
OBJECTIVES:

• To enable planning and understanding of general requirements of various industrial structures.
• To impart knowledge on design of various special structures in steel and RCC.
• To expose students, the principles involved in the design of prefabricated structures.

MODULE I PLANNING OF INDUSTRIAL STRUCTURES

Classification of industries and industrial structures – General requirements of various industries – Planning and layout of buildings and components.

MODULE II FUNCTIONAL REQUIREMENTS


MODULE III DESIGN OF STEEL STRUCTURES

Analysis and Design of Industrial buildings and bents – Industrial Roofs - Crane girders - Design of bunkers and silos.

MODULE IV POWER TRANSMISSION STRUCTURES


MODULE V DESIGN OF R.C. STRUCTURES

Analysis and Design of bunkers and silos – Design of Chimneys – Design of Grid floor

MODULE VI PREFABRICATED STRUCTURES

Principles of Prefabrication - Prestressed precast roof trusses – Functional requirements of precast concrete units

Total Hours: 45
REFERENCES:


OUTCOMES:

At the end of the course, students will be able to

• plan and design steel and RCC structures widely used in industrial projects.

• design transmission towers and prefabricated structures.
OBJECTIVES:

- To impart knowledge on quality assurance in construction, durability of concrete and deteriorating mechanisms and damage assessment of distressed structures.
- To expose students to various materials and techniques for repairing and rehabilitation of distressed structures with real time case studies and engineered demolition techniques.

MODULE I QUALITY ASSURANCE AND DURABILITY 8


MODULE II DAMAGE ASSESSMENT OF DISTRESSED STRUCTURES 8

Distress in structures, Damage assessment of distressed structures - Importance - Assessment procedure: preliminary inspection, planning, visual inspection, field and laboratory tests, report preparation. Non destructive testing techniques for damage assessment: Rebound hammer, Ultrasonic pulse velocity, half cell potential measurements.

MODULE III MATERIALS FOR DURABILITY AND REPAIR 8

Construction chemicals, Plasticizers, corrosion inhibitors, protective coatings for steel and concrete, rust convertors, fibre reinforced concrete, polymer concrete composites.

MODULE IV REPAIR TECHNIQUES 9

Significance of repair material and repair techniques. Repair techniques: Mortar and dry pack, vacuum concrete, Ferro cement, guniting and shotcrete, epoxy injection, grouting, plate bonding, prestressing, FRP jacketing and laminates.
B.Tech. Civil Engineering

MODULE V  REHABILITATION OF DISTRESSED STRUCTURAL ELEMENTS  9

Procedure for repairing structural and non-structural cracks. Rehabilitation procedure for: leaky sunken slabs, water tank and terrace slab, dampness in buildings. Case study on: Rehabilitation of distressed overhead water tank due to corrosion and rehabilitation of fire damaged structure.

MODULE VI  BUILDING DEMOLITION TECHNIQUES  3

Engineered demolition techniques - Water jetting, flame cutting, soundless chemical demolition etc

Total Hours: 45

TEXT BOOKS:

OUTCOMES:
At the end of the course the students will
• be able to assess the damage in distressed structures and suggest materials & techniques for repair and rehabilitation.
OBJECTIVES:

- To expose students the problems associated with tall structures with respect to different loads.
- To impart knowledge on the behaviour, analysis, design of various structural systems and stability of tall buildings including dynamic analysis.

MODULE I  DESIGN CRITERIA & LOADING  7


MODULE II  STRUCTURAL FORMS  6

Structural forms – braced frame, rigid frame, in filled frame, shear wall structures, wall-frame structures, framed tube structures, outrigger braced structures, space structures, hybrid structures, R.C.floor systems - One-way slab on beams and girders - Two-way flat slab - Two-way flat plate - Waffle flat slabs - Two-way slab and beam - Steel framing floor systems - One-way beam system - Two-way beam system - Three-way beam system - Composite steel - Concrete floor systems.

MODULE III  MODELING FOR ANALYSIS  8

Modeling for analysis - Assumptions - Modeling for approximate analyses - Modeling for accurate analysis - Reduction techniques.

MODULE IV  BEHAVIOUR & ANALYSIS OF STRUCTURAL SYSTEMS  8

Types, Behaviour and analysis methods of braced frames - Behaviour and analysis of Rigid frame structures - Behaviour, analysis & design of In filled frame structures - Behaviour and analysis of Shear wall, Coupled shear wall and Wall-frame structures - Behaviour of Tubular structures, Core structures and Outrigger-braced structures.
MODULE V STABILITY OF TALL BUILDINGS

Overall buckling analysis of frames (approximate methods) - Overall buckling analysis of wall frames - Second order effects of gravity loading - Translational - Torsional instability - Out-of-plumb effects - Effects of foundation rotation - Creep and Shrinkage effects - Temperature effects.

MODULE VI DYNAMIC ANALYSIS


Total Hours: 45

TEXT BOOKS:

REFERENCES:
B.Tech. Civil Engineering

OUTCOMES:

At the end of the course, the students will

• be able to apply the principles and procedures to design tall structures.

• gain knowledge on the stability of tall structures and their response to wind and earthquake motions.
OBJECTIVES:

- To acquaint with the limit state of serviceability and design of various types of retaining walls.
- To enable students to design water tanks and flat slabs.
- To give an exposure on analysis of multistory frames and yield line theory.

MODULE I  SERVICEABILITY LIMIT STATES : DEFLECTION AND CRACKING

Limit state of Deflection - factors affecting deflection - Short and long term deflections- control of deflection - computation of deflection as per IS code – Limit state of Cracking – reasons and effects of cracking - limiting criteria on cracking - Estimation of crack width.

MODULE II  RETAINING WALLS

Types of Retaining walls - Design of cantilever and counterfort retaining walls

MODULE III  WATER TANKS

Underground rectangular tanks - Overhead circular and rectangular tanks – Domes for water tanks - Design of staging and foundations.

MODULE IV  BUILDING FRAMES

Analysis of multistory frames - method of substitute frames – Analysis for vertical loads- Analysis of frames subjected to horizontal forces - portal method & cantilever method.

MODULE V  FLAT SLABS

Types of flat slabs – Direct design method - Equivalent frame method – Shear in flat slab – Design of flat slab.

MODULE VI  YIELD LINE THEORY

Introduction to yield line theory – Yield line patterns – Characteristic features
of yield lines – Load on slabs – Yield line analysis by virtual work method to square, rectangular, circular and triangular slabs.

Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course, the students will be able to

• analyze and design retaining walls, water tanks and flat slabs.
• apply the design principles, procedures and current codal provisions for analysis and design of reinforced concrete structures.
OBJECTIVES:

- To impart knowledge about the different types of offshore structures and their significance, wave theories, forces on offshore structures and design concepts.

MODULE I  BASICS OF OFFSHORE STRUCTURES  8


MODULE II  OCEAN ENVIRONMENT  7

Ocean water properties, Wave theories – Linear Wave Theory, Non-Linear Wave Theory (Stream Function Theory), 2nd and 5th order Stokes Wave Theories, Breaking Waves, Internal Waves and Sea Spectrum Model.

MODULE III LOADS ON OFFSHORE STRUCTURES  8


MODULE IV RESPONSE OF OFFSHORE STRUCTURES  7


MODULE V  STATISTICS & DESIGN APPROACHES  8


**Total Hours: 45**

**TEXT BOOKS:**

**REFERENCES:**

**OUTCOMES:**
At the end of the course, students will
- be able to predict the environmental forces and resulting motions of typical offshore structures.
OBJECTIVES:

- To impart knowledge about selection, design, and construction aspects of ground improvement techniques in problematic soils and rock subsurface strata.

MODULE I  INTRODUCTION

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.

MODULE II  DRAINAGE AND DEWATERING

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

MODULE III  IN SITU TREATMENT OF COHESIONLESS AND COHESIVE SOILS

Insitu densification of cohesion less and consolidation of cohesive soils - Dynamic compaction and consolidation - Vibrofloatation - 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.

MODULE IV  EARTH REINFORCEMENT

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

MODULE V  GROUTING TECHNIQUES

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

Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of this course, the student will be able to
• identify basic deficiencies of various soil deposits.
• decide upon the various ways and means of improving the soil.
OBJECTIVES:

• To provide sound understanding of the concepts, principles, and techniques of designing foundations for different types of machines.

MODULE I  INTRODUCTION TO VIBRATION OF SYSTEMS 7

Vibration of elementary systems-vibratory motion-single degree freedom system-free and forced vibration with and without damping.

MODULE II  WAVES AND WAVE PROPAGATION 8

Wave propagation in an elastic homogeneous isotropic medium- Raleigh, shear and compression waves-waves in elastic half space.

MODULE III  DYNAMIC PROPERTIES OF SOILS 7


MODULE IV  DESIGN OF RECIPROCATING MACHINES 8

Dynamic loads - simple design procedures for foundations under reciprocating machines.

MODULE V  DESIGN OF IMPACT AND ROTARY MACHINES 8

Design procedures for machines producing impact loads - rotary type machines.

MODULE VI  VIBRATION ISOLATION 7

Vibration isolation techniques-mechanical isolation- foundation isolation-isolation by location-isolation by barriers- active and passive isolation tests.

Total Hours: 45

TEXT BOOKS:

B.Tech. Civil Engineering


REFERENCES:


OUTCOMES:

- At the end of the course, the students will be able to design different types of machine foundations subjected to dynamic loads.
OBJECTIVES:

- To impart a good understanding of all the components of the hydrological cycle, the mechanics of rainfall, its spatial and temporal measurement including their applications.
- To offer exposure to simple statistical analysis, application of probability distribution of rainfall and run off process.

MODULE I  PRECIPITATION  

MODULE II  ABSTRACTION FROM PRECIPITATION  

MODULE III  HYDROGRAPHS  
Factors affecting Hydrograph – Baseflow separation – Unit hydrograph – Derivation of unit hydrograph – S curve hydrograph – Unit hydrograph of different deviations - Synthetic Unit Hydrograph.

MODULE IV  RUNOFF ESTIMATION  

MODULE V  FLOODS AND FLOOD ROUTING  
Flood frequency studies – Recurrence interval – Gumbel's method – Flood
B.Tech. Civil Engineering

routing – Reservoir flood routing – Muskingum’s Channel Routing – Flood control.

MODULE VI  GROUND WATER HYDROLOGY


Text Books:

References:

Outcomes:
• At the end of the course, students will be able to perform rainfall runoff analysis, flood analysis, prediction and assessment of ground water potential.
OBJECTIVES:

- To provide appropriate knowledge for the planning and designing of various components of an irrigation project scheme.

MODULE I  TANK IRRIGATION STRUCTURES  8

Detailed design of Tank bunds – Tank surplus weirs – Tank sluices weirs on pervious foundations - Percolation ponds.

MODULE II  IMPOUNDING STRUCTURES  8


MODULE III  CROSS DRAINAGE WORKS  8

Design of Aqueducts – Syphon aqueducts – Super passage – Canal syphon

MODULE IV  CANAL TRANSMISSION STRUCTURES  7

Design of Canal drops – Notch type – Rapid type fall – Syphon well drops

MODULE V  CANAL REGULATION STRUCTURES  7

Design aspects of Canal head works – Canal regulator – Canal escape – Silt exclusion structures.

MODULE VI  IRRIGATION WATER MANAGEMENT STRUCTURES  7


Total Hours: 45

TEXT BOOKS:


B.Tech. Civil Engineering

REFERENCE:


OUTCOME:

• At the end of the course, the student will be able to conceive and plan an irrigation project scheme and design its components.
OBJECTIVES:

- To impart sufficient knowledge on the coastal processes, coastal dynamics and management perspectives.

MODULE I  COASTAL ZONE

Introduction to basic concepts -Coastal zone – Coastal zone regulations – Beach profile – Surf zone – Off shore – Coastal waters – Estuaries – Wet lands and Lagoons – Living resources and their conservation – Non living resources and their exploration and exploitation.

MODULE II  WAVE DYNAMICS


MODULE III  WAVE FORECASTING AND TIDES


MODULE IV  COASTAL PROCESSES

Erosion and depositional shore features – Change levels of shoreline-sediment movement -Methods of protection – Littoral currents – Shifting river mouths and delta formation - Coastal aquifers – Sea water intrusion –Desalination - Impact of sewage disposal in seas

MODULE V  COASTAL STRUCTURES

Types and selection of break waters – Design and Application of break water- Need and mode of dredging – Selection of dredgers- Types and design of Coastal Protection Works- Design of shore defense structures- Wave-tidal engineering structures and other infrastructure in coastal zone – Dykes and Levees
Land use in coastal zone – Coastal zone management – Concepts and
development – Data base for coastal zone management – Design and
operation of closure works – Sand closure –Generation, propagation and
effect of tsunami –Environment impact of ports-Introduction and basic concepts
of GIS – Aquaculture remote sensing – Basic concepts –Application of remote
sensing in coastal zone management.

Total Hours: 45

TEXT BOOKS:

REFERENCES:
Research, USA.

OUTCOMES:
• At the end of the course, students will gain knowledge on different types of
coastal structures, coastal management and coastal protection works.
OBJECTIVES:

- To provide knowledge on various types of dams and their design & construction.
- To provide insight into the causes of failures of embankments, methods of analysis and remedial techniques.

MODULE I INTRODUCTION


MODULE II GRAVITY DAM DESIGN AND CONSTRUCTION

Forces acting on gravity dam - Methods of design of gravity dam - high & low dams - Joints, keys and openings in Dams - Galleries - Temperature control in gravity dam.

MODULE III EARTH DAM DESIGN AND CONSTRUCTION


MODULE IV BUTTRESS DAM AND ARCH DAM

Introduction to Buttress Dams - Types and Forces on Buttress Dams - Design of Flat slab type Buttress dam - Advantages and disadvantages - Types of Arch Dams - Forces acting on Arch dams - Design principle of Arch Dams

MODULE V ADVANCED THEORY OF SEEPAGE & SHEAR STRENGTH OF EARTHEEN DAM

Seepage pressure - quick conditions - Laplace equation - flow net phreatic
B.Tech. Civil Engineering

line on earth dam - a Casagrande’s solution – Shaffernak and Van Iterson
solution - Leo Casagrande solution - piping and exit gradient - Khosla’s theory
-composite profile - Schwarz Christoffel transformation-determination of
permeability in soil-rock - longitudinal test - radial test - shear tests on rock -
single jack test - direct shear test on rock cubes -punch shear test - shear box
tests - tensile strength tests on rock - brazilian test - flexural strength for
bending test - young’s modulus by bending test and brazilian tests

MODULE VI  STABILITY ANALYSIS OF EARTHEN DAM

Standard methods of analysis - Taylor’s modified swedish method including
side forces between slices - wedge method (sliding block) - stability conditions
during construction - full reservoir and draw down conditions - pore pressure
due to gravity seepage after instantaneous draw downs.

Total Hours: 45

TEXT BOOKS:
1. Sowers, G.F., “Earth and Rockfill Dam Engineering”, Asia Publishing House,
1962.


Book House, New Delhi, 2008.

REFERENCES:
1. Thomas, H.H., “Engineering of Large Dams - Part -1”, Wiley Publishers,
University of Michigan, 1976.

2. Verma, B.P., “Rock Mechanics for Engineers”, Khanna Publishers, New Delhi,
2013.

Delhi, 1982.


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

• plan & design various types of dams.
• suggest proper remedial techniques for distressed dams.
OBJECTIVES:

• To impart knowledge on the sources, characteristics, effects and control of air pollution and noise pollution.

MODULE I SOURCES AND EFFECTS OF AIR POLLUTANTS


MODULE II SAMPLING & ANALYSIS

Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

MODULE III DISPERSION OF POLLUTANTS


MODULE IV AIR POLLUTION CONTROL

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.

MODULE V AIR QUALITY MANAGEMENT

MODULE VI NOISE POLLUTION

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

Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOME:
• At the end of the course, the students will be able to assess the level of air & noise pollution and plan appropriate controlling measures.
OBJECTIVES:

• To impart knowledge on the sources, characterization, processing and disposal of municipal solid waste.

MODULE I SOURCES AND TYPES OF MUNICIPAL SOLID WASTES 7

Sources and types of solid wastes – Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization;

MODULE II EFFECTS OF SOLID WASTE DISPOSAL 7

Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects; Public awareness; Role of NGOs; Legislation.

MODULE III ON-SITE STORAGE & HANDLING 7


MODULE IV COLLECTION AND TRANSFER 8

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

MODULE V OFF-SITE PROCESSING 8

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

MODULE VI LANDFILLS 8


Total Hours: 45
B.Tech. Civil Engineering

TEXT BOOKS:


REFERENCES:


OUTCOMES:

• At the end of the course, the students will be able to formulate a municipal solid waste management scheme.
OBJECTIVE:

- To impart appropriate knowledge on waste audit, waste water treatment techniques, waste water reuse and methods of industrial waste water treatment.

MODULE I INTRODUCTION

Sources and types of industrial wastewater - Environmental impacts - Regulatory requirements - generation rates - characterization - Toxicity and Bioassay tests.

MODULE II WASTE AUDIT

Prevention Vs Control of Industrial Pollution- Source reduction techniques - Waste Audit- Evaluation of pollution prevention options.

MODULE III WASTEWATER TREATMENT TECHNIQUES


MODULE IV WASTEWATER REUSE

Individual and Common Effluent Treatment Plants - Zero effluent discharge systems - Wastewater reuse.

MODULE V SLUDGE DISPOSAL

Disposal of effluent on land - Quantification, characteristics and disposal of Sludge, Sludge digestion, drying beds, Conditioning and Dewatering.

MODULE VI TREATMENT FOR WASTEWATER FOR SPECIFIC INDUSTRIES

Industrial manufacturing process description, wastewater characteristics, source reduction options and waste treatment flow sheet for textiles - Tanneries - Pulp and paper - metal finishing - Petroleum Refining - Pharmaceuticals -
B.Tech. Civil Engineering

Sugar and Distilleries - Food Processing - fertilizers - Thermal Power Plants and Industrial Estates.

Total Hours: 45

TEXT BOOKS:


REFERENCE:


OUTCOMES:

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

• perform waste audit, use waste water treatment techniques and reuse waste water.
• suggest methods for industrial waste water treatment.
OBJECTIVES:

- To offer sufficient knowledge on various sources and characterization of municipal solid wastes.
- To give an exposure to the on-site and off-site processing of municipal solid waste including disposal methods.

MODULE I INTRODUCTION

Hazardous substances and Hazardous wastes, sources of generation, Composition, physical form; quantity and quality of hazardous wastes – Legal and Administrative requirements and aspects for management, regulations for pollution control administrative liability.

MODULE II WASTE COLLECTION

Waste Collection, segregation at source, on and off site collection, pre transport Requirements, safety in handling, transportation, storage, treatment, disposal technologies - Waste minimization physical and chemical and biological disposal treatment technologies.

MODULE III LAND DISPOSAL OF WASTE

Creation of treatment, storage and disposal facilities (TSDF) - Site selection for creating TSDF landfill, standards and guidelines for accepting a waste for land disposal, leachate management, monitoring and inspection, closure requirements and post - closure monitoring.

MODULE IV THERMAL TREATMENT OF WASTE

Thermal treatment incinerability tests, different types of incinerators and their applicability for hazardous waste management - Biological treatment of facilities.

MODULE V RECLAMATION

Reclamation of hazardous wastes - Management of gaseous emissions/air pollutants generated during treatment and disposal operations of hazardous wastes.
Remediation of hazardous wastes – Types – Stabilisation, Solidification, Myco remediation- Case studies

Total Hours: 45

TEXT BOOK:

REFERENCE:

OUTCOMES:
At the end of the course, the students will
• Differentiate various sources and characterization of municipal solid wastes, on-site and off-site processing of municipal solid waste including disposal methods.
• be able to suggest remedial measures for hazardous waste.
OBJECTIVES:

- To familiarize the students about impact of infrastructure projects on the components of environment, impact assessment methods and mitigation measures.

MODULE I  INTRODUCTION  7


MODULE II  EIA PROCESS  8

Rapid and Comprehensive EIA - Legislative and Environmental Clearance procedure in India - Prediction tools for EIA.

MODULE III  EIA FOR SPECIFIC PROJECTS  7

Assessment of Impact - Air - Water - Soil - Noise - Biological.

MODULE IV  PUBLIC PARTICIPATION IN EIA  8

Socio-cultural environment - Public participation - Resettlement and Rehabilitation.

MODULE V  MONITORING IN EIA  8

Documentation of EIA - Environmental management plan - Post project monitoring.

MODULE VI  ENVIRONMENTAL AUDIT  7

Environmental Audit- Life cycle assessment - EMS - case studies in EIA.

Total Hours: 45

TEXT BOOK:

B.Tech. Civil Engineering

REFERENCE:


OUTCOMES:

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

• assess impact of infrastructure projects on the components of environment.
• assess the impact of urbanization on environment and suggest remedial measures.
OBJECTIVES:

- To impart knowledge on geotechnical engineering problems associated with soil contamination, safe disposal of wastes and remediation of contaminated soils.

MODULE I  INTRODUCTION  7

Introduction to Environmental Geo techniques-Environmental cycles and their interaction-Soil water environment interaction relating to geotechnical problems-Effect of pollution on soil water behavior - Sources, production and classification of wastes.

MODULE II  ENVIRONMENTAL REGULATIONS  4

Environmental regulations in India - Case studies of foundation failures by ground contamination.

MODULE III  SITE SELECTION AND METHOD OF DISPOSAL  9

Criteria for selection of sites for waste disposal facilities-parameters controlling the selection of wastes disposal sites-current practices for waste disposal, subsurface disposal techniques-Passive contaminant systems- Leachate contamination-applications of geo membrane and other techniques in solid and liquid waste disposal-rigid or flexible membrane liners.

MODULE IV  HYDROLOGY OF CONTAMINANTS  9

Transport phenomena in saturated and partially saturated porous media contaminant migration and contaminant hydrology-Hydrological design for ground water pollution control-Ground water pollution downstream for landfills - pollution of aquifers by mining and liquid wastes-protection of aquifers.

MODULE V  HAZARDOUS WASTE MANAGEMENT  8

Hazardous waste control and storage system-Stabilization / Solidification of wastes-Processes and Functions- Monitoring and performance of contaminant facilities-Environmentally safe disposal of solid and liquid wastes
Module VI Remedial Measures for Waste Management

Ground modification techniques in waste fill, Remedial measures for contaminated grounds - Remediation technology - Bio-remediation

Total Hours: 45

Text Books:

References:

Outcomes:
• At the end of the course, the students will be able to recommend on waste disposal methods and remedial measures for contaminated land.
OBJECTIVE:
• To impart knowledge on the basic concepts, design principles and management techniques of highway traffic.

MODULE I INTRODUCTION
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.

MODULE II TRAFFIC SURVEYS AND ANALYSIS
Surveys and Analysis – Volume survey and its characteristics – Capacity-Speed and Delays- Origin and Destination studies.

MODULE III TRAFFIC CONTROL
Traffic Signs, Road Markings, Design of Traffic Signals and Signal Coordination (Problems), Traffic control Aids and Street Furniture, Computer Applications in Signal Design

MODULE IV DESIGN OF GEOMETRIC INTERSECTIONS
Conflicts at Intersections, Classification of Intersections at Grade, Grade Separators (Concepts only), Principles of Intersection Design, Elements of Intersection Design, Channelization and Rotary Design (Problem)

MODULE V TRAFFIC MANAGEMENT
Traffic Management- Traffic System Management (TSM) and Travel Demand Management (TDM), Restrictions on Turning Movements, One-way Streets, Traffic Segregation, Traffic Calming, Tidal Flow Operations, Exclusive Bus Lanes - Introduction to Intelligence Transport System (ITS)

MODULE VI TRAFFIC STUDIES
General outline of traffic studies - Parking studies – Accidental studies – Congestion studies –Fuel conception and emission studies.

Total Hours: 45
B.Tech. Civil Engineering

TEXT BOOKS:


REFERENCE:


OUTCOME:

• At the end of the course, the students will be able to traffic surveys, design geometric intersections and traffic signal.
OBJECTIVES:

- To impart sufficient knowledge on various components of highway engineering such as highway planning, design of geometric elements of highways & urban roads, and rigid & flexible pavements design.
- To give an exposure to desirable properties of highway materials and construction practices.

MODULE I PRINCIPLE OF PAVEMENT DESIGN

Components of a road and their function – Factors affecting pavement stability – Equivalent Single wheel load – Vehicle and traffic factors, moisture, Climate and soil factors – Stress distribution in different conditions – Modulus of elasticity of various layers.

MODULE II FLEXIBLE PAVEMENT DESIGN


MODULE III RIGID PAVEMENT DESIGN

General design consideration – Stresses in concrete pavement- Design procedure as per IRC method – Design of different joints in concrete pavement and their maintenance.

MODULE IV PAVEMENT EVALUATION


MODULE V PAVEMENTSTRENGTHENING

Strengthening of pavement-Methods –Flexible overlays and types- Rigid overlays-Case studies
MODULE VI  HIGHWAY MAINTENANCE

Maintenance of Bituminous surface, concrete roads and low cost roads –
Maintenance of shoulders and drainage system.

Total Hours: 45

TEXT BOOKS:
Chand and Brothers, Roorkee, 2001.

REFERENCES:
2. Yoder, R.J. and Witchak M.W., “Principles of Pavement Design”, John Wiley,
2000.
roads Congress, New Delhi.
Indian Roads Congress, New Delhi.

OUTCOMES:
At the end of the course, the students will
• be able to design rigid and flexible pavements as per IRC guidelines, assess
quality and serviceability condition of roads, evaluate pavements and suggest
appropriate maintenance procedure.
OBJECTIVES:

- To provide knowledge on latest techniques & methods in surveying and related instrumentation.
- To give an exposure to fundamental and advanced concepts in surveying and applications of Global Positioning System (GPS).

MODULE I HYDROGRAPHIC SURVEYING


MODULE II MODERN SYSTEMS IN SURVEYING AND MAPPING


MODULE III GLOBAL POSITIONING SYSTEM


MODULE IV GPS SURVEY METHODS AND APPLICATIONS

Single Point or Point Vs Relative, Static Vs Kinematic, Real time Vs Post mission. Practical GPS survey field procedures: Code and Carrier-based
positioning, Accuracy and recording time. GPS Applications - Geodetic control surveys, Cadastral surveys, Remote sensing, Engineering and monitoring. Military applications, Geographical Information System, Vehicle tracking and car navigation, LBS and special applications.

MODULE V  PHOTOGRAMMETRY  

Photogrammetric terms; Applications; Type of photographs; Perspective geometry of near vertical and tilted photographs, heights and tilt distortions; Flight planning; Stereoscopy, base lining, floating marks, parallax equation and stereo measurements for height determination; Developments in photogrammetry: analogue, analytical and digital methods; photogrammetric instruments.

MODULE VI  TOTAL STATION  


Comparison between Electro-optical and Microwave system applications. Care and maintenance of Total Station instruments.

Total Hours: 45

TEXT BOOKS:


REFERENCES:

B.Tech. Civil Engineering


OUTCOMES:

At the end of the course, the students will be able to

- apply latest techniques & methods in surveying including instrumentation; and fundamental & advanced concepts in surveying.
- use GPS in different application areas.
OBJECTIVES:

- To provide fundamental concepts of GIS and to introduce the multidisciplinary fields in geospatial technology such as remote sensing, cartography, surveying and photogrammetry.

- To give an exposure to the potential use of GIS in various civil engineering applications.

MODULE I  FUNDAMENTALS OF GIS  


MODULE II  GIS DATA MODELS & STRUCTURES  

Geographic data representation, storage, quality and standards: storage: digital representation of data –data-base structures and database management systems.

MODULE III  SPATIAL DATA STRUCTURES  


MODULE IV  GIS DATA PROCESSING AND ANALYSIS  


MODULE V  APPLICATIONS OF GIS FOR NATURAL RESOURCES  

Applications of GIS: Urban planning, Transportation Engineering, Utility management, Business development, Cartography, Web GIS and Mobile GIS.

Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course, the students will be able
• to use remote sensing & GIS techniques in various civil engineering disciplines.
OBJECTIVES:

- To provide students comprehensive understanding of the various concepts of geodetic surveying and to solve geodetic problems.

MODULE I  FUNDAMENTALS


MODULE II  GEOMETRIC GEODESY


MODULE III  GEODETIC COORDINATE SYSTEMS


MODULE IV  PHYSICAL GEODESY


MODULE V  GEODETIC ASTRONOMY

Horizon, Hour Angle, Right Ascension and Ecliptic co-ordinate System,
B.Tech. Civil Engineering

relationship with Cartesian System, Transformation between them. Special star positions, Major constellations, Rising and setting of Stars with respect to Declination, hour angle and Azimuth, Culmination, Prime Vertical Crossing and Elongation - Variation in celestial co – ordinates, Sidereal time, Universal time, Zone time and Atomic time. Determination of Astronomical Azimuth, latitude and longitude. Star catalogues, Ephemerides and Almanacs.

MODULE VI  GEODETIC COMPUTATION

Rectangular and Polar Co – ordinates - First and Second geodetic problem - Similarity and Helmert’s transformation, Point determination by Intersection - Resection and Arc Section.

Total Hours: 45

TEXT BOOK:

REFERENCES:

OUTCOME:
At the end of the course, the students will be able to
• apply various concepts of geodetic surveying to solve geodetic problems.
GROUP - IV
OTHER ELECTIVES

CEBX31  HOUSING, PLANNING AND MANAGEMENT  L  T  P  C
3 0 0 3

OBJECTIVE:
- To impart comprehensive knowledge on planning, design, evaluation, construction and financing of housing projects.

<table>
<thead>
<tr>
<th>MODULE I</th>
<th>INTRODUCTION TO HOUSING</th>
<th>7</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>MODULE II</th>
<th>HOUSING LAWS</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Housing Laws at State level, Bye-laws at Urban and Rural Local Bodies – levels - Development Control Regulations, Institutions for Housing at National, State and Local levels.</td>
<td></td>
</tr>
</tbody>
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<table>
<thead>
<tr>
<th>MODULE III</th>
<th>HOUSING PROGRAMMES</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Basic Concepts, Contents and Standards for Housing Programmes - Sites and Services, Neighbourhoods, Open Development Plots, Apartments, Rental Housing, Co-operative Housing, Slum Housing Programmes, Role of Public, Private and Non-Government Organizations</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MODULE IV</th>
<th>PLANNING AND DESIGN OF HOUSING</th>
<th>7</th>
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<td></td>
<td>Formulation of Housing Projects – Site Analysis, Layout Design, Design of Housing Units (Design-Problems)</td>
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<tr>
<th>MODULE V</th>
<th>COST-EFFECTIVE MATERIALS AND TECHNIQUES</th>
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<th>MODULE VI</th>
<th>HOUSING FINANCE AND PROJECT APPRAISAL</th>
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<td>Appraisal of Housing Projects – Housing Finance, Cost Recovery – Cash</td>
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</table>
B.Tech. Civil Engineering

Flow Analysis, Subsidy and Cross Subsidy, Pricing of Housing Units, Rents, Recovery Pattern (Problems).  

**Total Hours: 45**

**TEXT BOOKS:**


**REFERENCES:**


2. UNCHS, National Experiences with Shelter Delivery for the Poorest Groups, UNCHS (Habitat), Nairobi, 1994.


**OUTCOMES:**

At the end of the course, the students will

- acquire sufficient knowledge about housing laws, housing programmes, planning and design of housing projects, cost effective materials & techniques and appraisal of housing projects.

- be able to apply the housing laws and regulations during planning and designing a house

- be able to implement the cost effective material when planning for new buildings.
OBJECTIVES:

- To impart knowledge on various elements of building services like water supply, sanitation, electrical installations, lighting, air conditioning, and fire safety including smart buildings.

MODULE I  WATER TREATMENT AND SUPPLY SYSTEMS  7

Water quality, Purification and treatment- water supply systems-distribution systems in small towns -types of pipes used- laying jointing, testing-testing for water tightness plumbing system for building-internal supply in buildings-municipal bye laws and regulations.

MODULE II  SANITATION AND DRAINAGE  8

Rain Water Harvesting - Sanitation in buildings-arrangement of sewerage systems in housing -pipe systems- storm water drainage from buildings - septic and sewage treatment plant - collection, conveyance and disposal of town refuse systems.

MODULE III  ELECTRICITY AND LIGHTING  8

Types of wires , wiring systems and their choice -planning electrical wiring for building -main and distribution boards -transformers and switch gears -modern theory of light and colour -synthesis of light -luminous flux -candela- lans of illumination-lighting design-design for modern lighting.

MODULE IV  VENTILATION AND COOLING  7

Ventilation and its importance-natural and artificial systems-Window type and packaged air-conditioners-chilled water plant -fan coil systems-water piping -cooling load -air conditioning systems for different types of buildings -protection against fire to be caused by A.C. Systems.

MODULE V  FIRE SAFETY AND NBC PROVISONS IN BUILDINGS  8

Causes of fire in buildings-safety regulations-NBC-planning considerations in buildings like Non-combustible materials, construction, staircases and A.C. systems, special features required for physically handicapped and elderly in building types.
Heat and smoke detectors-dry and wet risers - Automatic sprinklers - Capacity determination of OHT and UGT for firefighting needs. - Intelligent buildings - Building automation - Smart buildings - Building services in high rise buildings.

**Total Hours: 45**

**REFERENCES:**


**OUTCOMES:**

At the end of the course, the students will be able to

• evaluate the functioning of various elements of building services such as water supply, sanitation, electrical installations, lighting, air conditioning, and fire safety including smart buildings.

• provide solutions regarding suitable water supply and electrical systems in a building.
OBJECTIVES:

• To impart knowledge on urbanization and its influence on region, city and built environment.

• To develop skills on computer applications in urban planning and advanced applications like MIS.

• To enrich with the basic architectural design principles in urban design.

MODULE I  INTRODUCTION


MODULE II  PLANNING PROCESS

Types of Urban and Regional Plans, Stages in the Planning Process – Delineation of Planning Areas, Goals and Objectives of Plans, Surveys and Analysis.

MODULE III  PLAN IMPLEMENTATION


MODULE IV  DEVELOPMENT MANAGEMENT SYSTEMS

Development Control Rules – Zoning regulations, sub Divisional Regulations - Building Bye-laws - co-ordination between Urban Local Bodies and Other Functional Agencies such as Water supply & Sewerage boards, Housing Boards including Slum boards and Planning Authorities

MODULE V  MIS AND DECISION SUPPORT SYSTEM

Database, Management information system, Decision Support system for Land Suitability, Urban Renewal and Network Analysis.
ARCHITECTURAL DESIGN


Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course, the students will
- be able to plan civil engineering structure in urban planning sector as per rules and regulations of the local authorities.
OBJECTIVES:

- To impart knowledge on the design principles and their application in architecture with the conception of forms, compositions and their spatial aspects.
- To impart knowledge of analytical understanding of spaces and built forms.

**MODULE I  ARCHITECTURAL SPACE AND MASS**

Definition of Architecture – Elements of architecture – Space defining elements, openings in Space defining Elements, Spatial relationships, Spatial Organization-Primary forms, Properties of form, transformation of form, dimensional transformation, subtractive, additive forms, organization of additive forms – Articulation of forms.

**MODULE II  AESTHETIC COMPONENTS OF DESIGN**

Exploration of the basic principles of Design such as proportion, scale, balance, rhythm, symmetry, hierarchy, axis with building examples.

**MODULE III  CIRCULATION**

Components of building circulation – The building approach, the building entrance, configuration of path, path space relationship, form of circulation of space- circulation diagram for residence and restaurant.

**MODULE IV  PRINCIPLES OF COMPOSITION**

Study of the basic principles that govern architectural composition such as Unity, Harmony, Dominance, Fluidity, Emphasis, Contrast.

**MODULE V  DESIGN PROCESS OF BUILDING**

Design process – Integration of aesthetics and function- understanding of formative ideas, organization concepts, spatial characteristics, massing and circulation in design.

**MODULE VI  ANALYSIS OF BUILDING**

Analysis of the following buildings-Falling water House & Guggenheim Museum
B.Tech. Civil Engineering

by F. L Wright-Villa Savoye & Chapel of Notre Dame by Le Corbusier.

Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
At the end of the course, the students will be able

• to design various architectural models in accordance to the principles of architecture.
• to appreciate various design process and concepts of architectural design.
OBJECTIVES:

- To enable the students to identify the core values that shape the ethical behavior of an engineer.
- To enable the students to utilize opportunities to explore one’s own values in ethical issues.
- To make the students aware of ethical concerns and conflicts.
- To enhance familiarity with codes of conduct and increase the ability to recognize and resolve ethical dilemmas.

**MODULE I  ENGINEERING ETHICS** 8


**MODULE II  ENGINEERING AS SOCIAL EXPERIMENTATION** 8

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

**MODULE III  ENGINEER’S RESPONSIBILITY FOR SAFETY** 8


**MODULE IV  ETHICAL RESPONSIBILITIES** 7

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime

**MODULE V  ETHICAL RIGHTS** 6

Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination

Total Hours: 45

REFERENCES:

OUTCOMES:
At the end of the course, the students will
• be able to identify the core values that shape the ethical behavior of an engineer.
• be aware of the ethical concerns and conflicts.
• be able to handle ethical dilemmas in a better way.
B.Tech. Civil Engineering

CEBX36 ENTREPRENEURSHIP FOR INFRASTRUCTURE ENGINEERS

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<td>OBJECTIVE:</td>
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<td>• To educate the students about entrepreneurship, marketing skills, role of entrepreneur and various business models and plans.</td>
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**MODULE I INTRODUCTION TO ENTREPRENEURSHIP** 7

Entrepreneurship General Concepts - Entrepreneurship – Regional Scenario & Characteristics & Qualities of an Entrepreneur – Advantages & Disadvantages of being an Entrepreneur

**MODULE II SELF ANALYSIS & IDEA TO OPPORTUNITY MAPPING** 7

Creativity and Innovation in Business & Self Analysis - Idea Generation and Opportunity Mapping

**MODULE III SELECTION CRITERIA & PROCEDURE FOR A START-UP** 8

Mechanism of product selection and technology-assistance from R&D labs and others on choice of technology - How to start an Enterprise unit (General concepts, Rules & Regulations, Govt. Norms)

**MODULE IV TECHNICAL & FINANCIAL ASPECTS OF AN ENTERPRISE** 8

Technical, Commercial & Financial aspects of Enterprise unit - Financial Support (Govt. agencies, banks, financial institutions, SFCs and others-securities demanded by FIs/banks)

**MODULE V MARKETING & MARKET SURVEY** 7

Marketing & market survey, Human Resources management & Quality control concepts

**MODULE VI BUSINESS MODELS & BUSINESS PLAN** 8

Introduction to Business Models and Business Plan. Writing a Project Report & business plan - Preliminary and final project report preparation, financial technical commercial and economic viability project implementation process project profiles.

**Total Hours: 45**
B.Tech. Civil Engineering

REFERENCES:


OUTCOME:

• At the end of the course, students will acquire skills needed to establish own business or to be an entrepreneur.
## GENERAL ELECTIVES

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<td>GEBX01</td>
<td>DISASTER MANAGEMENT</td>
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### OBJECTIVES:

- To give an exposure to various environmental hazards and disasters: and various concepts and principles to manage disaster.
- To give exposure to various environmental policies & programs in India for disaster management.

#### MODULE I  ENVIRONMENTAL HAZARDS

Environmental hazards, Environmental Disasters and Environmental stress-Meaning and concepts. Vulnerability and disaster preparedness.

#### MODULE II  NATURAL DISASTERS

Natural hazards and Disasters - Volcanic Eruption, Earthquakes, Tsunamis, Landslides, Cyclones, Lightning, Hailstorms, Floods, Droughts, Cold waves, Heat waves and Fire.

#### MODULE III  MAN-MADE DISASTERS

Man induced hazards & Disasters - Soil Erosion, Chemical hazards, Population Explosion.

#### MODULE IV  DISASTER MANAGEMENT

Emerging approaches in Disaster Management- Preparing hazard zonation maps, Predictability / forecasting & warning, Preparing disaster preparedness plan, Land use zoning, Communication. Disaster resistant house construction, Population reduction in vulnerable areas, Awareness - Rescue training for search & operation at national & regional level - Immediate relief, Assessment surveys, Political, Administrative, Social, Economic, Environmental Aspects.

#### MODULE V  NATURAL DISASTER REDUCTION & MANAGEMENT

Provision of Immediate relief measures to disaster affected people, Prediction of Hazards & Disasters, Measures of adjustment to natural hazards.
MODULE VI  ENVIRONMENTAL POLICIES & PROGRAMMES IN INDIA

Regional survey of Land Subsidence, Coastal Disaster, Cyclonic Disaster & Disaster in Hills with particular reference to India. Ecological planning for sustainability & sustainable development in India, Sustainable rural development: A Remedy to Disasters, Role of Panchayats in Disaster mitigations, Environmental policies & programmes in India- Institutions & National Centers for Natural Disaster reduction, Environmental Legislations in India, Awareness, Conservation Movement, Education & training.

Total Hours: 45

REFERENCES:

OUTCOMES:
At the end of the course, the students will

• achieve sufficient knowledge on the disaster prevention strategy, early warning system, disaster preparedness, response and human resource development.
• be familiar with the National Policy on Disaster Management.
OBJECTIVES:

- To introduce the basic concepts of Nanoscience relevant to the field of engineering.
- To provide an exposure about the importance of various synthesis methods.
- To enrich the knowledge of students in various characterisation techniques.

MODULE I  INTRODUCTION & CLASSIFICATION OF NANOMATERIALS  
Definition - Origin of nanotechnology - Difference between bulk and nanomaterials - Top-down and bottom-up processes - Size dependent properties (magnetic, electronic, transport and optical), Classification based on dimensional property - 0D, 1D, 2D and 3D nanostructures – Kubo gap.

MODULE II  TYPES OF NANOMATERIALS  
Metal oxides and metal nano particles - Ceramic nano particles - Semi conducting quantum dots - Core-shell quantum dots - Nanocomposites - Micellar nanoparticles.

MODULE III  PRODUCTION OF NANOPARTICLES  
Sol-gel, hydrothermal, solvothermal, Plasma Arcing, Electro deposition, RF sputtering, Pulsed laser deposition, Chemical vapour, deposition.

MODULE IV  CARBON BASED NANOMATERIALS  

MODULE V  NANOPHOTONICS  
Light and nanotechnology, Interaction of light and nanotechnology, Nanoholes and photons, nanoparticles and nanostructures; Nanostructured polymers, Photonic Crystals, Solar cells.

MODULE VI  CHARACTERISATION TECHNIQUES  
Basic principles of scanning Electron Microscopy (SEM), Atomic force
microscopy (AFM), Scanning tunneling microscopy (STM), Scanning probe microscopy (SPM) and Transmission electron microscopy (TEM), Particle size analyzer, Luminescence techniques.

Total Hours: 45

TEXTBOOKS:

REFERENCES:

OUTCOMES:
At the end of this course, the students will be able to:
• Apply the knowledge of different types of nanomaterials for various engineering applications.
• Acquire the knowledge of various methods of production of nanomaterials.
• Familiarize with various characterization techniques.
OBJECTIVES:

- To understand the system modeling and to derive their transfer function.
- To provide adequate knowledge of time response of systems and steady state error analysis.
- To accord basic knowledge in obtaining the open loop and closed–loop frequency responses of Control systems.

MODULE I BASIC CONCEPTS AND SYSTEM REPRESENTATION 8

Control System - Basic elements in control systems – Open and closed loop systems – Electrical analogy of mechanical and thermal systems – Transfer function – Block diagram reduction techniques – Signal flow graphs.

MODULE II TIME RESPONSE ANALYSIS AND DESIGN 8


MODULE III FREQUENCY RESPONSE ANALYSIS AND DESIGN 7

Performance specifications - correlation to time domain specifications - bode plots and polar plots – gain and phase margin – constant M and N circles and Nichols chart – all pass and non-minimum phase systems.

MODULE IV STABILITY 8


MODULE V COMPENSATOR DESIGN 8

Performance criteria – Lag, lead and lag-lead networks – Compensator design using bode plots and root locus technique.
B.Tech. Civil Engineering

MODULE VI  CONTROL SYSTEM COMPONENTS AND APPLICATION OF
CONTROL SYSTEMS  6

Synchros – AC servomotors - DC Servo motors - Stepper motors - AC Tacho
generator - DC Tacho generator - Typical applications of control system in
industry.

Total Hours : 45

REFERENCES:
Delhi, 2003.
5. R.C. Dorf and R.H. Bishop, “Modern Control Systems”, Addison-Wesley
(MATLAB Reference), 1995.

OUTCOMES:
At the end of the course, the student is expected to possess knowledge and achieve
skills on the following:

• Proper understanding of basics of Control Systems.
• Ability and skill to carry-out time domain and frequency domain analysis.
• Capable of determining stability of the system using Routh-Hurwitz criterion,
Root locus and Nyquist criterion.
• Ability to design lag, lead and lag lead compensator networks.
OBJECTIVE:

• To impart knowledge to face challenges, the technology poses for water, energy, and climate change by implementing sustainable design.

MODULE I CONCEPTS OF SUSTAINABLE DEVELOPMENT 7


MODULE II SUSTAINABLE DEVELOPMENT OF SOCIO ECONOMIC SYSTEMS 8


MODULE III FRAME WORK FOR ACHIEVING SUSTAINABILITY 7

Sustainability indicators- Hurdles to sustainability- Business and Industry – Science and Technology for Sustainable Development- Performance indicators of sustainability and assessment mechanism- Constraints and barriers of Sustainable Development.

MODULE IV GREEN BUILDINGS 8


MODULE V ENERGY CONSERVATION AND EFFICIENCY 7

Elements of Green Buildings Design - Foundation, Electrical, Plumbing, flooring, Decking, roofing, insulation, wall coverings, windows, siding, doors and finishing, LEED certification for Green Buildings, Green Buildings for sustainability.

Total Hours: 45

TEXT BOOK:

REFERENCE:

OUTCOMES:
At the end of the course, the students will be able to

• explain the relationship between sustainability and emergence of green building practices.

• address the economic, environmental, and social concerns.
OBJECTIVES:

The course

- Focuses on positioning knowledge as a valuable commodity, embedded in products and in the tacit knowledge of highly mobile individual employees.
- Presents KM as a deliberate and systematic approach to cultivating and sharing an organization's knowledge base.
- Brings out the paradigm in terms of information technology and intellectual capital.

MODULE I KNOWLEDGE MANAGEMENT 6


MODULE II KNOWLEDGE MANAGEMENT SYSTEMS AND MODELS 9


MODULE III CAPTURING KNOWLEDGE AND SHARING 9

Tacit knowledge capture - Explicit knowledge codification - Knowledge taxonomies - Knowledge sharing - Communities - Obstacles to knowledge capture and sharing.

MODULE IV KNOWLEDGE MANAGEMENT TOOLS 9

KM System tools – Neural Network – Association Rules – Classification Trees – Data Mining and Business Intelligence – Knowledge capture and creation tools - Content creation tools - Data mining and knowledge discovery - Content management tools - Knowledge sharing and dissemination tools - Group ware and Collaboration tools - Intelligent filtering tools.
MODULE V  KNOWLEDGE APPLICATION  6

KM at individual level - Knowledge workers - Task analysis and modeling - Knowledge application at group and organizational levels - Knowledge repositories - Knowledge reuse - Case study: e-learning.

MODULE VI  VALUE OF KNOWLEDGE MANAGEMENT  6


Total Hours : 45

TEXT BOOKS:

OUTCOMES:
Students who complete this course will be able to
• describe the fundamental concepts in the study of knowledge and its creation, acquisition, representation, dissemination, use and re-use, and management.
• explains the core concepts, methods, techniques, and tools for computer support of knowledge management.
• critically evaluate current trends in knowledge management and apply it for e-learning
B.Tech. Civil Engineering

GEBX06 APPROPRIATE TECHNOLOGY L T P C
3 0 0 3

OBJECTIVE:

• To impart students knowledge about the basics and applications of various appropriate technologies in the field of civil engineering.

MODULE I BASICS CONCEPTS

Background, Tools, Choices and Implications, Appropriate Technology Movement (an overview) - Basic design process, basic financial analysis-discounted cash flow, and energy fundamentals.

MODULE II APPROPRIATE TECHNOLOGY WITH REFERENCE TO BUILDING DESIGN


MODULE III WATER, HEALTH AND SANITATION MANAGEMENT


MODULE IV WASTE MANAGEMENT

Types of Waste - Sources - Collections and On-Site Processing - Transferring Stations - Disposal Systems - Recycling.

MODULE V ENERGY EFFICIENT TECHNIQUES


MODULE VI TECHNOLOGY POLICY


Total Hours: 45
TEXT BOOKS:


REFERENCES:


OUTCOME:

• At the end of the course, the students will be able to use suitable technologies for various conditions for sustainable development.
OBJECTIVES:

- To understand the basic principles of systems engineering
- To understand the systems engineering methodology
- To provide a systems viewpoint

**MODULE I  INTRODUCTION TO SYSTEMS ENGINEERING  8**


**MODULE II  SYSTEM DEVELOPMENT PROCESS AND MANAGEMENT  8**


**MODULE III  CONCEPT DEVELOPMENT  8**

Need Analysis – Concept Exploration – Performance requirement and validation - Concept selection and validation – systems architecture – Decision making.

**MODULE IV  ESTABLISHING ENGINEERING SYSTEMS  8**


**MODULE V  DECISION SUPPORT TOOLS IN SYSTEMS ENGINEERING  7**

Analytical decision support – Statistical influences on system design – System performance analysis – System Reliability, Availability and Maintainability (RAM) – Analysis of Alternatives.

Total Hours: 45

REFERENCES:

OUTCOMES:
At the end of the course the student will have the
• ability to have systems of view of problems and issues at hand.
• ability to comprehend systems in their totality and specific.
• ability to design, build and evaluate simple systems for industrial requirement.
• ability to analyze systems and strengthen them for performance enhancement.
OBJECTIVES:

- To get acquainted with value analysis and engineering tool for productivity improvement.
- To understand and analyze the theory and methodology of Value Engineering.

MODULE I VALUE ENGINEERING BASICS 8

Origin of Value Engineering, Meaning of value, Definition of Value Engineering and Value analysis, Difference between Value analysis and Value Engineering, Types of Value, function - Basic and Secondary functions, concept of cost and worth, creativity In Value Engineering.

MODULE II VALUE ENGINEERING JOB PLAN AND PROCESS 6

Seven phases of job plan, FAST Diagram as Value Engineering Tool, Behavioral and organizational aspects of Value Engineering, Ten principles of Value analysis, Benefits of Value Engineering.

MODULE III ORIENTATION AND INFORMATION PHASES 8


MODULE IV FUNCTION ANALYSIS AND CREATIVE PHASES 9


MODULE V EVALUATION, INVESTIGATION AND RECOMMENDATION 6


MODULE VI IMPLEMENTATION PHASE AND CASE STUDIES 8


Total Hours: 45

TEXTBOOKS:

REFERENCES:

OUTCOME:
- The student will be able to realize the value of products, processes and implement value analysis to achieve productivity improvement.
OBJECTIVES:

• Introduce methods of optimization to engineering students, including linear programming, network flow algorithms, integer programming, interior point methods, quadratic programming, nonlinear programming, and heuristic methods.

• The goal is to maintain a balance between theory, numerical computation, problem setup for solution by optimization techniques, and applications to engineering systems.

MODULE I  INTRODUCTION  
Overview of Optimization techniques for Civil Engineering Problems - Introduction to methods of optimization - Classification of Optimization problems - optimality and convexity - General optimization algorithm - necessary and sufficient conditions for optimality.

MODULE II  LINEAR PROGRAMMING  
Introduction to linear programming - a geometric perspective - Standard form in linear programming; basic solutions; fundamental theorem of linear programming - Simplex Algorithm for Solving Linear Programs - Duality; complementary slackness; economic interpretation of the dual;

MODULE III  DYNAMIC PROGRAMMING  
Sequential optimization; Representation of multistage decision process; Types of multistage decision problems; Concept of sub optimization and the principle of optimality; Recursive equations – Forward and backward recursions; Computational procedure in dynamic programming (DP); Discrete versus continuous dynamic programming; Multiple state variables; curse of dimensionality in DP.

MODULE IV  APPLICATIONS  
Regression modeling in engineering; industrial blending problems; dynamic optimal control of engineering systems; optimal estimation in environmental engineering - Water resources; production planning in industrial engineering;
B.Tech. Civil Engineering

transportation problem - Heuristic optimization methods: genetic algorithms; ecological engineering application; Minimum cost network flow algorithms; out-of-kilter method; primal-dual methods; Dynamic Programming Applications - Water allocation as a sequential process - Capacity expansion and Reservoir operation.

MODULE V INTEGER PROGRAMMING 8

Integer programming - applications in optimal irrigation scheduling in agricultural engineering - Interior point optimization methods - affine scaling method.

MODULE VI NON-LINEAR PROGRAMMING 6

Non-linear programming - Kuhn-Tucker conditions for constrained nonlinear programming problems; necessary and sufficient conditions; quadratic programming; applications.

Total Hours: 45

REFERENCES:


OUTCOMES:

At the end of the course, the students will be able to understand

• basic theoretical principles in optimization.
• formulation of optimization models.
• solution methods in optimization.
• methods of sensitivity analysis and post processing of results.
• applications to a wide range of engineering problems.
OBJECTIVES:
• To learn the concepts, techniques, tools for modeling and simulation systems and environments through the use of computers.
• To study the various aspects of discrete dynamic, stochastic systems modeling and conducting experiments with those models on a computer.

MODULE I INTRODUCTION 6

MODULE II RANDOM NUMBERS / VARIATES 7
Random numbers – methods of generation – random variates for standard distributions like uniform, exponential, Poisson, binomial, normal etc. – Testing of Random variates – Monte Carlo Simulation.

MODULE III MODELLING PROCESS 7
Primitive Models : Establishing relationships via physical laws; Establishing relationships via curve fitting; Parameters estimation problems; Elementary state transition models.

MODULE IV DESIGN OF SIMULATION EXPERIMENTS 9
Steps on Design of Simulation Experiments – Development of models using of Highlevel language for systems like Queuing, Inventory, Replacement, Production etc., – Model validation and verification, Output analysis.

MODULE V SIMULATION LANGUAGES 10
Need for simulation Languages – Comparisons & Selection of Languages – GPSS ARENA- EXTEND – Study of any one of the languages.

MODULE VI CASE STUDIES USING SIMULATION LANGUAGES 6
Total Hours: 45
REFERENCES:


OUTCOMES:

The student should be able to

• Model and simulate systems and environments through the use of computers.

• Conduct experiments with discrete dynamic, stochastic system models on a computer.
OBJECTIVES:
• To understand the various decision phases in a supply chain
• To be aware of the Supply Chain and its drivers
• To design Supply Chain Network
• To build a aggregate plan in supply chain
• To understand Sourcing Decisions in Supply Chain
• To comprehend the influence of Information technology in Supply Chain

MODULE I  INTRODUCTION TO SUPPLY CHAIN 9
Understanding Supply Chain - Decision phases - Supply chain performance - Competitive and supply chain strategies - Achieving strategic fit - Expanding strategic scope

MODULE II  SUPPLY CHAIN DRIVERS AND DESIGN 9
Drivers of supply chain performance – Designing distribution network - Network Design in the Supply Chain - Network design in Uncertain Environment

MODULE III  AGGREGATE PLANNING AND MANAGING SUPPLY, DEMAND AND INVENTORY 9

MODULE IV  SOURCING AND TRANSPORTATION 9
Sourcing decision in supply chain - Third and Fourth – Party Logistics providers - Supplier scoring and assessment - Transportation in a Supply Chain – Risk and Trade-offs in transportation design.

MODULE V  INFORMATION TECHNOLOGY IN A SUPPLY CHAIN 9

Total Hours: 45
B.Tech. Civil Engineering

REFERENCES:


OUTCOMES:

• After taking up the course the student will be able to brighten his prospects of taking up a career on supply chain management.

• The student decision making capability specific to supply chain issues in an industry is improved.

• The student can plan a well defined execution of supply chain strategy in companies.

• The student will be able to design an optimal distribution network as per the demands of the industry.

• The student can also determine the most favorable transportation plan for a company.

• The student will also be able to bring in company from paper environment to paperless environment.
OBJECTIVES:

• To understand the various principles, practices of TQM to achieve quality.
• To get acquainted with the various statistical tools and approaches for quality control and continuous improvement.
• To get aware of the importance of ISO and Quality Systems.

MODULE I  INTRODUCTION

Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs - Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.

MODULE II  TQM PRINCIPLES


MODULE III  TQM IMPROVEMENT PROCESS


MODULE IV  STATISTICAL PROCESS CONTROL (SPC)

The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.

MODULE V  TQM TOOLS

Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality
B.Tech. Civil Engineering


MODULE VI QUALITY SYSTEMS


Total Hours: 45

TEXT BOOK:

REFERENCES:

OUTCOMES:
The student should be able to

• apply the various statistical tools and approaches for quality control.
• achieve continuous process improvement through TQM.
OBJECTIVES:

- To learn the growing demand, supply of energy on global and national levels and the need for renewable energy promotion.
- To understand the basic need for energy conservation and waste heat recovery.
- To learn the important aspects of energy audit and management.
- To get acquainted with the global environmental issues and carbon credits.

MODULE I  GLOBAL AND NATIONAL ENERGY SCENARIO  7
Role of energy in economic development, various energy resources - overall energy demand and availability- Energy consumption in various sectors and its changing pattern - Exponential increase in energy consumption and projected future demands. Need for renewable energy.

MODULE II  SOLAR ENERGY  8

MODULE III  OTHER RENEWABLE ENERGY SOURCES  8
Power from wind – wind turbine working and types, solar thermal power plants – low medium and high power generation, power from wave, tidal, geothermal sources, OTEC system. MHD power plants – working, types, merits and demerits. Energy from biomass.

MODULE IV  COGENERATION, WASTE HEAT RECOVERY AND COMBINED CYCLE PLANTS  8
MODULE V  ENERGY CONSERVATION AND MANAGEMENT  


MODULE VI  GLOBAL ENERGY ISSUES AND CARBON CREDITS  


Total Hours: 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
The student should be able to
• Realize the global and national energy status and need to switch over to renewable energy technology.
• Energy audit and suggest methodologies for energy savings.
• Utilize the available resources in an optimal way.
• Concern about the global environmental issues & promote carbon credits.
OBJECTIVE:

• To learn about the robots, various components, of Robots, programming and their applications.

MODULE I  INTRODUCTION  8

Definition- Need - Application, Types of robots – Classifications – Configuration, work volume, control loops, controls and intelligence- basic parts - functions – specifications. of robot, degrees of freedoms, end effectors – types, selection

MODULE II  ROBOT DRIVES AND CONTROL  8


MODULE III  ROBOT SENSORS  8


MODULE IV  ROBOT PROGRAMMING & AI TECHNIQUES  7

Types of Programming – Teach pendant programming – Basic concepts in AI techniques – Concept of knowledge representations – Expert system and its components.

MODULE V  ROBOTIC WORK CELLS AND APPLICATIONS OF ROBOTS  7

Robotic cell layouts – Inter locks – Humanoid robots – Micro robots – Application of robots in surgery, Manufacturing industries, space and underwater.

MODULE VI  ROBOT KINEMATICS AND DYNAMICS  7

Forward and inverse Kinematic equations, Denvit – Hartenbers representations
B.Tech. Civil Engineering


Total Hours: 45

REFERENCES:

OUTCOMES:
Students would be able to
• Understand about the robots, its various components.
• Design Robots for industrial applications.
• Do programming for robots and apply them in real time applications.
OBJECTIVES:

• To understand the basics of Cyber Security Standards and Laws.
• To know the legal, ethical and professional issues in Cyber security.
• To understand Cyber Frauds and Abuse and its Security Measures.
• To know the technological aspects of Cyber Security.

MODULE I  FUNDAMENTALS OF CYBER SECURITY  8


MODULE II TYPES OF THREATS AND SECURITY MEASURES  8


MODULE III APPLICATION SECURITY  8


MODULE IV PHYSICAL SECURITY AND FORENSICS  7


MODULE V CYBER STALKING & FRAUD  7

MODULE VI  CYBER SECURITY STANDARDS AND POLICIES


Total Hours : 45

TEXT BOOK:

REFERENCES:

OUTCOMES:
Upon completion of this course, attendees should be able to satisfy the critical need for ensuring Cyber Security in Organizations.

• The students attending this course will be able to analyse the attacks and threats.
• They can also provide solutions with Intrusion Detection systems and Softwares.
• They will have knowledge about Cyber Frauds and Cyber Laws.
B.Tech. Civil Engineering

GEBX16  USABILITY ENGINEERING  L  T  P  C
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OBJECTIVES:
The objective of this course is

- To understand the emerging concept of usability, requirements gathering and analysis.
- To learn about human computer interaction with the help of interfaces that have high usability.

MODULE I  INTRODUCTION

MODULE II  USER INTERFACES
Generation of User Interfaces – Batch Systems, Line Oriented Interfaces, Full Screen Interfaces, Graphical User Interfaces, Next Generation Interfaces, Long Term Trends – Usability Engineering Life Cycle – Interfaces – Data Gathering – Data Analysis Interpretation and Presentation.

MODULE III  INTERACTION DESIGN

MODULE IV  USABILITY TESTING

MODULE V  USABILITY ASSESSMENT METHODS
Observation, Questionnaires and Interviews, Focus Groups, Logging Actual
B.Tech. Civil Engineering

Use, User Feedback, Usability Methods – Interface Standards - National, International and Vendor Standards, Producing Usable In-House Standards

MODULE VI USER INTERFACES


Total Hours : 45

TEXT BOOKS:

REFERENCES:

OUTCOMES:
Students who complete this course will be able to
• build effective, flexible and robust user interfaces.
• translate system requirements into appropriate human/computer interaction sequences.
• choose mode, media and device for the application requirements.
OBJECTIVE:
• To understand the various safety measures to be taken in different industrial environments.

MODULE I SAFETY MANAGEMENT 7
Evolution of modern safety concept- Safety policy - Safety Organization - line and staff functions for safety - Safety Committee- budgeting for safety. safety education and training.

MODULE II SAFETY IN MANUFACTURING 7
Safety in metal working-Machine guarding -Safety in welding and gas cutting - Safety in cold forming and hot working of metals -Safety in finishing, inspection and testing -Regulation.

MODULE III SAFETY IN CONSTRUCTION 8

Safety in Erection and closing operation - Safety in typical civil structures – Dams-bridges-water Tanks-Retaining walls-Critical factors for failure-Regular Inspection and monitoring.

MODULE IV ELECTRICAL SAFETY 8

Selection of Environment, Protection and Interlock – Discharge rods and earthing device – Safety in the use of portable tools - Preventive maintenance.

MODULE V SAFETY IN MATERIAL HANDLING 8
General safety consideration in material handling devices - Ropes, Chains, Sling, Hoops, Clamps, Arresting gears – Prime movers.
B.Tech. Civil Engineering

Ergonomic consideration in material handling, design, installation, operation and maintenance of Conveying equipments, hoisting, traveling and slewing mechanisms.

Storage and Retrieval of common goods of shapes and sizes in a general store of a big industry.

MODULE VI  SAFETY EDUCATION AND TRAINING


Total Hours: 45

REFERENCES:


OUTCOMES:

Students would be able to

• Acquire knowledge on various safety Hazards.
• Carry out safety measures for different industrial environments.
OBJECTIVES:

• To understand the transport fleet and their related activities for minimizing operational cost.

• To understand the need of maintenance and its importance.

• To understand the functions and applications of various types of transport system.

MODULE I  INTRODUCTION 7

Personnel management; objectives and functions of personnel management, psychology, sociology and their relevance to organization, personality problems. Selection process: job description, employment tests, interviewing, introduction to training objectives, advantages, methods of training, training procedure, psychological tests.

MODULE II  ORGANISATION AND MANAGEMENT 7


MODULE III  TRANSPORT SYSTEMS 9

Introduction to various transport systems. Advantages of motor transport. Principal function of administrative, traffic, secretarial and engineering divisions. chain of responsibility, forms of ownership by state, municipality, public body and private undertakings.

MODULE IV  SCHEDULING AND FARE STRUCTURE 8

Principal features of operating costs for transport vehicles with examples of estimating the costs. Fare structure and method of drawing up of a fare table. Various types of fare collecting methods. Basic factors of bus scheduling. Problems on bus scheduling.
B.Tech. Civil Engineering

MODULE V MOTOR VEHICLE ACT 7

Traffic signs, fitness certificate, registration requirements, permit insurance, constructional regulations, description of vehicle-tankers, tippers, delivery vans, recovery vans, power wagons and fire fighting vehicles. Spread over, running time, test for competence to drive.

MODULE VI MAINTENANCE 7

Preventive maintenance system in transport industry, tyre maintenance procedures. Causes for uneven tyre wear; remedies, maintenance procedure for better fuel economy, Design of bus depot layout.

Total Hours: 45

TEXT BOOKS:

REFERENCE:
1. Government Motor Vehicle Act, Publication on latest act to be used as on date.

OUTCOMES:
Upon completion of the course, students will

• Know about different aspects related to transport system and management.
• Know features of scheduling, fixing the fares
• Know about the motor vehicle act and maintenance aspects of transport.
OBJECTIVES:

- To introduce the various advanced optimization tools.
- To provide an understanding to deal with ill identified and fuzzy problems.

MODULE I  INTRODUCTION

Review of conventional optimization techniques - limitations - limitation of exhaustive search - need for artificial intelligence - bio mimicking methods

MODULE II  HEURISTICS METHODS


MODULE III  GENETIC ALGORITHM


MODULE IV  ANT COLONY OPTIMIZATION


MODULE V  FUZZY LOGIC AND ANN


**Total Hours: 45**

**REFERENCES:**


**OUTCOMES:**

At the end of the course student will be able to

1. Formulate a real life situation as an optimization the problem.
2. Identify the appropriate solution methodology and provide a solution
OBJECTIVES:

- To provide in depth knowledge on Plant Engineering
- To introduce detail engineering and P&ID
- To learn about the support to Instrumentation from other disciplines
- To study about the Installation and commissioning

MODULE I  INTRODUCTION OF PLANTS  7

General Project Cycle – Feed – Sales - Plant Description, Component / Areas of Plant, Plant Layout, Plant Interfaces, Plant Location

MODULE II  ELEMENTS OF PLANT  8


MODULE III  DETAIL ENGINEERING  10

P & ID Development with PFD’s, Major Discipline Involvement & Inter discipline Interaction, Major Instrumentation & Control Systems - Development Phase – Instrument List, I/O Count, Specification Sheets, Instrument Installation (Hook ups), Control Philosophy – Detail Engineering.

MODULE IV  SUPPORT FROM OTHER DISCIPLINE  8

Other Discipline Supports to Instrumentation – Plot Plan, Piping / Equipment Plan, Electrical Area Classification, Fire Hazardous Classification Telecommunication Systems - Control Network architecture

MODULE V  INSTALLATION AND COMMISSIONING  7

Plant Construction - Key Drawings for Construction Support Construction Activities, System Testing, Startup / Commissioning, Production.

MODULE VI  CASE STUDIES  5

Case studies of Water Treatment Plant - Paper Industry – Power Plant etc.

Total Hours: 45
REFERENCES:


OUTCOMES:

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

- Review and correct P&IDs
- Do installation and commissioning of new plants
- Apply plant engineering in design and maintenance of water treatment plant / power plant etc
OBJECTIVES:
The students would gain knowledge on

• Technicalities attached to Project Management and Significance of Quality Consideration

• Project management methodologies – tools and techniques, supplemented with examples from case studies

• The importance of Efficient HR team and role of Communication in executing Projects.

• Managing Risks in Project Management

MODULE I  INTRODUCTION TO PROJECT MANAGEMENT


MODULE II  PROJECT MANAGEMENT PROCESS, TOOLS AND TECHNIQUES

Project life cycle- Initiation, Planning, Execution, Monitoring and Closing Phase; - Link between project management process, process groups and knowledge areas; Project management tools and techniques- Project Stakeholders description and mapping - Stakeholder Management Process

MODULE III  PROJECT QUALITY, COST AND SCHEDULE MANAGEMENT

MODULE IV  PROJECT HR & COMMUNICATION MANAGEMENT 10


MODULE V  PROJECT PROCUREMENT & RISK MANAGEMENT  8


Total Hours: 45

REFERENCES:

OUTCOMES:
• Learners will be able to identify the Key Knowledge Areas and apply PM process in hypothetical project assignments given as continuous assessment.
• They would be able to suitably recognize tools and techniques required for various phases included in the project.
• They would also be able to manage scope, time, cost and other major components that would help them to execute the project efficiently.
OBJECTIVES:

• understand the community in which they work
• understand themselves in relation to their community
• identify the needs and problems of the community and involve them in problem-solving
• develop among themselves a sense of social and civic responsibility
• utilise their knowledge in finding practical solutions to individual and community problems
• develop competence required for group-living and sharing of responsibilities
• gain skills in mobilising community participation
• acquire leadership qualities and democratic attitudes
• develop capacity to meet emergencies and natural disasters and
• practise national integration and social harmony

MODULE I   INTRODUCTION AND BASIC CONCEPTS OF NSS   4

History, philosophy, aims & objectives of NSS – Emblem, flag, motto, song, badge, etc. – Organizational structure, roles and responsibilities of various NSS functionaries.

MODULE II   NSS PROGRAMMES AND ACTIVITIES   10

Concept of regular activities, special camping, Day Camps – Basis of adoption of village/slums, Methodology of conducting Survey – Financial pattern of the scheme – Other youth programme/schemes of GOI – Coordination with different agencies – Maintenance of the Diary.

MODULE III   UNDERSTANDING YOUTH   5

Definition, profile of youth, categories of youth – Issues, challenges and opportunities for youth – Youth as an agent of social change.
B.Tech. Civil Engineering

MODULE IV COMMUNITY MOBILISATION

Mapping of community stakeholders – Designing the message in the context of the problem and the culture of the community – Identifying methods of mobilisation – Youth-adult partnership.

MODULE V VOLUNTEERISM AND SHRAMDAN

Indian Tradition of volunteerism – Needs and importance of volunteerism – Motivation and Constraints of Volunteerism – Shramdan as a part of volunteerism.

Total Hours: 35