Condition for Admission

Candidates for admission to the first year of the four year B.E. Degree programmes shall be required to have passed the final examination of the plus 2 Higher Secondary Course with Mathematics, Physics and Chemistry as subjects of study and candidates who have passed the Higher Secondary Examination through vocational stream under Engineering, conducted by the Board of Secondary Education, Government of Tamil Nadu or an examination of any other authority accepted by the Syndicate of this University as equivalent thereto. They shall satisfy the conditions regarding qualifying marks, age and physical fitness as may be prescribed by the Syndicate of the Annamalai University from time to time.

Candidates who have passed the Diploma course in Engineering of the State Board of Technical Education, Tamil Nadu (listed in Annexure-1) will be eligible for admission to the second year of the four year degree programme in B.E. under the lateral entry scheme provided they satisfy other conditions.

1. Branches of Study in B.E.

   BRANCH I  - Civil Engineering
   BRANCH II - Civil and Structural Engineering
   BRANCH III - Mechanical Engineering
   BRANCH IV - Mechanical Engineering (Manufacturing)
   BRANCH V  - Electrical and Electronics Engineering
   BRANCH VI - Electronics and Instrumentation Engineering
   BRANCH VII - Chemical Engineering
   BRANCH VIII - Computer Science and Engineering
   BRANCH IX  - Information Technology
   BRANCH X  - Electronics and Communication Engineering

2. Courses of study

   The courses of study and the respective syllabi are given separately.

3. Scheme of Examinations

   The scheme of Examinations is given separately.
4. Choice Based Credit System (CBCS)

The curriculum includes six components namely Humanities/Social Sciences/Management, Basic Sciences, Engineering Sciences, Professional Core, Professional Electives and Open Electives in addition to Seminar & Industrial Training and Project. Each semester curriculum shall normally have a blend of theory and practical courses. The total credits for the entire degree Programme is 176 (135 for lateral entry students).

5. Eligibility for the Degree

A candidate shall be eligible for the degree of Bachelor of Engineering if the candidate has satisfactorily undergone the prescribed courses of study for a period of four academic years and has passed the prescribed examinations in all the four academic years. For the award of the degree, a student has to

1. Earn a minimum of 176 credits (135 for lateral entry students).
2. Serve in any one of the Co-curricular activities such as
   - National Cadet Corps (NCC)
   - National Service Scheme (NSS)
   - National Sports Organization (NSO) and
   - Youth Red Cross (YRC)

for at least one year. The students enrolled in any one of the co-curricular activities (NCC / NSS / NSO / YRC) will undergo training for about 80 hours and attend a camp of about seven days. The training shall include classes on hygiene and health awareness and also training in first-aid. While the training activities will normally be during weekends, the camp will normally be during vacation period.

(OR)

Enroll as a student member of a recognized professional society such as

- Student Chapters of Institution of Engineers (India)
- Student Chapters of other Professional bodies like ICI, ISA, IICHE

7. Assignment of Credits for Courses

Each course is normally assigned one credit per hour of lecture / tutorial per week and one credit for two hours or part thereof for laboratory or practical or drawing per week.

8. Duration of the programme

A student is normally expected to complete the B.E. programme in four years but in any case not more than eight years from the time of admission.

9. Registration for courses

A newly admitted student will automatically be registered for all the courses prescribed for the first, second and third semesters without any option.

Every other student shall enroll for the courses intended to be credited in the succeeding semester in the current semester itself by completing the registration form indicating the list of courses. This registration will be done a week before the last working day of the current semester.
A student is required to earn 176 (135 for lateral entry students) credits in order to be eligible for obtaining the degree. However the student is entitled to enjoy an option to earn either more or less than the total number of credits prescribed in the curriculum of a particular semester on the following guidelines:

The slow learners may be allowed to withdraw certain courses with the approval by Head of the Department and those courses may be completed by them in the fifth year of study and still they are eligible to be awarded with I Class. A student can withdraw a maximum of 2 courses per semester from IV semester to VII semester and take up those courses in the fifth year of study. However, courses withdrawn during odd semesters (V and VII) must be registered in the odd semester of fifth year and courses withdrawn during even semesters (IV and VI) must be registered in the even semester of fifth year.

The advance learners may be allowed to take up the open elective subjects of eighth semester in sixth and seventh semesters one in each to enable them to pursue industrial training / project work in the entire eighth semester period provided they should register those courses in the fifth semester itself. Such students should meet the teachers offering those elective courses themselves for clarifications. No specific slots will be allotted in the time table for such courses.

10. Seminar / Industrial Training

The student has to present a seminar on the chosen topic. However, the student can select a topic duly approved by the Seminar Coordinator and the Head of the Department concerned. The student who has presented the seminar has to submit a report and appear for viva-voce examination at the end of the semester.

11. Project Work

The student typically registers for project at the end of seventh semester and completes it at the end of the eighth semester along with the courses prescribed for study in the eighth semester. However a student who has registered and successfully completed the courses of eighth semester by acquiring additional credits in the earlier semesters can attempt to spend his / her period of study in an industry and complete his / her project work, submit the project report and appear for viva-voce examination at the end of eighth semester.

12. Industrial Training (Value added courses)

One credit courses shall be offered by a Department with the prior approval from the Dean, Faculty of Engineering and Technology. For one credit course, a relevant potential topic may be selected by a committee consisting of Head of the department concerned and the Board of Studies member from the Department and a senior faculty member from the department concerned. An expert from industry familiar with the topic chosen may be accordingly invited to handle classes for the students. The details of the syllabus, time table and the name of the industrial expert may be sent by the above committee to the Dean for approval. The credits earned through the one credit courses shall be over and above the total credit requirement prescribed in the curriculum for the award of the degree. Students can
take a maximum of two one credit courses (one each in VI and VII semesters). They shall be allowed to take one credit courses offered in other Departments with the permission of Head of the Department offering the course. A separate mark sheet shall be issued for one credit courses.

13. Electives
The elective courses fall under two categories: Professional Electives and Open Electives. The Professional Elective courses are offered in the concerned branch of specialization and a student can choose the Professional Elective courses with the approval of the Head of the Department concerned. Apart from the various Professional elective courses, a student can choose the open electives from any specialization offered in any Department in the Faculty of Engineering & Technology during the entire period of study, with the approval of the Head of the Department and the Head of the Department offering the course.

Further, the student can also credit not more than two courses offered through the SWAYAM Portal of UGC with the approval of the Head of the Department concerned. These courses will be considered as equivalent of open electives.

14. Assessment
The break-up of continuous assessment and examination marks for theory courses is as follows:

- First assessment (Mid-Semester Test-I) : 10 marks
- Second assessment (Mid-Semester Test-II) : 10 marks
- Third Assessment : 5 marks
- End Semester Examination : 75 marks

The break-up of continuous assessment and examination marks for Practical courses is as follows:

- First assessment (Test-I) : 15 marks
- Second assessment (Test-II) : 15 marks
- Maintenance of record book : 10 marks
- End Semester Examination : 60 marks

The continuous assessment marks for the seminar / industrial training will be 40 and to be assessed by a seminar committee consisting of the Seminar Coordinator and a minimum of two members nominated by the Head of the Department. The continuous assessment marks will be awarded at the end of seminar session. 60 marks are allotted for the seminar / industrial training and viva voce examination conducted based on the seminar / industrial training report at the end of the semester.

The continuous assessment marks for the project work will be 40 and to be assessed by a review committee consisting of the project guide and a minimum of two members nominated by the Head of the Department. One of the committee members will be nominated as the Chairman by the Head of the Department. The
Head of the Department may be a member or the Chairman. At least two reviews should be conducted during the semester by the review committee. The student shall make presentation on the progress made before the committee. 60 marks are allotted for the project work and viva voce examination at the end of the semester.

15. Substitute Assessment

A student who has missed, for genuine reasons accepted by the Head of the Department, one or more of the assessments of a course other than the final examination, may take a substitute assessment for any one of the missed assessments. The substitute assessment must be completed before the date of the third meeting of the respective class committees.

A student who wishes to have a substitute assessment for a missed assessment must apply to the Dean/Head of the Department within a week from the date of the missed assessment.

16. Student Counsellors (Mentors)

To help the students in planning their course of study and for general advice on the academic programme, the Dean/Head of the Department will attach a certain number of students to a member of the faculty who shall function as student counsellor for those students throughout their period of study. Such student counsellors shall advise the students, give preliminary approval for the courses to be taken by the students during each semester and obtain the final approval of the Dean/Head of the Department.

17. Class Committee

For all the branches of study during the first two semesters, a common class committee will be constituted by the Dean of the faculty. From among the various teachers teaching the same common course to different classes during each semester of the first year, the Dean shall appoint one of them as course coordinator. The composition of the class committee during first and second semesters will be as follows:

- Course coordinators of all courses.
- All Heads of the Sections, among whom one may be nominated as Chairman by the Dean.
- The Dean may opt to be a member or the Chairman.

For each of the higher semesters, separate class committees will be constituted by the respective Head of the Departments. The composition of the class committees from third to eighth semester will be as follows:

- Teachers of the individual courses.
- A seminar coordinator (for seventh semester only) shall be appointed by the Head of the Department.
- A project coordinator (for eighth semester only) shall be appointed by the Head of the Department from among the project supervisors.
- One Professor or Associate Professor, preferably not teaching the concerned class, appointed as Chairman by the Head of the Department.
- The Head of the Department may opt to be a member or the Chairman.
The class committee shall meet three times during the semester. The first meeting will be held within two weeks from the date of class commencement in which the type of assessment like test, assignment etc. for the third assessment and the dates of completion of the assessments will be decided.

The second meeting will be held within a week after the completion of the first assessment to review the performance and for follow-up action.

The third meeting will be held after all the assessments but before the University semester examinations are completed for all the courses, and at least one week before the commencement of the examinations. During this meeting the assessment on a maximum of 25 marks for theory / 40 marks for seminar / industrial training, practical and project work will be finalized for every student and tabulated and submitted to the Head of the Department (to the Dean in the case of I & II Semester) for approval and transmission to the Controller of Examinations.

18. Attendance requirements
The students with 75% attendance and above are permitted to appear for the University examinations. However, the Vice Chancellor may give a rebate / concession not exceeding 10% in attendance for exceptional cases only on Medical Grounds.

19. Temporary break of study
A student is permitted to go on break of study for a maximum period of one year either as two breaks of one semester each or a single break of one year.

The student applies for break of study, the student shall apply to the Dean in advance, in any case, not later than the last date of the first assessment period. The application duly filled by the student shall be submitted through the Head of the Department. In the case of short term employment/ training/ internship, the application for break of study shall be approved and forwarded by the Head of the department concerned to the Dean.

However, the student must complete the entire programme within the maximum period of eight years.

20. Procedure for Withdrawing from the Examinations
A student can withdraw from all the examinations of the semester only once during the entire programme on valid grounds accepted by the University. Such withdrawal from the examinations of a semester will be permitted only if the candidate applies for withdrawal at least 24 hours before the commencement of the last examination. The letter grade ‘W’ appears in the mark sheet for such candidates.

21. Passing and Declaration of Examination Results
All assessments of all the courses on an absolute marks basis will be considered and passed by the respective results passing boards in accordance with the rules of the University. Thereafter, the Controller of examinations shall convert the marks for each course to the corresponding letter grade as follows, compute the Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA), and prepare the mark sheets.
<table>
<thead>
<tr>
<th>Marks Range</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 to 100</td>
<td>'S'</td>
</tr>
<tr>
<td>80 to 89</td>
<td>'A'</td>
</tr>
<tr>
<td>70 to 79</td>
<td>'B'</td>
</tr>
<tr>
<td>60 to 69</td>
<td>'C'</td>
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<tr>
<td>55 to 59</td>
<td>'D'</td>
</tr>
<tr>
<td>50 to 54</td>
<td>'E'</td>
</tr>
<tr>
<td>Less than 50</td>
<td>'RA'</td>
</tr>
<tr>
<td>Withdrawn from exam</td>
<td>'W'</td>
</tr>
</tbody>
</table>

A student who obtains less than 30/24 marks out of 75/60 in the theory/practical examinations respectively or is absent for the examination will be awarded grade RA.

A student who earns a grade of S,A,B,C,D or E for a course is declared to have successfully completed that course. Such a course cannot be repeated by the student.

A student who is detained for lack of attendance must re-register for and repeat the courses in the respective semester.

A student who obtains letter grade RA / W in the mark sheet must reappear for the examination of the courses.

The following grade points are associated with each letter grade for calculating the grade point average and cumulative grade point average.

- S - 10; A - 9; B - 8; C - 7; D - 6; E - 5; RA - 0

Courses with grade RA / W are not considered for calculation of grade point average or cumulative grade point average.

A student can apply for re-totaling of one or more of his examination answer papers within a week from the date of issue of mark sheet to the student on payment of the prescribed fee per paper. The application must be made to the Controller of Examinations with the recommendation of the Head of the Department.

After the results are declared, mark sheets will be issued to the students. The mark sheet will contain the list of courses registered during the semester, the grades scored and the grade point average for the semester.

GPA is the sum of the products of the number of credits of a course with the grade point scored in that course, taken over all the courses for the semester, divided by the sum of the number of credits for all courses taken in that semester.

CGPA is similarly calculated considering all the courses taken from the time of admission.

### 22. Awarding degree

After successful completion of the programme, the degree will be awarded with the following classification based on CGPA.

- For First Class with Distinction, the student must earn a minimum of 176 credits within four years (135 credits within three years for lateral entry...
students) for from the time of admission, pass all the courses in the first attempt and obtain a CGPA of 8.25 or above for all the subjects from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students).

- For First Class, the student must earn a minimum of 176 credits within five years (135 credits within four years for lateral entry students) from the time of admission and obtain a CGPA of 6.75 or above for all the subjects from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students).

- For Second Class, the student must earn a minimum of 176 credits within eight years (135 credits within seven years for lateral entry students) from the time of admission.

23. Ranking of Candidates

The candidates who are eligible to get the B.E. degree in the First Class with Distinction will be ranked together on the basis of CGPA for all the subjects of study from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students).

The Candidates passing with First Class will be ranked next after those with distinction on the basis of CGPA for all the subjects of study from I Semester to VIII Semester (III Semester to VIII Semester for lateral entry students).

The ranking of candidates will be done separately for each branch of study.

24. Transitory Regulations

The University shall have powers to revise or change or amend the regulations, the scheme of examinations, the courses of study and the syllabi from time to time.

Wherever there had been change of syllabi, examinations based on the existing syllabi will be conducted for three consecutive times after implementation of the new syllabi in order to enable the students to clear the arrears. Beyond that the students will have to take up their examinations in equivalent courses, as per the new syllabi, on the recommendations of the Head of the Department concerned.

Diploma Programmes Eligible for the B.E. (Lateral Entry) Programmes offered in FEAT (from 2017-2018)

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Branches of Study</th>
<th>Eligible Diploma Programme (FT/PT/ SW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Civil Engineering</td>
<td>1. Civil Engineering</td>
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<tr>
<td></td>
<td></td>
<td>2. Civil Engineering(Architecture)</td>
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<tr>
<td>2.</td>
<td>Civil and Structural Engineering</td>
<td>3. Environmental Engineering and Pollution Control(Full Time)</td>
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<td></td>
<td></td>
<td>4. Architectural Assistantship</td>
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<td></td>
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<td>5. Civil Engineering (Rural Tech.)</td>
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<td></td>
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<td>6. Civil and Rural Engineering</td>
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<td>3.</td>
<td>Mechanical Engineering</td>
<td>1. Mechanical Engineering</td>
</tr>
<tr>
<td>S.No.</td>
<td>Branches of Study</td>
<td>Eligible Diploma Programme (FT/PT/ SW)</td>
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<tr>
<td></td>
<td></td>
<td>2. Mechanical and Rural Engineering</td>
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<tr>
<td>4.</td>
<td>Mechanical Engineering (Manufacturing Engineering)</td>
<td>3. Mechanical Design and Drafting</td>
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<td></td>
<td>4. Production Engineering</td>
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<td></td>
<td></td>
<td>5. Production Technology</td>
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<td></td>
<td></td>
<td>6. Automobile Engineering</td>
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<td></td>
<td></td>
<td>7. Automobile Technology</td>
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<tr>
<td></td>
<td></td>
<td>8. Metallurgy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>9. Mechatronics Engineering</td>
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<tr>
<td></td>
<td></td>
<td>10. Machine Tool Maintenance and Repairs</td>
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<tr>
<td></td>
<td></td>
<td>11. Tool and Die making</td>
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<tr>
<td></td>
<td></td>
<td>12. Tool Engineering</td>
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<tr>
<td></td>
<td></td>
<td>13. Tool Design</td>
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<td></td>
<td></td>
<td>14. Foundry Technology</td>
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<td></td>
<td></td>
<td>15. Refrigeration and Air Conditioning</td>
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<td>16. Agricultural Engineering</td>
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<td></td>
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<td>17. Agricultural Technology</td>
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<td></td>
<td></td>
<td>18. Marine Engineering</td>
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<td></td>
<td>19. Mechanical Engineering(Production)</td>
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<td></td>
<td></td>
<td>20. Mechanical Engineering(Tool &amp;Die)</td>
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<tr>
<td></td>
<td></td>
<td>21. Mechanical Engineering (Foundry)</td>
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<tr>
<td></td>
<td></td>
<td>22. Mechanical Engineering(R &amp; A.C.)</td>
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<td></td>
<td></td>
<td>23. Electronics(Robotics)</td>
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<td></td>
<td></td>
<td>24. Mining Engineering</td>
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<td></td>
<td></td>
<td>25. Agricultural Engineering and Farm</td>
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<td>26. Equipment Technology</td>
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<tr>
<td>5.</td>
<td>Electrical and Electronics Engineering</td>
<td>1. Electrical and Electronics Engg.</td>
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<td>5. Instrument Technology</td>
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<td>7. Electrical Engineering (Instruments and Control)</td>
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<td>9. Instrumentation Technology</td>
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<td></td>
<td></td>
<td>10. Electronics (Robotics)</td>
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<tr>
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<td></td>
<td>11. Mechatronics Engineering</td>
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<tr>
<td>S.No.</td>
<td>Branches of Study</td>
<td>Eligible Diploma Programme (FT/PT/ SW)</td>
</tr>
<tr>
<td>-------</td>
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<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
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</tbody>
</table>
| 7.    | Chemical Engineering              | 1. Petrochemical Engineering  
2. Chemical Engineering  
3. Environmental Engineering and Pollution Control  
4. Leather Technology (Footwear)  
5. Leather Technology  
6. Plastic Technology  
7. Polymer Technology  
8. Sugar Technology  
9. Textile Technology  
10. Chemical Technology  
11. Ceramic Technology  
12. Petro Chemical Technology  
13. Pulp & Paper Technology  
14. Petroleum Engineering                                                                                                   |
2. Computer Technology  
3. Computer Science and Engineering  
4. Information Technology  
5. Computer Engineering  
6. Computer Networking  
7. Electronics(Robotics)  
8. Mechatronics Engineering                                                                                                    |
| 9.    | Information Technology            |                                                                                                                |
2. Computer Technology  
3. Computer Science and Engineering  
4. Information Technology  
5. Computer Engineering  
6. Computer Networking  
7. Electronics(Robotics)  
8. Mechatronics Engineering                                                                                                    |

FT - Full Time;  PT - Part Time;  SW – Sandwich.

**COURSES AND CREDITS - SUMMARY**

<table>
<thead>
<tr>
<th>Semester</th>
<th>No. of Courses</th>
<th>HS</th>
<th>BS</th>
<th>ES</th>
<th>PC</th>
<th>PE</th>
<th>OE</th>
<th>S &amp; IT</th>
<th>Proj.</th>
<th>Total Credits</th>
</tr>
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<tbody>
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<td>3*</td>
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<tr>
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<td>4</td>
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<td>-</td>
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<td>-</td>
<td>-</td>
<td>17</td>
<td>8</td>
<td>-</td>
<td>-</td>
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<tr>
<td>VI.</td>
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<td>9</td>
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<td>-</td>
<td>-</td>
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<td>11</td>
<td>3</td>
<td>-</td>
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<tr>
<td>VII.</td>
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<td>3</td>
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<td>-</td>
<td>5</td>
<td>8</td>
<td>3</td>
<td>1</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>14</td>
</tr>
</tbody>
</table>

* - No of Credits,  ** - No of Courses.

**DETAILS OF COURSE CODE**

| Code (First Two digits) | Details | Code (3rd and 4th) | Details |
5th digit represents the semester and 6th and 7th digits represent the serial number of courses.

### COURSES OF STUDY AND SCHEME OF EXAMINATIONS

#### FIRST SEMESTER

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Category</th>
<th>Course Code</th>
<th>Course</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>Exam</th>
<th>CA</th>
<th>Total</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>HS-I</td>
<td>00HS101</td>
<td>Technical English</td>
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**Total**: 24 1 6 570 230 800 23

* Basic Civil Engg. Course for Mech., Manuf., EEE, EIE, ECE, CSE & IT.

L-Lecture; T-Tutorial; P-Practical.

Exam-End Semester Examination; CA-Continuous Assessment.
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### SYLLABUS

#### FIRST SEMESTER

**00HS101 TECHNICAL ENGLISH**

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**COURSE OBJECTIVES**

- English technical communication focuses on developing the proficiency of Engineering students in communicative skills, ensuring them to face the demand of their profession with high command in English.

- At the end of the course, the learners will be able to use English for all purposes of technical communication and come out in “flying colours”.

**Unit-I : Listening Strategies**

This unit makes the students to get exposed to the listening exercises and get registered in their minds the nuances of listening and its importance.

1. Listening process.
2. Types of listening.
3. Barriers to listening.
5. Team listening and note making.
Unit–II : Critical Reading and Creative Writing Skills

This unit introduces communication model like courtesy, body language, role play and good presentation in an effective manner, where the students are given an opportunity to observe, analyze, interpret, imagine and implement their ideas too.

Poem : Road not taken – Robert Frost
Ulysses – Alfred Lord Tennyson.

Prose : Of Studies – Francis Bacon
Science – Destroyer or creator – J. Bronowski

Play : Pygmalion – Bernardshaw.

Unit–III : Speaking Skill

Students shall be motivated to speak in English on familiar or unfamiliar topics. It is a platform to train the students to achieve competency in oral expression.

1. Interview Techniques
2. Group discussion
3. Making presentation and Discussing on the presentation.
4. Sample interviews
5. Dialogue writing

Unit–IV : Professional Writing

Students shall be trained to create their own proficiency in writing like – calling for quotation, asking clarification, placing orders and so on.

1. Poster making
2. Letter writing (formal and E – mail)
3. Analytical writing
4. Format of memos.
5. Report Writing

Unit–V : Theoretical Writing

The nuances of English grammar may be taught to the students so as to present flawless English both in their oral and written communication

2. Single word substitution
3. Concord
4. Tag Questions
5. Active voice and passive voice

TEXT BOOK

REFERENCE BOOKS


COURSE OUTCOMES
1. Understand the role of speaking in English and its contribution to their success.

2. Help the students increase the lingual power and word power, and frame suitable structures to use appropriately in different contexts.

3. Initiate the students to adopt different strategies for personal and professional writing.

4. Train the students use diversified rhetorical functions of technical English.

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COURSE OBJECTIVES
To acquaint the student with the concepts in
- matrices,
- differential calculus,
- multiple integrals,
- vector calculus, which are most important in connection with practical engineering problems.

Unit–I : Matrices

Unit–II : Differential Calculus
Curvature in Cartesian and parametric co–ordinates – Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes.

Unit–III : Differential Calculus: Functions of Several Variables
Jacobians – Taylor’s and Maclaurin’s series expansions of functions of two variables – Maxima and Minima of functions of two variables – Constrained Maxima and Minima by Lagrange Method.

Unit–IV : Multiple Integrals
Unit–V : Laplace Transform

Definition, Transform of elementary functions, Properties, Derivatives and integrals of transforms, Transforms of derivatives, Convolution theorem, Transforms of periodic functions, Inverse Laplace transform, Application to solution of linear ordinary differential equations of second order with constant coefficients.

(In all units, proof of theorems are not included).

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
1. This course equips students to have knowledge and understanding in matrices, differential calculus, multiple integrals and Laplace transforms.
2. Students will be able to solve problems related to above fields in engineering applications.

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<th>00BS103</th>
<th>APPLIED PHYSICS – I</th>
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COURSE OBJECTIVES

At the end of the course the students would be exposed to fundamental knowledge in various engineering Courses and applications

- Determine the different modulus of elasticity and viscosity of the less and highly viscous liquids.
- Design of acoustically good buildings.
- Interferometric techniques in metrology, communication and civil engineering.
- Application of quantum physics to optical and electrical phenomena.
- Application of ultrasonic’s and acoustics.
- Structure identification of engineering materials.
- Applications of Radio isotopes and power reactor systems.

Unit–I : Properties of Matter


Unit–II : Sound

Introduction to Ultrasonics – production – magnetostriction and piezo electric methods – Detection of Ultrasonic waves (Acoustics grating) – Applications.

Unit–III : Optics

Unit–IV : Crystal Physics
Lattice – Unit cell – Bravais lattice – Atomic radius, co – ordination number, Packing factor and their calculations of SC,BCC,FCC and HCP crystal structures – Miller indices – Crystal imperfections (Point defect, Line defect, surface defect and volume defect).

Unit–V : Nuclear Physics

TEXT BOOKS

REFERENCE BOOKS
**COURSE OUTCOMES**

1. The Engineering students can gain the basic knowledge in the field of optics, sound, nuclear physics and crystalline materials etc.

2. It will be useful to apply in engineering applications.

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<th>00BS104</th>
<th>APPLIED CHEMISTRY – I</th>
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**COURSE OBJECTIVES**

To make the student conversant with the

- Water treatment techniques and disinfection methods.
- Working principle of electrochemical cells.
- Sources, refining and various types of fuels.
- Mechanism, classification, applications of lubricants and introduction adhesives.
- Surface chemistry, principle and applications of chromatography.

**Unit-I : Water Treatment**


**Unit-II : Electrochemistry**


**Unit-III : Fuels and Combustion**


**Unit-IV : Engineering Materials – I**

Unit–V : Analytical Technique and Surface Chemistry

Chromatography – Definition – classifications – partition chromatography and adsorption chromatography.


TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course, the student will be able to
1. Understand and develop innovative methods to produce soft water for industrial use and potable water at cheaper cost.
2. Understand and apply the concepts of electrochemistry including electroplating.
3. Understand the properties, sources of fuel and the concept of combustion
4. Gain the knowledge about types of lubricants, uses & their mechanisms and to understand the binding process of adhesives, and its application in building and construction.
5. Separate and purify various organic and inorganic compounds using different chromatographic techniques.
6. Understand the concept of surface chemistry and its applications.

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<tr>
<th>00SP105</th>
<th>COMPUTER PROGRAMMING LABORATORY</th>
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COURSE OBJECTIVES
• To enable the students to have a good understanding about the concepts of “C” programming.
• To provide the hands on experience in basic concepts of AUTOCAD to students.

C Programs based on the following Concepts
AUTOCAD

Special Features – Dimensioning – Angular, Diameter and Radius – Hatching – Patterns – Slides – Attributes – Configuring – Plotting – Exercises in AUTOCAD (2D Drawings only).

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
1. Understand the concepts of C programming.
2. Apply the syntax of conditional and looping statements for writing C programs.
3. Use the features of AUTOCAD for 2D drawing.

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<th>00SP106</th>
<th>ENGINEERING WORKSHOP</th>
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COURSE OBJECTIVES
- To provide the students simple hands-on experience in the basic aspects of production engineering in fitting, carpentry and sheet metal.

Workshop Practice in the Shops
Carpentry: Use of hand tools – exercises in planning and making joints namely, half lap joint, dovetail joint, mortising and tenoning.

Fitting: Use of bench tools, vice, hammers, chisels, files, hacksaw, centre punch, twist drill, taps and dies – Simple exercises in making T joint and dovetail joints.

Sheet Metal Work: Use of hand tools – Simple exercises in making objects like cone, funnel, tray, cylinder.

Smithy: Demonstration of hand forging and drop forging.

COURSE OUTCOMES
This course
1. Use basic tools of fitting, carpentry and sheet metal fabrication.
2. Experience in the fabrication of simple carpentry joints.
3. Develop skill to make simple fitting joints.
4. Train to make simple shapes of sheet material.
5. Distinguish hand forging and drop forging operation.
COURSE OBJECTIVES

- To acquaint the student with the concepts in ordinary differential equations and vector calculus.
- To acquaint the student with the techniques in the theory of analytic functions and complex integration.
- Above topics are most important in connection with practical engineering problems.

Unit–I : Ordinary Differential Equations
Second order linear differential equations with constant coefficients, Second order linear differential equations with variable coefficients (Euler and Legendre’s linear equations), Simultaneous first order linear equations with constant coefficients, method of variation of parameters.

Unit–II : Vector Differentiation
Gradient, divergence and curl, directional derivative, unit normal vector, irrotational and solenoidal vector fields, expansion formulae for operators involving $\nabla$.

Unit–III : Vector Integration
Line, surface and volume integrals, Green’s theorem in a plane, Gauss divergence theorem, Stoke’s theorem – Verification of the above theorems and evaluation of integrals using them.

Unit–IV : Analytic Functions
Functions of a complex variable, Analytic function, the necessary conditions (Cauchy – Riemann equations), sufficient conditions, Properties of analytic functions, harmonic functions, construction of Analytic function by Milne – Thomson method, Conformal mapping: $w = z^2$, $1/z$, $e^z$, $\sin z$, $\cos z$.

Unit–V : Complex Integration
Statement and application of Cauchy theorem, Cauchy integral formulas, Taylor and Laurent expansion, Singularities – Classification; Residues – Statement and application of Cauchy residue theorem, Contour integration round the unit circle.

(In all units, proof of theorems are not included)

TEXT BOOKS

REFERENCE BOOKS
COURSE OUTCOMES
1. This course equips students to have knowledge and understanding in ordinary differential equations, vector calculus and complex variables.
2. Students will be able to solve problems related to above fields in engineering applications.

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<th>00BS202</th>
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COURSE OBJECTIVES
At the end of the course the students would be exposed to fundamental knowledge in various materials and applications
- Application of lasers and fiber optics in engineering and technology.
- Astrophysics is the study of physics of the universe. In various objects, such as stars, planets and galaxies.
- To measure positions, brightness, spectra structure of gas clouds, planets, starts, galaxies, globular clusters, quasars etc.
- Physics of modern engineering materials.
- Electromagnetic phenomena and wave propagation
- Applications of nano materials, nano electronics and optoelectronic devices.
- Design of energy sources and applications of solar energy.

Unit–I : Laser and Fiber Optics

Fiber optics – Principle and propagation of light in optical fibers – Numerical aperture and acceptance angle – Types of optical fibers (Material, Mode and refractive index) – Applications – Fiber Optic communication system.

Unit–II : Dielectrics and Superconductors

Unit–III : Nano Materials

Unit–IV : Quantum Mechanics
The wave Equation, Schrödinger’s Time dependent wave equation, Schrödinger’s time independent wave equation – The Wave function and its physical significance – The particle in a box – energy quantization – Eigen values and Eigen functions.

Unit–V: Energy Physics

TEXT BOOKS

REFERENCE BOOKS
COURSE OUTCOMES
1. The student will have the theoretical knowledge in this field of laser, dielectrics, Nano technique, energy physics etc.
2. It will be very useful to the students to apply in different field of engineering.

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COURSE OBJECTIVES
To make the students to understand the
- Types of polymers and polymerization processes.
- Phase rule with different kinds of systems.
- Different types of corrosion and their mechanism.
- Working principle and applications of primary and secondary batteries.
- Engineering materials such as refractories and abrasives.

Unit–I : Polymers

Unit–II : Phase Rule

Unit–III : Corrosion and Prevention

Unit–IV : Energy Storage Devices
Unit–V : Engineering Materials II

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course, the student will be able to
1. Understand the synthesis and applications of various types of polymers and moulding processes.
2. Understand the concept of phase rule and its applications, which is applicable in alloy preparation.
3. Understand the concept of corrosion and to apply the knowledge in the protection of different metals from corrosion.
4. Gain the knowledge about various energy storage devices, especially solar energy.
5. Have the knowledge of converting solar energy into most needy electrical energy efficiently and economically to reduce the environmental pollution.
6. Gain knowledge on classification, synthesis and applications of abrasives and refractories.
COURSE OBJECTIVES

- To inculcate a knowledge on essentials of Civil Engineering
- To expose the students on the role, significance and contributions of Civil Engineering in satisfying societal needs
- To illustrate the concepts of various construction techniques

Module I

Introduction to Civil Engineering – various disciplines of Civil Engineering, relevance of Civil Engineering in the overall infrastructural development of the country. Introduction to various building materials – Stone, Bricks, Steel, Cement, Concrete, Timber – its characteristics, types and uses. Various types of buildings as per nbc; Selection of suitable site for buildings, Components of a residential building – its functions, Orientation of a building, simple definitions – plinth area / built up area, floor area / carpet area – floor space index.

Module II

Surveying – Principles and objectives of surveying; Types, Classifications of surveying, measurement of areas and distances – chain – compass: Introduction to Leveling, Total station, Remote sensing – fundamental principles and applications.


Module III


TEXT BOOKS


REFERENCE BOOKS

COURSE OUTCOMES
1. Understand the basic knowledge on civil engineering materials
2. Develops the skill to satisfy the social needs
3. Describe the suitable method of construction technique

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<th>BASIC ENGINEERING (ELECTRICAL)</th>
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COURSE OBJECTIVES
- PO1: To impart the basic principles of generation of electrical energy.
- PO2: To explain the operation of electrical machines and various measuring instruments.
- PO3: To understand the basic concepts of circuit analysis.
- PO4: To provide an overview of the principles, operation and application of semiconductor devices like diodes, BJT, FET and a basic knowledge of fundamentals of Communication Systems.

Module I
Sources of Electrical energy – Generation of electrical energy – working principles of DC generators and alternators – Advantages of electrical energy over other forms of Energy.


Working principles of MC and MI voltmeters and Ammeters, Dynamo meter type wattmeter, Induction type energy meter and Multimeter – types of wiring – requirements for house wiring – typical layout for a small house – earthing.

Module II
DC Circuits: Definition of current, voltage, power and energy – DC voltage and current sources – resistance, types of resistors, series and parallel connections of resistors, current and voltage division – loop method of analysis of simple circuits.

AC Circuits: Sinusoidal signals – average, r.m.s values – inductance, capacitance and their V – I relationships. Analysis of simple single phase series circuits – power and power factor – phasor diagrams – Introductions to three phase AC circuits.

Module III
Basic Electronics: Principle and characteristics, uses of PN junction Diode, Zenerdiode, BJT, FET, UJT, Thyristors, – Operating principle of Half wave, Full wave and Bridge rectifiers.

TEXTBOOKS

REFERENCE BOOKS

COURSE OUTCOMES
After the completion of the course, the student should be able to
1. Provide comprehensive idea about simple circuit analysis, working principles of machines and common measuring instruments.
2. Analyze the behavior of any dc and ac circuits.
3. Characterize semiconductor devices that include diodes, BJT and digital functions.
4. Understand fundamental principles of communication systems.

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<th>00ES204</th>
<th>BASIC ENGINEERING (MECHANICAL)</th>
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COURSE OBJECTIVES
- To familiarize the students the functioning of different types of Boilers, the mountings and accessories.
- To provide basic knowledge about the use of various machine tools and the basic principles of welding, brazing and soldering.
- To illustrate the concepts of various metal forming operations and metal joining techniques.

Module I
Boilers: Classification – Description and working of Simple vertical boiler, Cochran boiler, Babcock and Wilcox boiler – Description and working of boiler mountings: water level indicator, Pressure gauge, Dead weight and Spring loaded Safety value, Fusible plug, Feed check value, Steam stop value and Blow – off cock – Description and working of boiler accessories: Economiser and Super heater.

Module II
Module III

Machine Tools: Description of parts and operations performed – Lathe, Shaper and Drilling machine.

Metal Forming: Hot working versus cold working; Hand forging – Principle and operations; Rolling – Principle, rolling mill configurations; Extrusion – Direct versus indirect extrusion.


TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
1. Understand the construction and working principles of boiler operations
2. Distinguish between steam turbines and gas turbines.
3. Select suitable manufacturing methods to produce a new component.

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<th>00HS205</th>
<th>COMMUNICATION SKILLS AND LANGUAGE LABORATORY</th>
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COURSE OBJECTIVES
- The Language Lab focuses on the production and practices of sounds of language
- The Language Lab familiarizes the students with the use of English in everyday situations and contexts.

Theoretical Session (Internal Assessment only)
1. English sound pattern
2. Sounds of English
3. Pronunciation
4. Stress and Intonation
5. Situational Dialogues/ Role play
6. Oral presentations – Prepared or Extempore
7. ‘Just a Minute’ sessions (JAM)
8. Describing Objects /situations/ people
9. Debate
10. Giving Directions

**Practical Session**
- To make the students recognize the sounds of English through Audio Visual Aids
- To enable the students speak fluently without fear
- To develop their communicative skill with individual practice through the prescribed package
- The Globarena Package consists of the following exercises
  1. Reading comprehension
  2. Listening comprehension
  3. Vocabulary exercises
  4. Phonetics
  5. Role Play in dialogues
  6. Auto Speak

**Minimum Requirement**
The English Language Lab shall have two parts:

The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language Globarena software for self-study by learners and Library with Books to improve their proficiency in English.

**Suggested Software:**
1. Globarena Package for communicative English
2. Cambridge Advanced Learner’s English Dictionary

**Books to be procured for English Language Lab Library:**
1. Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.
5. A text book of English Phonetics for Indian Students by T.Balasubramanian (Macmillan)
6. English Skills for Technical Students, WBSCTE with British Council, OL.
DISTRIBUTION AND WEIGHTAGE OF MARKS

English Language Laboratory Practical Paper:

1. The practical examinations for the English Language Laboratory shall be conducted as per the University norms prescribed for the core engineering practical sessions.

2. For the Language lab sessions, there shall be a continuous evaluation during the year for 40 sessional marks and 60 year end Examination marks. The year end Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

COURSE OUTCOMES

1. Help the students cultivate the habit of reading passages from the computer monitor, thus providing them with the required facility to face computer based competitive exams such as GRE, TOEFL, GMAT, etc.

2. Train the students to use language effectively to face interviews, group discussions, and public speaking.

3. Initiate the students into greater use of the computer in resume preparation, report writing, format making, etc.

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COURSE OBJECTIVES

The ability to offer students a variety of research opportunities

1. To determine the radius of curvature of the plano convex lens and the wavelength of the sodium light by measuring the diameter of Newton’s rings.

2. We can use a spectrometer to measure this angle of deviation.

3. To measure the modulus of elastic material by torsional pendulum and bending of a beam.

4. To determine the resistivity of a given steel and brass wire.

5. To find the velocity of ultrasonic waves in a liquid.


List of Experiments (Any Ten)

1. Non – Uniform Bending – Determination of Young’s modulus of the given scale or beam.


4. Spectrometer – Dispersive power of a given prism.

5. Torsional Pendulum – Determination of Moment of Inertia of the metallic disc and
6. Rigidity Modulus of the material of a wire.
7. Field along the axis of a coil – Determination of horizontal earth magnetic flux density.
8. Air wedge – Determination of thickness of a given thin wire and paper.
9. Viscosity – Determination of co – efficient of Viscosity of a less viscous liquid by Capillary flow method
10. Uniform bending – Determination of Young's modulus of the given scale or beam.

**COURSE OUTCOMES**

This course

1. To determine resistivity of a given steel and brass wire.
2. To find the velocity of ultrasonic waves in a liquid.
3. To measure the thickness of a thin material.
4. To determine the band gap of a given semiconductor.
5. Diffraction patterns can be formed by light passing through a series of fine lines.
6. Applications of opto electronic devices.

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**COURSE OBJECTIVES**

- To appreciate the practical significance of acidimetry, alkalimetry and permanganometry
- To analyze quantitatively the amount of a substance present in a given sample.
- To assess the composition of an alloy
- To test the water quality standards.

**LIST OF EXPERIMENTS**

1. Estimation of Potassium hydroxide
2. Estimation of Acetic acid in vinegar
3. Estimation of Temporary hardness of water sample
4. Estimation of Total hardness of water sample
5. Estimate separate amount of sodium carbonate and sodium hydroxide in a mixture.
6. Estimation of Ferrous sulphate
7. Estimation of Mohr’s salt
8. Estimation of ferrous iron
9. Estimation of Oxalic acid
10. Determination of available free chlorine in a water sample.
11. Estimation of copper in brass by iodometry
12. Estimation of iron by dichrometry
13. Estimation of nickel in an alloy

COURSE OUTCOMES
At the end of the course, the student will be able to
1. Gain knowledge in the quantitative chemical analysis of water quality related parameters, acid – base, red – ox and iodometry titrations.

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<th>00SP 208</th>
<th>ENGINEERING GRAPHICS</th>
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COURSE OBJECTIVES
- To develop the ability to produce simple engineering drawing and sketches based on current practice.
- To develop the means for communication of ideas, thoughts and design of objects, related to engineering applications, to others through drawing.
- To develop the skills to read manufacturing and construction drawings used in industry.
- To develop a working knowledge of the layout of plant and equipment.
- To develop skills in abstracting information from calculation sheets and schematic diagrams to produce working drawings for manufacturers, installers and fabricators.
- To expose the international standards of technical drawing

Unit–I
Introduction to Engineering Drawing, Use of drafting instruments – Lettering and dimensioning.

Construction of conic sections – Ellipse, Parabola & Hyperbola (Eccentricity Method, Rectangle method, Intersecting arcs method) – Special curves – Simple cycloids and involutes – Tangent and normal at points on the curves only.

Unit–II
Orthographic projections – Projections of Points – Projections of Straight lines (given the projections, to determine the true length and true inclinations).

Unit–III
Projections of Solids like prism, pyramid, cylinder, cone, tetrahedron and octahedron in simple positions.

Auxiliary Projections of prism, pyramid, cylinder, cone when the axis is inclined to one plane only.
Unit–IV

Unit–V
Isometric Projections of simple solids and combinations. Perspective Projections of simple solids. Conversion of Pictorial view of simple objects into Orthographic views

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
Upon completion of this course, the students will be able to:
1. Construct, read, and understand the Title and Revision Block
2. Usage of common drafting tools to construct engineering drawings enhances
3. Apply dimensions on engineering drawing.
4. Ability of converting sketches to engineered drawings will increase.
5. Developing cognitive and psychomotor skills, visualize images and their dimensions
6. Develop good communication skills and team work.
VISION

To provide quality education and strive to mould students to scale new heights to become leaders in the Civil Engineering profession as practicing engineers, researchers or academicians through value-based technical education and congenial study environment.

MISSION

- To establish state-of-the-art infrastructure in a broad array of civil engineering disciplines and create technologically capable and intellectually motivated civil engineers to enrich civil engineering research and practice.
- To impart fundamental engineering knowledge, a broad set of required technical skills and an inquisitive attitude to take up the challenges of creating and sustaining the built environment that underpins our society and inspire them to be leaders of tomorrow.
- To ensure that ample opportunities are created to enable them to serve the community as responsible civil engineers who successfully adapt and innovate solutions in the face of uncertain information, as well as ever-changing needs, risks and constraints.
- To equip students with communications skills, ethical values and an understanding of economic, societal and environmental impacts necessary to address modern civil engineering challenges that will benefit all stakeholders.

PROGRAMME EDUCATIONAL OBJECTIVES

The objectives of the Civil Engineering undergraduate programme are to produce Civil engineers who:

1. Are proficient in the fundamentals of engineering science, analytical and quantitative reasoning and design in the context of civil engineering.
2. Are able to apply these skills in developing safe, sustainable, economical and environmentally sound solutions to civil engineering problems either within the profession or further specialize through post-graduate research.
3. Can grow professionally in their careers through continued development of technical and management skills, achievement of professional excellence and assumption of roles of responsibility in professional service with ethics.
4. Understand the responsibility of a civil engineer and the diversity inherent in the civil engineering profession and thereby engage in independent life-long learning by developing skills, adopting up-to-date techniques and tools to serve the needs of society with a deep sense of commitment.
PROGRAMME OUTCOMES

After the successful completion of the B.E. (Civil Engineering) degree programme, the graduates will be able to:

PO1: Apply knowledge of mathematics, science and engineering concepts to solve problems related to civil engineering.

PO2: Identify, Formulate and Analyze civil engineering problems using the first principles of mathematics, sciences and engineering sciences and reach substantiate conclusions.

PO3: Design solutions for complex civil engineering problems and design system components satisfying standards laid by Indian Standard codes or processes to meet societal needs within realistic constraints.

PO4: Develop skills, select and apply modern engineering tools such as FEM, CAD, GIS and techniques for soft computing and optimization, including prediction and modeling of complex civil engineering problems.

PO5: Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary settings.

PO6: Assess the societal needs and bring solutions with ethical principles in professional civil engineering practice with commitment, adhering to the norms of civil engineering practice.

PO7: Interact effectively with the engineering community and properly communicate with the society as well, by being able to comprehend through effective technical reports, documents, presentations and drawings, give and receive clear instructions, imperative to decision making for successful execution.

PO8: Demonstrate the knowledge and understanding of the engineering and management principles and apply these to one’s work in construction, finance & asset management, public policy and administration in executing projects, as a member or leader in a team with self confidence and courage.

PO9: Appreciate the need to develop ability to design, implement and evaluate a field program to meet desired requirements within dynamic constraints related to economy, environment, social, political, health and safety aspects, manufacturability and sustainability, precisely the ability to engage in lifelong learning in the broadest context of technological change.

PO10: Recognize the importance of civil engineering professional development by pursuing postgraduate studies or face competitive examinations that offer challenging and rewarding careers.

PO11: Create innovative construction materials to improve the performance of infrastructure in case of buildings and transportation systems.

PO12: Develop and apply high performance structural materials and disaster–resistant systems.
PO13: Improve reliability, performance and disaster – resistance of water supplies, treatment processes and distribution systems.

PO14: Characterize and mitigate natural and man – made hazards by improving fundamental knowledge of the inter – relationships between the built environment and natural systems, to safeguard and economize infrastructure and society.

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**LIST OF PROFESSIONAL ELECTIVES**

1. Hydrology
2. Construction Management
3. Water Supply Engineering
4. Foundation Engineering
5. Transportation Engineering
6. Wastewater Engineering
7. Pre – Stressed Concrete
8. Safety in Civil Engineering Practices
9. Ground Water Engineering
10. Numerical Methods applied to civil engineering
11. Civil Engineering Systems Analysis
12. Irrigation Engineering
13. Bridge Engineering
14. Architecture
15. Services in High Rise Buildings
16. Construction Techniques
17. Ground Improvement Techniques
18. Repair and Rehabilitation of structures
19. River Engineering
20. Tall Buildings
21. Earthquake Engineering
22. Watershed conservation & Management
23. Special Concrete Structures
24. Prefabricated Structures
25. Hydropower Engineering
26. Traffic Engineering

**LIST OF PROFESSIONAL ELECTIVES LAB**
1. Design & Drawing Laboratory – I
2. Civil Engineering Software Laboratory
3. Design & Drawing Laboratory – II

**LIST OF OPEN ELECTIVES**
1. Urban & Rural Planning
2. Solid Waste Management
3. Airports, Harbours & Dock Engineering
4. Remote Sensing & GIS
5. Renewable Energy Engineering
6. Economics and Finance for Civil Engineering
7. Environmental Impact Assessment
8. Air & Noise Pollution
9. Operations Research for Civil Engineers
10. Soil & Water Conservation Engineering
11. Engineering Thermodynamics
12. Refrigeration & Air – Conditioning
13. Biology for Engineers
14. Disaster Management
15. Entrepreneurship
SYLLABUS
THIRD SEMESTER

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COURSE OBJECTIVES

- To realize the importance of environment for engineering students.
- To understand the basis of ecosystems.
- To make aware the student about global environmental problems and natural disasters.
- To give the ideas about advance technologies of Engineering that will useful to protect environment.

Unit–I

Introduction – Multidisciplinary nature of environmental studies – Definition, scope and importance – Need for public awareness.

Natural resources – Forest resources: use and over – exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. Water resources: Use and over – utilization of surface and ground water, floods, drought, conflicts over water, dams – benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer – pesticide problems, Energy resources: Growing energy needs, renewable and non – renewable energy sources, use of alternate energy sources. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. – Role of an individual in conservation of natural resources. – Equitable use of resources for sustainable lifestyles.

Unit–II


Unit–III

Unit–IV


Unit–V


Field work

Visit to a local area to document environmental assets – river/forest/grassland/hill/mountain – Visit to a local polluted site – Urban/Rural/Industrial/Agricultural – Study of common plants, insects, birds – Study of simple ecosystems – pond, river, hill slopes, etc. (Field work Equal to 5 lecture hours).

TEXT BOOKS

2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380 013, India, Email: mapin@icenet.net (R).

REFERENCE BOOKS


5. Down to Earth, Centre for Science and Environment (R).


COURSE OUTCOMES
At the end students can able to

1. Understand the importance of environment.
2. Analyze the importance of environment in engineering.
3. Apply their own ideas and demonstrate advanced technologies that will be useful to protect environment.
4. Employ awareness among the society about environmental problems and natural disasters.
5. Practice according to the present and future environmental issues.

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COURSE OBJECTIVES

- To learn, partial differential equations, Fourier series, Boundary value problems.
- To learn the transforms such as Sine, Cosine, Fourier transform and Z – transforms.
- To gain knowledge of the method to find the Solution of difference equations.

Unit–I

Unit–II

Unit–III
Solutions of one dimensional wave equation – One dimensional heat equation (without derivation) – Fourier series solutions in Cartesian co – ordinates.

Unit–IV

Unit–V

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course the students will be able to acquire knowledge on
1. Partial differential equations.
2. Fourier series.
3. Fourier transform.
4. Z-transforms and the methods of solving them.
5. Solving boundary value problems.

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**Course Objectives**

- To introduce the fundamentals of forces and their effects with their governing laws.
- To understand the definitions of particle, body forces and their equilibrium conditions.
- To understand and predict the forces and its related motions.

**Unit – I**


**Unit – II**


**Unit – III**


Unit–IV


Unit–V

Rolling Resistance – Translation and Rotation of Rigid Bodies – Velocity and Acceleration – General Plane Motion of Simple Rigid Bodies such as Cylinder, Disc/Wheel and Sphere.

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end, Students can able to
1. Explain the forces and its related laws of mechanics in static and dynamic conditions.
2. Analyse the forces and its motions on particles, rigid bodies and structures.
3. Solve the moment of inertia of any sections and masses for the structural members.

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COURSE OBJECTIVES

- To expose the students to construction practice through an understanding of different types of construction materials and their properties.
- To understand the techniques of construction, different finishing works and remedial practices for distressed structures.
- To impart knowledge of modern construction materials and equipments.

Unit–I


Unit–II


Unit–III


Unit–IV

Types of floor finishes – Mud flooring, Cement flooring, Ceramic tile flooring, Marble and Granite flooring, Wooden flooring, flooring with puffed panels – Plastering (Interior and Exterior) – Pointing for walls and floors using grouts – White washing – Colour washing with different colour shades available in the markets – Painting – Types of painting for Interior and Exterior application – Formwork (Shuttering or Scaffolding) – Types of Formwork – Use of Shoring and Underpinning.

Unit–V


Cracks in buildings – Causes – Methods of repairs – Equipments used for repair works.

TEXT BOOKS


REFERENCE BOOKS

Standards

COURSE OUTCOMES
At the end of the course students will be able to
1. Compare the properties of most common and advanced building materials.
2. Acquire knowledge of testing of construction materials, their strength requirements and applications.
3. Recognize the functions of different building components.
4. Understand the usage of modern building materials and construction equipments.
5. Apply techniques to repair buildings.

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02PC305       CONCRETE TECHNOLOGY       L   T   P
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COURSE OBJECTIVES
1. To develop systematic knowledge about the nature and basic properties of the ingredients of concrete.
2. To familiarize testing procedures of fresh and hardened concrete.
3. To introduce fundamentals and principles of mix design.

Unit–I

Unit–II

Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCE BOOKS

Standards
6. ACI Committee 211.1,91 Standard Practice for Selecting Proportions for Normal, Heavy weight and Mass Concrete, ACI Manual of Concrete Practice Part 1, 1991, American Concrete Institute, Detroit.


**COURSE OUTCOMES**

At the end of the course students will be able to

1. Identify the properties of cement, aggregate and concrete.
2. Acquire knowledge of testing of cement, aggregate and concrete and their strength requirements.
3. Understand the importance of manufacturing process of concrete.
4. Recognize the functions of different concrete admixtures and its types.
5. Realize the significance of mechanical properties in hardened concrete
6. Understand the concept of concrete mix proportioning.

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**01PC306 MECHANICS OF FLUIDS**

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**COURSE OBJECTIVES**

- To introduce the mechanics of fluids through a thorough understanding of the properties of the fluids, behavior of fluids under static conditions.
- To learn dynamics of fluids through control volume approach this gives an integrated understanding of the transport of mass, momentum and energy.
- To expose to boundary layer theory.
- To understand the applications of the conservation laws to (a) flow measurements and (b) flow through pipes (both laminar and turbulent).

**Unit–I**

Properties of fluids – Mass density, specific weight, specific volume, specific gravity, viscosity, vapour pressure, compressibility and elasticity, surface tension and capillarity.

Fluid pressure – variation of pressure in a fluid – Pascal’s law – atmospheric, absolute, gage and vacuum pressures – measurement of pressure – manometers and mechanical gages.
Unit–II

Total pressure and centre of pressure – total pressure on horizontal, vertical and inclined plane surfaces – total pressure on curved surface.


Unit–III


Euler’s equation of motion in differential form – Bernoulli’s equation derived from integration of Euler’s equation of motion – applications of Bernoulli’s equation – Venturimeter, orificemeter and flow nozzle.

Unit–IV

Flow measurement: orifices and mouthpieces – classification – determination of $C_c$, $C_v$ and $C_d$ – submerged orifices – time of emptying a tank – flow of liquid from one vessel to the other.


Other flow measurement devices – rotameter – elbowmeter and pitot tube.

Unit–V


TEXT BOOKS


REFERENCE BOOKS

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

- Understand properties of fluids and acquire knowledge of fluids in static, kinematic and dynamic equilibrium.
- Identify type of flow and carry out flow measurements.
- Apply physical laws in addressing hydraulic problems.
- Analyse flow through pipes and carry out measurement.
- Understand the impact of engineering solutions for boundary layer theory in the context of submerged bodies.

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### COURSE OBJECTIVES

- To introduce the student to basic principles of Building drawing.
- To learn to draft plan, elevation and sectional views of buildings in accordance with development and control rules satisfying orientation and functional requirements as per National Building Code.

Unit–I

Unit–II

Unit–III
Types of residential buildings – usual requirements and different space units – minimum size requirements for each type of rooms – furniture arrangements – circulatory elements – position of stairs – position of doors/windows /ventilators and sanitary fittings.

Unit–IV
Unit–V

Exercises
1. Conventional symbols.
2. Paneled and flush doors.
3. Paneled and glazed windows.
4. Lean to roof and small sheds.
5. Residential buildings with fully tiled roof with hips & valleys.
6. R.C.C. flat roofed single roomed building.
7. Residential building with single bedroom (load bearing structure).
8. Residential building with double bedroom (framed structure).
12. Primary health centre for rural areas with R.C.C. flat roof.
15. Mini shopping mall building.

TEXT BOOKS

REFERENCE BOOKS
2. Rangwala. S.C., “Civil Engineering Drawing,”

COURSE OUTCOMES
At the end of the course students will be able to
1. Understand conventional symbols used in drawing.
2. Draft plan, elevation and sectional views of doors & windows, lean to roof and different types of buildings.
3. Understand the regulations as per National Building Code.
4. Identify the functional requirements and building rules.

| MAPPING PROGRAMME OUTCOMES WITH COURSE OUTCOMES |
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Co4 ✔ ✔
COURSE OBJECTIVES
- To train the students in standard testing procedures for different compositions of building materials.
- To provide them an opportunity to design a concrete mix.

LIST OF EXPERIMENTS
1. Standard tests on cement.
2. Standard tests on fine and coarse aggregates.
3. Workability tests on fresh concrete.
4. Tests on hardened concrete, bricks and tiles.

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Understand the concrete properties.
2. Gain knowledge on the workability, durability, creep, shrinkage, temperature effects etc.

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FOURTH SEMESTER

01BS401 PROBABILITY, RANDOM PROCESSES AND NUMERICAL METHODS

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COURSE OBJECTIVES

- Be exposed to probability, random processes, and statistical methods designed to contribute to the process of making scientific judgments in the face of uncertainty and variation.

- To develop the skills of the students in numerical mathematics – using method of finite difference interpolation, finding numerical solution of algebraic and transcendental equations, and finding numerical solution of ordinary and partial differential equations.

Unit–I


Unit–II


Unit–III

Hypothesis, testing – Large sampling tests – small sampling test based on t, F and chi – square distributions – interval estimates of mean, standard deviation and proportion.

Unit–IV

Interpolation: Gregory Newton forward and backward interpolation formula; Stirling’s central difference formula; Lagrange’s interpolation formula for unequal interval.

Numerical differentiation: Using Newton’s forward and backward interpolation formula.

Numerical integration: Trapezoidal rule, Simpson’s one – third and three – eight rule.

Unit–V


**TEXT BOOKS**


**REFERENCE BOOKS**


**COURSE OUTCOMES**

At the end of the course, the students able to

1. Acquire skills in handling situations involving random variables, random processes

2. Solve problems for engineers in using numerical methods.

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**COURSE OBJECTIVES**

- To understand the concepts of stress and strain
- To determine the internal forces in beams
- To formulate the expressions for deflection
- To identify the behaviour of columns, struts and cylindrical shells

**Unit–I**


**Unit–II**

Unit–III
Deflection of beams – Estimation of slope and deflection for Cantilever, Simply Supported and Overhanging beams by Macaulay's method, Strain energy and Moment area methods Courseed to various types of loading.

Torsion of shafts – Assumptions – horse power transmitted by a shaft – Strength of a shaft – Torsional resistance of Solid and Hollow shafts – Combined bending and torsion.

Unit–IV

Unit–V
Columns and Struts – Types – Failure modes – Euler’s formula – Rankine's formula – I.S. code formula – Practical end conditions and Effective length factors – Built – up columns –

Thin Cylindrical shells – Assumptions – Internal pressure – Change in volume – Minimum thickness of wall plates – Thick Cylindrical Shells – Assumptions – Lame’s theory – Compound cylinders.

TEXT BOOKS

REFERENCE BOOKS
COURSE OUTCOMES
At the end of the course students will be able to
1. Compute stress and strain for various loads.
2. Arrive Shear force and bending moment in beams.
3. Estimate slope and deflection of types of beams.
4. Analyze statically determinate frames.
5. Assess behaviour of columns and struts and failure of materials.

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COURSE OBJECTIVES
- To introduce the principles of various surveying methods and survey instruments.
- To expose students to levelling by several methods.
- To learn to handle survey instruments and Area and Volume computations.
- To solve problems and understand applications of surveying to civil engineering projects.

Unit–I


Unit–II

Plane tables and its accessories – Merits and demerits – Applications.

Unit–III

Unit–IV


Unit–V

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Possess knowledge about chain surveying, compass surveying, plane able surveying and Levelling.
2. Gain knowledge about Survey Instruments, their care and adjustments.
3. Use all surveying equipments, prepare LS & CS, contour maps and carryout surveying works related to land civil engineering projects.

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02PC404 STRUCTURAL CONCRETE DESIGN I

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COURSE OBJECTIVES
- To introduce the different types of philosophies related to design of basic structural elements such as slabs, beams and columns with reference to Indian standard code of practice.
- To learn to design footings.

Unit–I

Unit–II


Unit–III


Unit–IV


Unit–V


TEXT BOOKS


REFERENCE BOOKS

Standards

COURSE OUTCOMES
At the end of the course students will be able to
1. Understand the behaviour of Reinforced Concrete and its design philosophies.
2. Gain knowledge about the rudimentary principles of designing reinforced concrete structural elements as per the existing codes.

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COURSE OBJECTIVES
- To introduce the students to various hydraulic engineering problems like open channel flows and their computations.
- To understand the methods of dimensional analysis.
- To impart knowledge on characteristics and working principles of hydraulic machines.

Unit–I
Types of flow in open channels – geometrical properties of channel sections – velocity distribution in a channel section – Chezy’s formula – Manning’s formula – Most economical sections of a channel – rectangular, trapezoidal, triangular and circular sections – uniform flow computations – specific energy and critical depth – critical flow and its computation.
Unit–II

Hydraulic jump in rectangular channels – types of hydraulic jumps – surges in open channels – positive and negative surges.

Unit–III


Unit–IV


Unit–V
Pumps – classification of pumps – working principle of single acting and double acting pumps – slip and coefficient of discharge – rate of delivery – velocity and acceleration of water – speed indicator diagrams – effect of bent delivery pipe on separation – air vessels – suction in pumps with air vessels – pressure in cylinder on delivery stroke with air vessels – maximum speed of pump with air vessel – power required to drive the pump fitted with air vessels.

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Relate the theory and practice of problems in hydraulic engineering.
2. Apply knowledge of fluid mechanics in addressing open channel flow problems.
3. Solve problems in uniform, gradually varied and rapidly varied flows in steady state conditions.
4. Understand the working principle of pumps and turbines.

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COURSE OBJECTIVES
- To learn the importance of geology in civil engineering field during earthquake, volcanic activity and the action of various geological agencies.
- To impart knowledge of geology essential in projects such as dams, tunnels, bridges, roads, airports and harbours.

Unit–I
Unit–II
Physical properties of minerals – Quartz group – Feldspar group – Pyroxene, Hypersthenes and Augite – Amphibole, Hornblende, Mica, Muscovite and Biotite – Calcite, Gypsum and Clay minerals.

Unit–III
Classification of rocks – distinction between Igneous, Sedimentary and Metamorphic rocks – Engineering properties of rocks – Description, occurrence, engineering properties, distribution and uses of Granite, Dolerite, Basalt, Sandstone, Limestone, Laterite, Shale, Quartzite, Marble, Slate, Gneiss and Schist.

Unit–IV

Unit–V
Remote sensing for civil engineering applications – Geological conditions necessary for design and construction of Dams, Reservoirs, Tunnels and Road cuttings – Coastal protection structures – Investigation of Landslides, causes and mitigation.

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Gain knowledge on projects such as dams, tunnels, bridges.
2. Realize the importance of Earthquakes, volcanoes and the action of various geological agencies.

3. Choose the type of foundations and other aspects related to roads, airports and harbours.

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**COURSE OBJECTIVES**

- To conduct experiments on Surveying and Levelling.
- Understand the principles of surveying.
- Know about compass surveying and plane table surveying.
- Understand the concepts of leveling and its applications.

**LIST OF EXPERIMENTS**

**I Chain Surveying**

1. Study of Chains and its accessories
2. Ranging a line and taking offsets
3. Cross – Staff Survey (Area of a traversing by Chain triangulation)

**II Compass Surveying**

1. Study of prismatic compass and its accessories
2. Determination of area of an extent by radiation methods
3. Open Traversing and Closed Traversing
4. Determination of distance of two inaccessible points

**III Plane Table Surveying**

1. Study of Plane Table Accessories
2. Determination of Area of an extent by radiation method
3. Determination of distances using Intersection method
4. Determination of a point using resection – Three point problem

**IV Levelling**

1. Study of Dumpy level and Telescopic Levelling staff
2. Simple Leveling – Determination of Reduced levels using Height of Collimation Method
3. Simple Leveling – Determination of Reduced levels using Rise & Fall Method
4. Differential Leveling – Determination of Reduced levels using Height of Collimation Method
5. Differential Leveling – Determination of Reduced levels using Rise & Fall Method
TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Possess knowledge about chain surveying, compass surveying, plane table surveying and Leveling.
2. Gain knowledge about Survey Instruments, their care and adjustments and principles.

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COURSE OBJECTIVES
- To provide practical training on testing of conventional engineering materials like steel and wood.
- To understand the stress – deformation response under axial and transverse loading conditions in the above tests.

LIST OF EXPERIMENTS
1. Tension test on Steel rods
2. Double Shear test on Steel rods
3. Deflection test on Steel and Wooden beams
4. Compression test on wooden specimens
5. Impact test
6. Hardness tests on different metals
7. Test on helical springs
8. Torsion test

REFERENCE BOOKS
COURSE OUTCOMES
At the end of the course students will be able to
1. Understand the material properties.
2. Gain knowledge about stress, strain, Young’s modulus, Poisson’s ratio etc.

MAPPING PROGRAMME OUTCOMES WITH COURSE OUTCOMES

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FIFTH SEMESTER

02PC501 STRUCTURAL MECHANICS I

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COURSE OBJECTIVES
- To understand the complex analysis of structures with different end conditions.
- To learn the concepts of analysis in arches and cables.
- To have knowledge in the various classical methods of analysis of structures.

Unit–I
Linear elastic Analysis – Degree of Redundancy – Degree of Freedom – Static and Kinematic Indeterminacies – Maxwell’s Theorem – Betti’s law – Method of consistent deformation – sign convention – Clapeyron’s theorem of three moments
Equation method – Problems with concentrated loads, partial or and full UDL, concentrated moments – Propped Cantilever Beams, Fixed Beams and Continuous Beams (restricted to two spans) – Additional problems with flexural hinges, elastic supports and support settlements. All problems shall end with elastic curve, Shear Force Diagrams (SFD) and Bending Moment Diagrams (BMD).

Unit–II
Degree of Redundancy – Static and Kinematic Indeterminacies – Plane frames – Virtual work method (Unit Load Method) – Castigliano’s Theorems – Simple frames (restricted to three members with two redundancies) – Simple trusses (restricted to five members with two redundancies) – Additional problems with flexural hinges, elastic supports and support settlements. All should end with elastic curve, Shear Force Diagrams (SFD) and Bending Moment Diagrams (BMD).

Unit–III
Analysis for moving loads – Influence Line Diagram (ILD) – Muller Breslau Principle for Influence Lines – ILD for simply supported beams – ILD for simple
supported beams – ILD for single over hang beams – ILD for Propped cantilever beams with flexural hinges – simply simple beams with floor girders – Problems with single concentrated loads, two loads, train of loads, UDL longer than span and shorter than span – Maximum SFD and BMDs – ILD for Simple Plane truss problems.

ILD for continuous beams and rigid frames (no problems) – Indirect model analysis for indeterminate structures.

Unit–IV

Arch action – Types of Arches – Analysis of Three – hinged and Two – hinged arches with effect of temperature change, rib shortening yielding of supports – Influence lines – Parabolic and Circular arches – Settlement effects

Unit–V

Cables and Suspension bridges – Cable Theorem – Cable under uniformly distributed loads (Cable Equation) – Horizontal thrust on the cable – Tension in the cable – Length of the cable – Effect of temperature on the cable – Stiffening girders in suspension bridges – Analysis of three – hinged and two – hinged stiffening girders with sample support level and different support levels. ILD for moving loads over suspension bridges.

Analysis Beams Curved in Plan – Analysis of Space trusses using tension coefficient method.

TEXT BOOKS

REFERENCE BOOKS
COURSE OUTCOMES
At the end Students will be able to
1. Analyze the indeterminate structures like beams and frames with different end conditions.
2. Explain the concepts of influence lines and its effects.
3. Analyse the arch structures and suspension cable bridges.
4. Solve the structural problems with different methods of analysis.

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01PC502 SURVEYING II

COURSE OBJECTIVES

- To expose students to geodetic measurements and control survey methodology and its adjustments.
- To introduce the concepts of modern surveying.

Unit–I


Unit–II


Unit–III

Introduction to compound, reverse, transition and vertical curves.

Unit–IV

Unit–V


TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Understand the advantages of electronic surveying over conventional surveying methods.
2. Gain knowledge on the working principle of GPS, its components, and signal structure and error sources.
3. Understand various GPS surveying methods and processing techniques used in GPS observations.

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COURSE OBJECTIVES

- To understand the nature, properties and behavioral response of soils is essential for a safe and stable design of foundations.
- To understand the behavior of soils as a supporting medium for structures.
- To develop knowledge required for successful structural engineering practice

Unit–I


Unit–II

Flow through soil: Darcy’s Law, Coefficient of permeability, laboratory and field determination of coefficient of permeability, Permeability for Stratified Deposits, Laplace’s Equations, Flow nets, Flow Through Earthen Dam, Estimation of Seepage, Uplift due to seepage. Effective Stress Principles: Effective Stress, Effective pressure due to different conditions, Seepage force, Critical hydraulic gradient, Quick sand condition, Design of filters, Capillarity in soil

Unit–III

Stress Distribution In Soil: Normal and shear stresses, Stress due to point loads, Stress beneath Line, strip & uniformly loaded circular area & rectangular area, pressure bulbs, Newmark’s charts – Use for determination of stress due to arbitrarily loaded areas

Unit–IV


Unit–V


TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Understand the soil characters such as shear strength and stress distribution.
2. Understand the soil properties.

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COURSE OBJECTIVES
- To learn advanced structural design of building frames, raft foundations, pile foundations and water tanks.
- To enhance the structural design skill to develop confidence in structural design.

Unit–I

Unit–II

Unit–III
Unit-IV

Unit-V

TEXT BOOKS

REFERENCE BOOKS

Standards:
2. IS 13920: 1993, Ductile Detailing of Reinforced Concrete Structures Courseed to Seismic Forces – Code Of Practice
8. IS 3370 (Part IV) :1967, Code Of Practice For Concrete Structures for the Storage of Liquids.

COURSE OUTCOMES
At the end of the course students will be able to
1. Understand the basic design principles of frames, raft foundations, water tanks and retaining wall as per relevant IS standards.
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01CP507 SURVEYING LABORATORY II

COURSE OBJECTIVES
1. To conduct experiments on Surveying and Levelling.
2. Understand the principles of surveying.
3. Understand the concepts of Theodolite surveying.

LIST OF EXPERIMENTS

I Theodolite and Trigonometric Surveying
1. Study of Transit theodolite, fundamentals of various axes
2. Measurement of horizontal angle by repetition method
3. Measurement of horizontal angle by reiteration method
4. Trigonometric levelling – Single plane method – Base accessible
5. Trigonometric levelling – Single plane method – Base inaccessible
6. Trigonometric levelling – Double plane method – Base inaccessible

II Tacheometric Surveying
1. Determination of tacheometric constants
2. Determination of Distance and elevation by stadia hair method
3. Determination of Distance and elevation by tangential method
4. Determination of Gradient of a line using stadia hair and tangential method
5. Determination of distances and heights using Subtense bar

III Demonstration
1. Study of GPS
2. Study of Total Station

IV Survey Camp (One Week Mandatory)
1. Longitudinal Section and Cross Section of Canal / Bund
2. Block Contouring
3. Hill Contouring
4. Setting out work – Simple Curves
5. Building Marking

TEXT BOOKS
REFERENCE BOOKS


COURSE OUTCOMES

At the end of the course students will be able to

1. Possess knowledge about Levelling, Theodolite survey, Tachometric survey and contouring.
2. Handle Survey and Levelling Instruments, with proper knowledge of their care and adjustments.
3. Carry out surveying and levelling methodically.

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COURSE OBJECTIVES

- To train the students in various aspects of soil investigation.
- To learn the determination of basic soil properties, strength, deformation and permeability characteristics of soils.

LIST OF EXPERIMENTS

1. Sieve analysis
2. Hydrometer analysis
3. Atterberg limits
4. Permeability determination (constant head and falling head methods)
5. Optimum Moisture content determination (Proctor compaction, CBR value test)
6. Shear strength determination (Direct shear test, Unconfined compression test, Triaxial compression test)
7. One – dimensional consolidation test.

REFERENCE BOOKS


COURSE OUTCOMES
At the end of the course students will be able to
1. Understand the soil properties.
2. Gain knowledge about the soil characters.

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SIXTH SEMESTER

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COURSE OBJECTIVES
- To understand the complex analysis of indeterminate structures with different end conditions. Through various classical methods of analysis of indeterminate structures.
- To provide advanced and modern methods of structural analysis of simple and complicated structures and structural systems.
- To learn the concept of force method and displacement method of analysis using matrix approach.
- To have the knowledge of plastic analysis of concrete structures.

Unit–I
Slope deflection equations – sign convention – Continuous beams (two spans only) – Simple Plane frames with and without sway (three members only) – Problems with flexural hinges, elastic supports support settlements and non prismatic fixed beams – Problems using Symmetry and Anti – symmetry concepts.

Unit–II
Joint stiffness – Distribution factors – Carry over factors – Analysis of continuous beams – simple Plane frames with and without sways – Problems with flexural hinges, elastic supports and support settlements – Neylor’s Simplification method.

Unit–III
Flexibility or Force equation – Member flexibility – Flexibility coefficients – Equivalent Joint Loads – Choice of Redundant force restricted to two – Analysis of
continuous beams, frames (two redundant forces), Analysis of simple plane truss, Problems with temperature changes, pre – strains and support settlements.

Unit–IV
Stiffness or Displacement equation – Member stiffness – Stiffness coefficients – Element and Global stiffness matrices – Transformations of stiffness matrices, load vectors and displacements vectors – Choice of displacements restricted to two – Analysis of continuous beams, frames, Analysis of simple plane truss, Problems with temperature changes, pre – strains and support settlements.

Unit–V
Approximate methods: substitute frame method for gravity loads, Portal and cantilever methods for lateral loads. Simple frames used for water tanks, industrial bends, bunkers and silos staging.


TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end Students will be able to
1. Analyze the indeterminate structures like beams and frames with different end conditions through various advanced and modern methods.
2. Solve the structural problems with matrix approach.
3. Do the plastic analysis for concrete structures.
COURSE OBJECTIVES

- To equip the students with current practices in cost and material estimates.
- To identify the methods adopted for different structural components.
- To impart knowledge on valuation practices necessary to make the student a complete civil engineer.
- To learn the tender procedure.

Unit–I

Unit–II

Unit–III

Unit–IV

Unit–V

TEXT BOOKS
REFERENCE BOOKS
5. Rangwala S.C., “Valuations of Real Properties”

COURSE OUTCOMES
At the end of the course students will be able to
1. Prepare a detailed estimate for different types of structures.
2. Prepare valuation reports.
3. Understand and execute rate analysis of various works in construction.
4. Estimate the total construction cost of the structure.

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COURSE OBJECTIVES
- To understand the practical methods for determination of co-efficient of discharge.
- To study characteristic features of pumps and turbines by carrying out experiments.
- To understand the significance and role of such utilities in their further course of study.

LIST OF EXPERIMENTS
1. Determination of Co-efficient of discharge of Mouthpiece
2. Determination of Co-efficient of discharge of Venturimeter
3. Determination of Co-efficient of Head loss due to Sudden Change in Section
4. Determination of Co-efficient of Head loss due to Friction in Pipes
5. Determination of Co-efficient of discharge of Rectangular Notch
6. Determination of Co-efficient of Impact of Jet on Vanes
7. Study of Performance characteristics of Elmo Pump (Centrifugal Pump)
8. Study of Performance characteristics of Sump Pump (Centrifugal Pump)
9. Study of Performance characteristics of Submersible Pump (Centrifugal Pump)
10. Study of Performance characteristics of Gould’s Pump (Reciprocating Pump)
11. Study of Performance characteristics of Pelton Turbine (Constant Speed method)
12. Study of Performance characteristics of Francis Turbine (Constant Head method)
13. Determination of Metacentric Height of a floating vessel (Demo Only)

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Determine discharge in devices.
2. Measure flow in pipes and determine frictional losses.
3. Compute forces and coefficient of impact on jets.
4. Develop Characteristics of pumps and turbines.

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COURSE OBJECTIVES
- To introduce students to various properties of the materials commonly used in Transportation engineering construction.
- To conduct tests on various construction materials.

LIST OF EXPERIMENTS
1. Determination of crushing value of Coarse Aggregates.
2. Determination of Impact value of Coarse Aggregates.
3. Determination of Flakiness Index and Elongation Index of Coarse Aggregates.
5. Determination of Fineness modulus and grading curve of coarse aggregates.
6. Determination of Flash and Fire point of Bitumen.
7. Determination of Viscosity of Bitumen.
8. Determination of Penetration value of Bitumen.
10. Determination of Ductility value of Bitumen.

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Gain knowledge about mechanical properties of materials such as Coarse Aggregates and Bitumen.
2. Determine the properties related to strength and performance of materials in transportation structures.

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SEVENTH SEMESTER

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COURSE OBJECTIVES
- To understand the moral and ethical dimensions in engineering.
- To take balanced decisions.

Unit–I

Unit–II
Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
1. Understand the relationship between the engineer and the society.
2. Learn the importance of codes in engineering practice.
3. Acquire knowledge on the legal, moral and ethical aspects in engineering.

|MAPPING PROGRAMME OUTCOMES WITH COURSE OUTCOMES |
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COURSE OBJECTIVES

- To design simple steel elements and the corresponding fastening systems are dealt with the course.

- To learn the design of steel structural elements along with advanced design concepts to enhance their design concepts with the relevant codal standards.

Unit–I


Unit–II

Tension members – Types – Design strength duo to yielding of cross section – Rupture of critical section – Plates – Threaded rod single Angles – Other sections – Block shear – Bolted and welded connection of Tension members – Design of Tension members as per IS 800 – 2007 provisions.


Unit–III


Unit–IV

Beams – Effective span of Beams – Design strength in Bending Torsional Buckling – Effective Length for simply supported beams – Shear – Beams of unsymmetrical sections – Plate girders – Elements of a plate girder Design of beams and plate girders as per IS 800 – 2007 provisions. Design of gantry girder – Braced
industrial buildings – Un – braced industrial frames – Base plate with anchor bolt details – detailing as per IS standards

**Unit–V**


Cold Form light gauge section – Type of cross section, Stiffened, multiple stiffened and un – stiffened element, Design of light gauge compression, tension and flexural members – Detailing as per IS: 802{Part 1 to part 3}:1995

**TEXT BOOKS**


**REFERENCE BOOKS**


**Standards**

6. SP: 6 (2) – 1962 Steel beams and plate girders.
8. IS codes for Aluminium Structures, IS: 3908, 3909, 3921, 5384, 6445, 6476, 6475, 6449, 8147, Bureau of Indian Standards.

**COURSE OUTCOMES**

At the end of the course students will be able to

1. Get the fundamental knowledge about the different types of Steel sections available in the market.
2. Know the design of Connections and Different types of members which Courseed to Various load conditions.
### COURSE OBJECTIVES

- To quantify water and wastewater pollutants.
- To determine concentration of air pollutants.
- To analyze the characteristics of water, wastewater and ambient air.
- To study the growth of microorganisms and its quantification.

### LIST OF EXPERIMENTS

1. Determination of Chloride content in water sample.
2. Determination of Dissolved Oxygen in water sample.
3. Determination of pH in water sample.
5. Determination of Total Solids (TDS, TSS) in water sample.
6. Determination of Turbidity of various water and wastewater samples using Nephelo Turbidity meter.
7. Determination of Electrical Conductivity of water samples.
8. Determination of Sulphates in water sample.
11. Determination of Residual Chlorine in water sample.
12. Determination of Chlorine Demand for water sample.

### REFERENCE BOOKS


### COURSE OUTCOMES

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

1. Quantify the pollutant concentration in water, wastewater and ambient air.
2. Recommend the degree of treatment required for water and wastewater.
3. Analyze the survival conditions for the microorganisms and their growth rate.
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EIGHTH SEMESTER

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COURSE OBJECTIVES

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

COURSE OUTCOMES

1. On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.
2. Carrying out any experimental works on construction planning, water resource planning & management and environmental aspects.
3. Understand the modelling, analysis and design concepts related to civil engineering applications.

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COURSE OBJECTIVES

- To introduce the student to principles of Hydrologic cycle and precipitation.
- To impart knowledge on characteristics of aquifers and well hydraulics.
- To understand the techniques of development and management of Rainfall and Runoff.
- To expose students to investigation, artificial recharge of groundwater, Flood management and Drought assessment.

Unit–I

Unit–II

Unit–III

Unit–IV

Unit–V

TEXT BOOKS
REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Understand Hydrologic cycle and precipitation.
2. Acquire knowledge of Flood Management.
3. Realize the importance of rainfall and Runoff.
4. Understand the concept of Drought Assessment.

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COURSE OBJECTIVES
- To introduce the practices of various stages of construction.
- To learn elements of management, project planning and cost analysis.
- To acquire knowledge on PERT and CPM.

Unit–I

Unit–II

Unit–III
Primavera – Preparation of schedule for a project by using Microsoft projects and Primavera.

Unit–IV

Unit–V

TEXT BOOKS

REFERENCE BOOKS
5. CADD Centre Manual, “Project planning and management by using MS Project”, CADD Centre Training Services Pvt. Ltd., 2010.

COURSE OUTCOMES
At the end of the course students will be able to
1. Develop the ability to influence project design and to manage pre – construction activities.
2. Understand method of control of project schedule, cost, quality and risks.
3. Realize ethics of project management.
4. Acquire knowledge on Tenders and related procedures.
5. Recognize the significance of safety and health management.
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COURSE OBJECTIVES

- To make students conversant with basic principles of water supply engineering.
- To learn about quantification of water, analysis, sources, conveyance, treatment and distribution of water.

Unit–I

Objectives of public water supply schemes; Health acceptability, adequacy, conveyance and economy – Per Capita Demand – Standards and planning factors for public water supplies in India – Population forecasting – Variation in demand pattern – Dual Plumbing Systems.

Unit–II


Unit–III


Unit–IV


Unit–V

Continuous Vs Intermittent supplies: types, functions and requirements – Layout and analysis of distribution networks using Hardy cross method – Equivalent pipes – Methods of pipes sizing – Operation and Maintenance – Leak
detection – Equalising and service reservoirs – Elevated and ground level reservoirs – Location and determination of capacity – Appurtenances.

**TEXT BOOKS**

**REFERENCE BOOKS**

**COURSE OUTCOMES**
At the end of the course students will be able to
1. Apply procedures to forecast population and compute future water demand.
2. Develop on Environmental Management Systems for characteristics of water.
3. Explain different methodologies for collection and conveyance systems.
4. Examine layout and analyze water distribution systems.

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**COURSE OBJECTIVES**
- To impart basic knowledge on design of foundations and its behaviours under different soil conditions to carry out proper foundation design.
- To draw shear force and Bending moment diagram for foundations.
- To get exposed to settlement of foundations.
- To learn concept of pile foundations.
Unit–I

Unit–II

Settlement of foundations – Immediate, consolidation and secondary(creep) Settlements – Elastic Settlement of footings – Correction for depth and width of foundation – Determination of total Settlement of foundations on cohesion – less and cohesive soils as per relevant IS standards – Total and differential settlements – Allowable settlements as per relevant IS standards – Methods of minimizing total and differential settlements.

Unit–III
Contact pressure distribution on base of footings under rigid and flexible footings – Modulus of sub – grade reaction on rigid and flexible footings – Problems on contact pressure distributions beneath the isolated, combined, strap and mat foundations for axial and eccentric column loads. Draw shear force and bending moment diagrams using appropriate contact pressures beneath the foundations.

Unit–IV
Types of piles and their function – Factors influencing the selection of pile – Ground heave and pile heave effects – Effective length – Point of inflection – Load carrying capacity of single pile in cohesion – less or granular and cohesive soils as per relevant IS standards – static formula – Dynamic formulae (Engineering news and Hiley’s) – Capacity from in – situ tests (SPT and SCPT) – Negative skin friction – Uplift capacity – Group capacity by different methods – Settlement of pile groups – Interpretation of pile load test (routine test only) – Under reamed piles – Capacity under compression and uplift.

Unit–V
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 with and without surcharge and traffic loads – Culmann Graphical method – Pressure on the wall due to line load – Stability analysis of retaining walls.
TEXT BOOKS

REFERENCE BOOKS

STANDARDS
COURSE OUTCOMES

At the end of the course students will be able to

1. Select type of foundation required for the soil at a place and able to design shallow, foundations, deep foundations and retaining structures.

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01PExxx TRANSPORTATION ENGINEERING

COURSE OBJECTIVES

- To give an overview of highway engineering with respect to the development, planning, design, construction of highways.
- To impart knowledge on the elements of traffic engineering and associated studies.
- To expose students to the basics of railways, geometric design, construction, maintenance, operation and control of railways.

Unit–I


Unit–II


Unit–III


Unit–IV

Unit–V
Construction of railway track – earthwork – plate laying and packing –
Maintenance of track – alignment – gauge – renewal of component parts – drainage
– modern methods of track maintenance.

Railway Operation and Control: Points and crossings and their design – Track
junctions – simple track layouts – Details of different types of stations and yards –
passenger amenities – Signaling and interlocking – Train movement control systems
– Urban rail – Infrastructure for Metro, Mono and underground railways.

TEXT BOOKS
   Brothers, Roorkee, 2005
   Delhi, 1977

REFERENCE BOOKS
   Publishers, New Delhi, 2013
   Dhanpat Rai and Sons, New Delhi, 2003
   Charotar Publishing House, 2013
   II”, Khanna Publishers, New Delhi, 2000
   Limited, Kundli, Seventh Edition. Indian Roads Congress (IRC)
   Specifications, “Guidelines and Special Publications on Traffic Planning and
   Management”, 1994
   2003
   Tata McGraw Hill Company, 2004
    Hall of India, 2005
    Basics”, ASCE Press, 2000
**COURSE OUTCOMES**

At the end of the course students will be able to

1. Classify the different types of transportation systems.
2. Plan various public transportation systems.
3. Classify and Design highways according to IRC standards.
4. Design pavements as per IRC recommendations.
5. Demonstrate various test methods for highway materials.

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**01PExxx**

**WASTE WATER ENGINEERING**

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**COURSE OBJECTIVES**

- To make the students conversant with basic principles of wastewater engineering.
- To learn about collection, conveyance, characterization, treatment and disposal of domestic wastewater.

**Unit–I**


**Unit–II**


Principles and layout of house drainage systems – Sanitary fixtures and fittings – one pipe systems and two pipe systems.

**Unit–III**

Unit–IV

Unit–V

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Apply the main procedures and methods of treatment for wastewater.
3. Explain different methodologies for collection and conveyance of wastewater.
4. Examine the physical, chemical and biological characteristics of wastewater.
5. Suggest suitable methods for treatment and disposal.

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| 01PExxx | PRESTRESSED CONCRETE | L | T | P |
COURSE OBJECTIVES

- To inculcate the basics of pre-stressing techniques.
- To design prestressed beams as per IS code specifications.
- To understand the concepts adopted for design of bridge structures.

Unit-I


Unit-II

Flexural strength – Simplified procedures as per codes – Strain compatibility method – Basic concepts in selection of cross section for bending – Design of sections as per code for pre-tensioned and post-tensioned rectangular beams – Check for strength limit based on IS:1343 – 2012 – Design for shear based on IS1343 – 2012

Unit-III

Analysis for stresses for composite sections – Estimation of deflections – Flexural and shear strength of composite members – Shear key.

Unit-IV

Factors influencing deflections – Short term deflections of un-cracked members – Prediction of long term deflections due to creep and shrinkage – Check for serviceability limit state of deflection.

Continuous beams – Method of achieving continuity – Analysis – Concordant cable and linear transformation.

Unit-V


TEXT BOOKS


REFERENCE BOOKS


**COURSE OUTCOMES:**

At the end of the course students will be able to

1. Gain knowledge on concepts and methods of pre-stressing.
2. Design various Pre-stressed concrete structural elements.
3. Calculate deflections and analyze stresses in prestressed beams.

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**COURSE OBJECTIVES**

- To get familiar with the various terminology in accident prevention and its theories.
- To assess the safety performance as per Indian Standards.
- To know the principles involved in the design of industrial buildings.

**Unit—I**


**Unit—II**


**Unit—III**

Unit–IV


Unit–V

Reasons for maintaining interest – Staff functions – Safety meeting – Posters and display – other promotional methods – safety publicity by various means.

Involvement in safety: Role on treatment and voluntary agencies – safety officers – Five hazards and Prevention methods – Interesting experiences at the construction site against fire accidents.

REFERENCE BOOKS:

COURSE OUTCOMES

At the end of the course students will be able to
1. Know modern construction safety techniques to be adopted in the construction of buildings and special structures
2. Aware of maintenance of rehabilitation and strengthening techniques and demolition.
3. Realize the significance of alertness against accidents and safety management.

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COURSE OBJECTIVES

- To introduce the student to principles of groundwater governing equations.
- To impart knowledge on characteristics of aquifers and well hydraulics.
- To understand the techniques of development and management of groundwater.
- To expose students to investigation, artificial recharge of groundwater and seawater intrusion.

Unit–I

Origin and age of groundwater – Scope and place of groundwater in Hydrologic cycle – vertical distribution of groundwater – rock properties affecting ground water – types of aquifers – water level fluctuations – Groundwater in India
Unit–II
Storage coefficient – specific yield – Darcy’s law – coefficient of permeability – laboratory measurement of permeability – field measurement of permeability – general flow equation – steady unidirectional flow – steady radial flow to a well both in confined and unconfined aquifer – steady flow with uniform recharge – unsteady radial flow to a well in confined aquifer – Non equilibrium equation for pumping tests by Theis method and Cooper – Jacob method.

Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Understand aquifer properties and its dynamics.
2. Acquire knowledge of well construction and maintenance.
3. Realize the importance of artificial recharge of groundwater.
4. Understand the concept of seawater intrusion.

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COURSE OBJECTIVES

- To provide mathematical foundation of numerical techniques for solving equations in engineering problems.
- To impart knowledge on finite difference techniques and power series methods of solution.
- To demonstrate the utility of numerical methods in obtaining solution to ordinary differential and partial differential equations describing various civil engineering problems, where analytical solutions are not readily available.

Unit–I

Unit–II


Unit–III


Unit–IV


Unit–V
TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Perceive the power of numerical techniques.
2. Demonstrate the applications of these techniques to problems drawn from industry, management and civil engineering fields.
3. Apply numerical methods to get close approximate solutions to complex Engineering problems.

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COURSE OBJECTIVES

- To introduce the engineering systems concept and methodology.
- To learn methods of Linear programming, formulation and solution of problems by LP.
- To learn concepts of Non – linear programming, Dynamic Programming and applications.
- To understand the economic aspects of engineering systems.

Unit–I


Unit–II


Unit–III


Unit–IV

Dynamic programming – DP terminology – the principle of optimality – allocation process.

Unit–V


TEXT BOOKS


REFERENCE BOOKS

COURSE OUTCOMES

At the end of the course students will be able to

1. Perceive the concept of civil engineering systems.
2. Apply Linear Programming and Dynamic Programming to solve Engineering problems.
3. Demonstrate the applications of system engineering to real systems.
4. Apply methods related to economic aspects of engineering systems

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COURSE OBJECTIVES

- To learn the IRC loading standards and analysis
- To design the different types of bridges.

Unit–I


Unit–II


Unit–III


Unit–IV

Unit–V


TEXT BOOKS


REFERENCE BOOKS


STANDARDS

5. IRC 21: 2000, Standard Specifications and Code of Practice for Road Bridges Section: III [Cement Concrete (Plain and Reinforced)].

COURSE OUTCOMES

At the end of the course students will be able to

1. Understand the behaviour of bridge structures.
2. Gain knowledge about the rudimentary principles of designing the bridges as per the existing codes.

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COURSE OBJECTIVES

- To introduce various architectural aspects.
- To understand the history of architecture.
- To realize the impact of climate on architecture of buildings.

Unit–I


Unit–II


Unit–III

Planning of residential buildings – Space units of Living, Dining, Sleeping areas, Kitchens and Bathrooms – Single storied, Double storied Residential buildings with different roofing systems – Multiple accommodations – Apartments – Group Housing – Gated Communities – Housing for Handicapped – Housing for Elderly – Youth Hostels.

Unit–IV


Unit–V


TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Recognize the different qualities of architecture.
2. Understand that architecture can enhance the building in terms of appearance and utility.
3. Realize that architectural design can improve comfort in living conditions of buildings.
4. Apply architectural concept and design buildings according to specific requirements.

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COURSE OBJECTIVES
- To introduce the student to various services in high rise buildings.
- To impart knowledge on the integration of services into an Intelligent and energy efficient system.
- To learn about water supply, sanitation, light, ventilation and security systems.
- To get an exposure to air conditioning and fire safety arrangement.

Unit–I

Unit–II

Unit–III
Natural and Mechanical Ventilation systems – Air conditioning systems and load estimation – Planning and design for efficiency – Automation and Energy

Unit–IV


Unit–V

Case Studies of High Rise Buildings and skyscrapers through appropriate examples – Norman Foster; Ove Arup; Ken Yeang, etc.

TEXT BOOKS


REFERENCE BOOKS


COURSE OUTCOMES

At the end of the course students will be able to

1. Understand the concepts of energy efficient design of buildings.

2. Explain different services essential for living in buildings.

3. Acquire knowledge of effective management of services.

4. Classify different types of A.C. systems.

5. Plan Electrical, Sanitation and Mechanical systems for buildings.

6. Emphasize the need for building automation, fire safety and security.

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COURSE OBJECTIVES

- To study and understand the latest construction techniques applied to engineering construction for sub structures, super structures and special structures.
- To learn about rehabilitation and strengthening techniques and demolition techniques.

Unit–I


Unit–II


Unit–III

Erection of lattice towers – Rigging of transmission line structures – Construction sequence in cooling towers, Silos, chimney, sky scrapers – Bow string bridges, Cable stayed bridges – Launching and pushing of box decks – Construction of jetties and break water structures – Construction sequence and methods in domes – Support structure for heavy equipment and machinery in heavy industries – Erection of articulated structures and space decks.

Unit–IV


Unit–V

Demolition Techniques, Demolition by Machines, Demolition by Explosives(implosion), Advanced techniques using Robotic Machines, Demolition Sequence, Dismantling Techniques, Safety precautions in Demolition and Dismantling.

TEXT BOOKS

REFRENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Know the modern construction techniques to be used in the construction of buildings and special structures
2. Understand rehabilitation and strengthening techniques and demolition.
3. Aware of safety precautions in Demolition and Dismantling.

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<td>To learn the advancement in the subsoil stabilization with a modern approach.</td>
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<td>To get exposed to the real problem, methods of improvement over such problems and the methodology involved.</td>
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Unit–I
Introduction – Methods of ground improvement – Geotechnical problems in alluvial, lateritic and Black Cotton soils – Selection of suitable ground improvement methods based on soil conditions.

Unit–II
Drainage and dewatering – Drainage techniques – Vacuum and electro – Osmotic methods – Seepage analysis for 2D flow fully and partially penetrating slots in homogeneous deposits.

Unit–III
Unit–IV


Unit–V


TEXT BOOKS


REFERENCE BOOKS


COURSE OUTCOMES

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

1. Understand the behaviour of ground improvement techniques.
2. Gain knowledge the rudimentary principles of designing ground piles as per the existing codes.
3. Analyze and select materials and techniques suitable for ground improvement.

MAPPING PROGRAMME OUTCOMES WITH COURSE OUTCOMES

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01PExxx | REPAIR AND REHABILITATION OS STRUCTURES | L | T | P
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COURSE OBJECTIVES

- To understand the mechanism of deterioration of concrete and damage assessment.
- To get exposed to repair materials and rehabilitation techniques.

Unit–I

Unit–II

Unit–III

Unit–IV

Unit–V
Methodology for repair materials – Mortar Replacement – Concrete Replacement – Total Replacement – Preplaced aggregate concrete – Jacketing technique – Plate Bonding technique – Fibre Sheet Bonding Technique

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course, the students will be able to
1. Understand and assess damages.
2. Select suitable repair materials and techniques for rehabilitation of concrete structures.
3. Analyze the damage by testing methods, and give suggestions and recommendations for different rehabilitation techniques.
CO1: To introduce the student to processes related to stream flow and forces involved.

CO2: To impart knowledge on regimes of flow and their importance.

CO3: To understand the land use changes in basin morphology.

CO4: To discuss on sediment control and related measures.

**Unit-I**

**Unit-II**
Bed level variation in alluvial streams: Continuity equation for sediment – equilibrium depth of scour in long channel contractions – general mathematical models – silting of reservoirs – local scour.

**Unit-III**
Variation in plan form of streams: secondary currents – flow in rigid boundary open channel bends – scour and deposition at alluvial bends – sediment distribution at channel bifurcations – meandering – lateral migration of alluvial streams cutoffs – delta formation.

Impact: Impact of land use changes in basin morphology – Impact of droughts and floods – Watershed changes on quantity and quality of water.

**Unit-IV**

**Unit-V**
TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Understand concept of sediment transport and river morphology.
2. Explain watershed changes due to stream flow.
3. Recognize the significance of river training works and their role in flood control.
4. Acquire knowledge on flood routing and equations governing unsteady flow.

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COURSE OBJECTIVES
1. To introduce design aspects and analysis methodologies of tall buildings.
2. To learn to analyze the stability analysis of tall buildings.

Unit—I

Unit—II
Unit–III
Factors affecting growth, Height and Structural form High rise behaviour of Various structural systems – Rigid frames, braced frames, Infilled frames, shear walls, coupled shear walls, wall – frames, tubular structures, cores, outrigger – braced and hybrid mega systems.

Unit–IV
Modeling for approximate analysis, Accurate analysis and reduction techniques, Analysis of buildings as total structural system considering overall integrity and major sub system interaction, Analysis for member forces, drift and twist, computerized general three dimensional analysis.

Unit–V
Overall buckling analysis of frames, wall – frames, Approximate methods, second order effects of gravity of loading, P – Delta analysis, simultaneous first – order and P – Delta analysis, Translational, Torsional instability, out of plumb effects, stiffness of member in stability, effect of foundation rotation.

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of this course the student will be able to
1. Understand the behavior of tall buildings Coursed to lateral loading.
2. Gain knowledge about the rudimentary principles of designing tall buildings as per the existing IS Codes.
3. Analyze different types of frames.

| MAPPING PROGRAMME OUTCOMES WITH COURSE OUTCOMES |
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COURSE OBJECTIVES

- To realize that Earthquake and Wind excitations are two major dynamic loadings to be considered for many modern civil engineering structures.
- To understand that these loadings will enable design engineers to ensure the safety and serviceability of structures.

Unit–I

Elements of Earth, core, mantle and crust – Engineering Seismology, Plate tectonic theory, originations of earthquake – Volcanic and tectonic origins, Faults, Dips, slips in crust, seismic zoning map of India & its use.

Earthquake Effects: Land and rock slides, Liquefaction, Fires, Tsunamis, Floods, Release of poisonous gases and Radiation.

Earthquake Phenomenon: – Focus epicentre, Seismic waves, Magnitude, intensity, Ritcher scale, MM scale, Earthquake recording instruments, and Seismic resistant design guidelines

Unit–II


Unit–III

Forced Vibration Analysis (Harmonic loading) of Single Degree of freedom systems with and without damping under harmonic excitations, Forced vibration response to harmonic base excitation. Formulation of Response Spectrum, Design Response spectrum as per IS:1893, simple problems using the above response spectrums. Forced vibration analysis of multi Degrees of freedom systems (restricted to two degrees of freedom only) using modal superposition technique.

Unit–IV

Analysis of building frames, Equivalent static method as per IS: 1893 – Dynamic analysis using mode superposition concept – Push over analysis. Modelling of Building Frames with Brick and Concrete Walls – Centre of Mass locations – Centre of Stiffness locations – Orientation of Shear walls.

Unit–V

Philosophy and Principles of Earthquake Resistant design – Strength and Stiffness, Ductility Design and Detailing (15:13920), Concept of Energy Absorbing Devices, Concepts of Seismic Base isolation technique and Seismic Active control
methods. Lessons learnt from the Past Earthquakes – Case studies of important Indian Earthquakes, Major world Earthquakes.

**TEXT BOOKS**


**REFERENCE BOOKS**


**List of Codes**

COURSE OUTCOMES
At the end of the course students will be able to
1. Design the earthquake resistant structures.
2. Understand the behaviour of structures during earthquakes.
3. Explain the Philosophy and Principles of Earthquake Resistant design.

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COURSE OBJECTIVES
- To introduce the student to the concept of dynamic process of a watershed resulting in soil erosion.
- To emphasize the need for water conservation.

Unit–I
Watershed – concept – classification – characteristics History of erosion – Erosion problems of India – Approaches to soil and water conservation.

Unit–II

Unit–III

Unit–IV
Watershed programmes – factors affecting watershed management – planning of watershed works – watershed water resources – watershed management practices.

Unit–V

TEXT BOOKS

REFERENCE BOOKS
COURSE OUTCOMES
At the end of the course the students will be able to
1. Understand the appropriate Conservation measures to be adopted for remediation of a watershed.
2. Suggest measures for control of soil erosion.
3. Explain principles and techniques to be adopted for water conservation.

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COURSE OBJECTIVES
- To expose the students to the design practices of complicated RCC structures like Deep beams, R.C.poles, storage containers and elevated water tanks.
- To understand the significance of various code specifications in design of special concrete structures.

Unit–I

Unit–II

Unit–III
Design of Concrete Bunkers as per IS 4995 (Part I,II): 1974 – Design of Concrete Silos as per IS 5503 (Part I) :1969 – Detailing of reinforcement as per relevant standards.

Unit–IV
Unit–V


TEXT BOOKS


REFERENCE BOOKS


STANDARDS

2. IS 13920: 1993, Ductile Detailing of Reinforced Concrete structures Coursed to Seismic Forces – Code of Practice.
5. IRC 21: 2000, Standard Specifications and Code of Practice for Road Bridges Section: III [Cement Concrete (Plain and Reinforced)].
20. IRC 21: 2000, Standard Specifications and Code of Practice for Road Bridges Section III [Cement Concrete (Plain and Reinforced)].

**COURSE OUTCOMES**

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

1. Understand the advanced structural elements and its design procedure.
2. Acquire knowledge about the rudimentary principles of designing deep beams, R.C. Poles etc. as per the existing codes.
3. Analyze building frames for vertical and horizontal loads.
4. Design special concrete structures like bunkers, water tanks and bridge decks.

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**COURSE OBJECTIVES**

- To impart knowledge to students on modular construction, industrialized construction.
- To learn to design prefabricated elements and their construction methods.

**Unit–I**

Unit–II


Unit–III


Unit–IV


Unit–V

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course, students will be able to
1. Realize the need for prefabrication in construction.
2. Design some of the prefabricated elements.
3. Understand the construction techniques involved in building framed structures.
4. Insist on Quality in precast construction.

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01PExxx HYDROPOWER ENGINEERING

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COURSE OBJECTIVES
- To introduce the student to various forms of energy resources.
- To learn in detail about hydroelectric power plants and their components.
- To impart knowledge on load assessment and operation.
- To study about economics of hydroelectric power.

Unit–I
Power resources – Conventional and Nonconventional, Need & advantages, Hydrological analysis, Hydropower development in India, Hydropower potential.

Unit–II
Classification of hydropower plants – Run of river plants, Storage or Valley dam plants, Pumped storage plants, Introduction to micro hydro, Base load and Peak load plants, advantages & disadvantages, Components of hydropower plants.
Unit–III
Estimation of electrical load on turbines, Load factor, Plant factor, peak demand and utilization factor, load duration curve, Prediction of load.

Unit–IV
Types of Powerhouses, Typical layout of powerhouse, Components, Power plant equipments, Instrumentation and control, Selection, Classification, Principles and design of impulse & reaction turbines, Governing of turbines, Water hammer, Surge tanks, Draft tubes, Cavitation.

Unit–V

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Understand the layout, functional aspects and principles involved in the selection of different types of power plants.
2. Acquire thorough knowledge of operation of hydropower plants and design components.
3. Explain pricing of Electricity.

| MAPPING PROGRAMME OUTCOMES WITH COURSE OUTCOMES |
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| CO3 |     |     | ✓   | ✓   |     |     |     |     |     |     |     |     |     | ✓   |
COURSE OBJECTIVES

- To give an overview of traffic engineering characteristics, traffic control and design.
- To understand the techniques of traffic survey and traffic regulation.
- To expose students to traffic management and traffic safety with integrated approach in traffic planning.
- To learn the environmental impact of traffic.

Unit–I
Introduction – Objectives and scope of traffic engineering – Components of road traffic: vehicle, driver and road – Road user and vehicle characteristics and their effect on road traffic – Fundamentals of Traffic Flow – Urban Traffic problems in India and Sustainable approach.

Unit–II

Unit–III
Control of traffic movements through time sharing and space sharing concepts – Intersection Design – channelization – Rotary intersection design – Signal design – Coordination of signals – Grade separation – Traffic signs including VMS and road markings – Significant roles of traffic control personnel – Bus stop location and bus bay design – Road lighting – Regulations on vehicles – drivers and traffic.

Unit–IV
Concept and significance of traffic safety – Road accidents – Causes, effect, prevention, and cost – Road traffic accidents scenario in India – Engineering measures of traffic safety – Traffic and environment hazards – Air and Noise Pollution, causes, abatement measures – Promotion and integration of public transportation – Promotion of non–motorized transport.

Unit–V
Nature of traffic problems in cities – Area Traffic Management System – Traffic System Management(TSM) with IRC standards – Traffic Regulatory Measures – Travel Demand Management(TDM) – Direct and indirect methods – Congestion and parking pricing – All segregation methods – Coordination among different agencies – Intelligent Transportation Systems: applications in traffic management and control.
TEXT BOOKS
2. Indian Roads Congress(IRC) Specifications: “Guidelines and Special Publications on Traffic Planning and Management”.

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Understand the concepts of traffic engineering and its characteristics.
2. Perform traffic studies.
3. Explain traffic control and design.
4. Realize the importance of traffic management.
5. Identify the specification of traffic facilities.

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MAPPING PROGRAMME OUTCOMES WITH COURSE OUTCOMES
SYLLABUS OF PROFESSIONAL ELECTIVES LABORATORIES

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COURSE OBJECTIVES

- Train students to use latest software available to solve structural engineering problems.
- Learn documentations procedures.

LIST OF EXPERIMENTS

Plate 1. Draw cross section, longitudinal sections of Concrete Beams with reinforcement details as per SP 34: 1987, IS 13920: 1993.
  
  a. Singly and Doubly Reinforced Concrete Beams
  b. Flanged beams: T and L shaped Reinforced Concrete Beams
  c. Rectangular Continuous Beams
  d. Lintel Beams with sunshade
  e. Plinth Beams
  f. One way and two way slabs.
  g. Continuous slabs

Plate 2. Draw cross section, longitudinal sections of Concrete staircase with reinforcement details as per SP 34: 1987, IS 13920: 1993.
  
  a. Dog legged staircase

Plate 3. Draw cross section, longitudinal sections of Column with Footings and reinforcement details as per SP 34: 1987, IS 13920: 1993.
  
  a. Rectangular Column with Isolated Footings
  b. Circular Column with Circular Isolated Footings

Plate 4 & 5. Draw cross section, longitudinal sections and reinforcement details for the followings
  
  a. Strap footing

  
  a. Pile with Pile cap (Two pile group)
  b. Pile with Pile cap (Three pile group)
  c. Pile with Pile cap (Four pile group)

Plate 9 & 10. Draw cross section, longitudinal sections and reinforcement details as per SP 34: 1987.
  
  a. Cantilever Type Retaining Wall
  b. Counter fort Type Retaining Wall
Plate 11. Analysis of Symmetrical and Un - Symmetrical Building Frames (Gravity, Wind and Earthquake Loads) using STADD PRO and Etabs Softwares.

REFERENCE BOOKS
3. STADD PRO and Etabs Software Working Manuals.

Standards
2. IS 13920: 1993, Ductile Detailing of Reinforced Concrete Structures Courseed to Seismic Forces – Code of Practice.

COURSE OUTCOMES
At the end of the course students will be able to
1. Gain Structural Engineering knowledge on Reinforced concrete structural elements for practical applications.
2. Acquire experience to use Modern Software in Civil engineering.
3. Understand the design and development of Shop drawing for practical purposes.

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COURSE OBJECTIVES
- To enable the students to be conversant with the use of software packages like STAAD PRO, 3D Home Architecture, ERDAS, GIS and Water quality softwares

LIST OF EXPERIMENTS
1. Structural Engineering Software packages like STAAD PRO
2. 3D Home Architecture to solve simple problems.
3. Quantity and Cost estimation software
4. PRIMAVERA & MS Project to solve simple problems.
5. Water distributing network softwares
7. GIS and water quality softwares – Q.GIS, Arc GIS, MapInfo, etc.,
8. GRAMM++

REFERENCES
1. STAAD Pro Manual
2. PRIMAVERA Manual
3. ERDAS Manual
4. ARC VIEW Manual
5. SMS, GMS and WMS Manual

COURSE OUTCOMES
At the end of the course the students will be able to
1. Implement ideas of Computer aided design in Civil Engineering Projects
2. Use various softwares for Quantity and Cost estimation
3. Apply soft computing to water resource distribution problems.

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01EPxxx DESIGN & DRAWING LABORATORY II
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COURSE OBJECTIVES
- To understand principles of design of Irrigation and Public Health structures.
- To prepare the drawings using AutoCAD for various systems.

LIST OF EXPERIMENTS
A – Design of the following Irrigation Structures and Drawing using AutoCAD
   a. Tank Sluice with Tower Head.
   b. A tank surplus weir.
   c. A canal drop (Notchtype).
   d. A canal regulator cum Bridge.
   e. Cross drainage work: Super passage only.
B – Design of the following Items and Drawing using AutoCAD
   a. River or canal intake.
   b. Slow sand filter.
   c. Rapid sand filter.
   d. Clari – flocculator.
   e. Septic tank.
   f. Trickling Filter (Conventional type).
g. Activate Sludge Process.

h. Layout of Water Supply System for a Town.

i. Layout of Sewerage System for a Town.

REFERENCE BOOKS


COURSE OUTCOMES

At the end of the course students will be able to

1. Understand conventional systems of Irrigation and Public health drawings.

2. Draft plan, elevation and sectional views of Public health structures.

3. Identify the functional requirements of the structures.

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SYLLABUS OF OPEN ELECTIVES

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COURSE OBJECTIVES

- To enable students to develop knowledge on Urban and rural planning.
- To introduce the regulations and laws related to urban planning.
- To educate the importance of zoning in planning.
- To get to know the principles involved in planning public buildings.

Unit–I


Unit–II

Types of surveys – Collection of Data – Importance of zoning – Classification of Zoning – Use of zoning – Height zoning – Density zoning – Housing – Planning of neighborhood units – Types of Layouts – Classification of housing – Housing problems in India.
Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Describe basic issues in urban planning.
2. Formulate plans for Urban and rural development.
4. Understand functions of local authority with a clear idea of control rules.

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COURSE OBJECTIVES

- To gain an insight regarding sources, characteristics and composition of solid waste.
- To understand the rate of generation of solid waste and its present status in India.
- To know the method of collection, transfer, and transport of municipal solid waste.
- To understand the role and applicability of physical, chemical, thermal and biological processing techniques.
- To acquire substantial knowledge in the field of resource recovery, waste – to – energy and on composting facility.

Unit-I


Unit-II


Incinerators – design and operation – dust and air pollution problems – use – cost considerations.

Unit-III


Unit-IV


Unit-V

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Apply the procedures and methods for MSW Collection, segregation, processing and disposal
2. Develop an Environmental Management System.
3. Explain different methodologies for Environmentally sound solutions
4. Examine the process by which legal systems are adopted and enforced.

MAPPING PROGRAMME OUTCOMES WITH COURSE OUTCOMES

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01OExxx AIRPORT, HARBOUR AND DOCK L T P
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COURSE OBJECTIVES
To expose the students to Airport Planning, Harbours and Docks.

Unit–I
Air transport characteristics – airport classification – airport planning: objectives, components, layout characteristics, socio – economic characteristics of the Catch ment area, criteria for air portsite selection and ICAO stipulations, Typical airport layouts, Case studies, Parking and circulation area.

Unit–II
Runway Design: Orientation, Wind Rose Diagram – Runway length – Problems on basic and Actual Length, Geometric design of runways, Configuration and

Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end students will be able to
1. Plan the various civil Engineering aspects of Airports, Harbour and Docks.
2. Design various aspects of civil Engineering of Airports, Harbour and Docks.

| MAPPING PROGRAMME OUTCOMES WITH COURSE OUTCOMES |
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COURSE OBJECTIVES

- To introduce the basic concepts of remote sensing.
- To learn the fundamentals of photogrammetric and image interpretation.
- To understand the techniques involved in cartography and GPS.
- To impart knowledge on applications of RS and GIS in resource mapping.

Unit–I


Unit–II


Unit–III


Unit–IV


Unit–V


TEXT BOOKS


REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Identify the concepts and characteristics of Remote Sensing.
2. Acquire knowledge of appropriate map projection and coordinate systems.
4. Get exposure to several applications of RS and GIS in the various fields of Civil engineering especially resource mapping.

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COURSE OBJECTIVES
- To impart Business acumen and a deep insight in economics imminent to be successful in civil engineering practice.
- To learn the basics of economics, finance and accounting necessary for a Civil Engineering enterprise to be successful and profitable.
Unit–I
Economics – Role of Civil Engineering in Industrial development – Support matters of economy as related to engineering – Market demand & supply – Choice of technology Quality control and production – Audit in economic law of returns governing production.

Unit–II
Land and construction economics – Urban land use and values – Construction development in housing, transport and other infrastructures – Economics of ecology, environment, energy resources, local material selection, form and functional designs – Constructionworkers – Urbanproblems – Poverty – Migration – Unemployment – Pollution.

Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCE BOOKS
COURSE OUTCOMES
At the end of the course students will be able to
1. Perceive the power of economics techniques and finance.
2. Demonstrate the applications of these techniques to problems drawn from industry, management and other engineering fields.
3. Apply cost estimation methods to get close approximate solutions to complex Engineering problems.

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COURSE OBJECTIVES
- To understand the evolution, role, application and the general procedure for EIA
- To impart the concept of Environmental Management Systems (EMS).
- To impart / inculcate the knowledge of Environmental Auditing, Life cycle Assessment (LCA).
- To introduce the concept and role of Cleaner Production, Sustainable Development and ISO 14000 series.
- To understand the rules and regulations governing EIA and EIA case studies.

Unit–I

Unit–II
Rapid EIA – Comprehensive EIA – Legislative and Environmental Clearance procedure in India – prediction tools for EIA.

Unit–III

Public participation – Resettlement and Rehabilitation procedures – Sustainable Development.

Unit–IV
Documentation of EIA – EMP – Post project Monitoring – EIA case studies.

Environmental Auditing – Various types of Audit – Philosophy – concepts – rules and relevant methodologies.

Unit–V
Concept of Cleaner production – Role of ISO and ISO 14000 in Environmental Management.

TEXT BOOKS
REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Apply the main procedures and methods which are adopted at different stages in EIA process.
3. Explain different methodologies for Environmental Impact prediction and assessment.
4. Evaluate EIA reports.
5. Examine the process by which legal systems are adopted and enforced.

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COURSE OBJECTIVES
- To make the students conversant with basic principles of Air and Noise Pollution.
- To analyse the sources, conveyance, treatment and effects of air & Noise Pollution.

Unit–I
Introduction: Definition of clean air – air pollutants – Sources and classification – Effects of air pollution on man, animal, vegetation and properties – Ambient Air Quality Standards, Air pollution control legislation.
Unit–II

Unit–III

Unit–IV

Unit–V

TEXTBOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Understand the basics of Air and Noise Pollution.
2. Develop on Environmental Management Systems for air and noise
3. Emphasize the importance of control of air and noise pollution.

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COURSE OBJECTIVES

• To Assess the real conditions of a project so that loss can be avoided.
• To Solve the Linear programming problems for minimizing the project cost and maximizing its profit.

Unit–I

Unit–II
Duality: Definition, Relationship between primal and dual solutions, Economic Interpretation, Post optimal of sensitivity analysis, Dual Simplex Method.

Unit–III

Unit–IV
Replacement Models: Introduction, replacement of items that deteriorate ignoring change in money value, replacement of items that deteriorate considering change in money value with time, replacement of items that fail suddenly – Individual replacement policy, Group replacement policy.

Game Theory: Introduction, 2 person zero sum games, Maximi – Minimax principle, Principle of Dominance, Solution for mixed strategy problems, Graphical method for 2 x n and m x 2 games.

Unit–V
Sequencing Models: Introduction, General assumptions, processing n jobs through 2 machines, processing ‘n’ jobs through m machines, Processing 2 jobs through m machines.

Queueing Theory: Introduction, single channel – poission arrivals – exponential service times with infinite population & finite population, Multi channel – poisson arrivals – Exponential service times with infinite population.

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
On completion of the course, the students will be able to:
1. Solve the optimization problems.
2. Apply LPP to Transportations a problem which is essential for a Civil Engineer.
3. Solve assignment problems in an easy way.
4. Assess the real conditions of a project so that loss can be avoided.
5. Solve the Linear programming problems for minimizing the project cost and maximizing its profit.

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COURSE OBJECTIVES
- To introduce the student to various soil and water conservation measures for creating an awareness of problems of soil erosion.
- To impart knowledge on the appropriate conservation measures to be adopted for remediation of watershed.

Unit–I

Unit–II
Unit–III

Unit–IV

Unit–V

TEXT BOOKS
2. Tideman, “Soil and Water conservation”.

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1. Understand soil erosion in depth and carryout computation of parameters measuring erosion.
2. Recognize different types of soil erosion and their impact.
3. Acquire knowledge of various soil erosion control measures.
4. Devise watershed management plans.

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<tr>
<th>MAPPING PROGRAMME OUTCOMES WITH COURSE OUTCOMES</th>
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COURSE OBJECTIVES

- To understand the principles and analysis of Thermodynamic and bulk behavior of simple physical systems.

Unit-I


Unit-II


Unit-III


Unit-IV

Vapour cycle: Carnot cycle with steam as working substance – Rankine cycle – Efficiency of these cycles – representation on T – s and h – s diagrams – Reheat cycle – specific steam consumption and work ratio – Regeneration(Concept only)

Unit-V


TEXT BOOKS


REFERENCE BOOKS

COURSE OUTCOMES
At the end students will be able to
1. understand the principles of thermodynamics
2. analyze the bulk behavior of simple physical systems.

<table>
<thead>
<tr>
<th>01OExxx</th>
<th>REFRIGERATION AND AIR CONDITIONING</th>
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COURSE OBJECTIVES

- To provide in – depth study of the basics of refrigeration and air – conditioning
- To study the various refrigeration systems and their thermodynamic cycles.
- To study the basics of psychrometry and cooling load calculations of air – conditioning systems.

Unit–I

Unit–II

Unit–III

Unit–IV
Psychometric of Air conditioning Processes – Adiabatic mixing, sensible cooling and heating, latent heat process, total heat process, sensible heat factor – By – pass factor – Cooling and Dehumidifying coil, heat coils, air washer, adiabatic dehumidifiers, water and steam injection – Problems on psychrometric processes.
Unit-V


TEXT BOOKS


REFERENCE BOOKS

4. V.K Jain, Refrigeration and Air – conditioning, S.Chand & company ltd, New Delhi.

COURSE OUTCOMES

At the end students will be able to
1. understand the basics of refrigeration and air – conditioning
2. know the various refrigeration systems and thermodynamic cycles.

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<tr>
<th>01OExxx</th>
<th>BIOLOGY FOR ENGINEERS</th>
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COURSE OBJECTIVES

- The course acts as a bridge between engineering and biology to provide basic understanding of biological mechanisms of living systems from engineering perspective.
- It will illustrate the many possible means to utilize living things’ relevance to engineering principles.
- With substantial knowledge and continuing interest will make a student into a specialist in the technical diversity.

Unit–I : Requirements of Biological Systems

Biological Units Need Water; Biological Units Need the Right Amount of Oxygen; Biological Units Need Food and Nutrients; Biological Units Become Ill in the Presence of Wastes; Biological Units Need Heat Sources and Sinks.

Unit–II : Behavior of Biological Systems

Biological Units Adapt to Their Environments; Biological Units Modify Their Environments; Adaptations Require Extra Energy and Resources; Biological Units,
If Possible, Move to Friendlier Environments; Biological Units Evolve under Environmental Pressures.

**Unit–III: Response to Stress by Biological Systems**

Crowding of Biological Units Produces Stress; Biological Units Are Affected by Chemical Stresses; Biological Units Respond to Mechanical Stresses; Optimization Is Used to Save Energy and Nutrient Resources; Biological Units Alter Themselves to Protect against Harsh Environments.

**Unit–IV: Existence of Biological Systems**

Biological Units Cooperate with Other Biological Units; Biological Units Compete with Other Biological Units; Biological Units Reproduce; Biological Units Coordinate Activities through Communication; Biological Units Maintain Stability with Exquisite Control; Biological Units Go through Natural Cycles; Biological Units Need Emotional Satisfaction and Intellectual Stimulation; Biological Units Die.

**Unit–V: Scaling Factors and Biological Engineering Solutions**

Allometric Relationships from Evolutionary Pressure; Dimensional Analysis; Golden Ratio; Fractal Scaling within an Organism; Self – Similarity for Tissues and Organs; Self – Similarity in Populations; Systems Approach; Relationships between Engineering and Biology; The Completed Design.

**TEXT BOOKS**


**REFERENCE BOOKS**


**COURSE OUTCOMES**

1. The ability to understand the information known about familiar living systems.

2. The ability to anticipate the properties of an unfamiliar group of living things from knowledge about a familiar group.

3. The ability to demonstrate the relevance of engineering to biological systems.

4. The knowledge about the biological responses and it is scaling with respect to scientific principles that cannot be related back.

5. The knowledge of biological principles and generalizations that can lead to useful products and processes.

6. The ability to avoid or mitigate unintended consequences of dealing with any and all living system.
COURSE OBJECTIVES

- This course helps in providing the basic concepts of disasters and also gives a thorough knowledge and experience to reduce disaster risks.

Unit–I


Unit–II

Earthquake – Cause of Earthquake – General characteristics – Measuring Earthquakes – Distribution pattern of Earthquakes in India – Earthquake prone areas – case studies of important Indian earthquakes – Forecasting techniques and risk analysis – Possible risk reduction measures – earthquake resistance buildings and re-engineering techniques in India.

Unit–III


Unit–IV


Unit–V


**TEXT BOOKS**


**REFERENCE BOOKS**


**COURSE OUTCOMES**

1. Develop an understanding of the key concepts, definitions key perspectives of all Hazards Emergency Management.

2. Develop a basic under understanding of Prevention, Mitigation, Preparedness, Response and Recovery.

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<tr>
<th>01OExxx</th>
<th>ENTREPRENEURSHIP</th>
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**COURSE OBJECTIVES**

- Develop an entrepreneurship sprit
- Help to identify business opportunities within an organization or independently
- Initiate action on the business plan from the prospective business through EDC

**Unit–I**

Unit–II


Unit–III

Meaning and nature of direction – Principles of directing – Leadership and leadership style – Motivation – Communication – Need and feedback in communication – Importance of communication – Channels of communication – Types of communication – Forms of communication.

Unit–IV

Evolution of concept of entrepreneur – Concept of entrepreneur – Characteristics of entrepreneur – Distinction between entrepreneur and manager – Technical entrepreneur – Charms of being an entrepreneur – Types of entrepreneur – Role of entrepreneurship in economic development – Barriers in entrepreneurship.

Unit–V


TEXT BOOKS


REFERENCE BOOKS

1. Alan Barrell “Creativity, innovation, entrepreneurship and enterprise in construction and development”, University of Reading, Entrepreneur in Residence Entrepreneur in Residence, University of Xiamen, Xiamen 2012.

COURSE OUTCOMES

At the end of the course students will be able to
1. Understand the concept of entrepreneurship.
2. Identify business support unities within an organization or independently.
COURSE OBJECTIVES

- Understand the community in which they work and their relation.
- Identify the needs and problems of the community and involve them in problem-solving.
- Develop capacity to meet emergencies and natural disasters.
- Practice national integration and social harmony and
- Utilize their knowledge in finding practical solutions to individual and community problems.

Unit–I : National Service Scheme
a) History and its Objectives
b) Organizational structure of N.S.S. at National, State, University and College Levels
c) Advisory committee and their functions with special reference to college principal, Programme officer, N.S.S. group leader and N.S.S. volunteers in the implementation.

Unit–II : National Integration
a) Need of National integration
b) Various obstacles in the way of National Integration; such as caste, religion, language and provisional problems etc.

Unit–III : Special Programme
a) Legal awareness
b) Health awareness
c) First – aid
d) Career guidance
e) Leadership training – cum – Cultural Programme

Unit–IV : Special Camping Programme
a) Nature and its objectives
b) Selection of camp site and physical arrangement
c) Organization of N.S.S. camp through various committees and discipline in the camp.
d) Activities to be undertaken during the N.S.S. camp.
e) Use of the mass media in the N.S.S. activities.

Unit–V : N.S.S. Regular Activities
a) Traffic regulation
b) Working with Police Commissioner’s Office
c) Working with Corporation of Chennai  
d) Working with Health Department  
e) Blind assistance  
f) Garments collection  
g) Non – formal education  
h) 'Environmental Education, Awareness and Training (EEAT)’  
i) Blood donation  

REFERENCE BOOKS  
2. Training Programme on National Programme scheme, TISS.  
3. Orientation Courses for N.S.S. Programme officers, TISS.  
4. Case material as Training Aid for field workers, Gurmeet Hans.  
5. Social service opportunities in Hospitals, KapilK. Krishan, TISS.  