ANNAMALAI UNIVERSITY
FACULTY OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF CIVIL AND STRUCTURAL ENGINEERING
B.E. CIVIL AND STRUCTURAL ENGINEERING
(Four Year Degree Programme)
(Choice Based Credit System)
(FULL–TIME)
REGULATIONS AND SYLLABUS

REGULATIONS

1. 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 Tamilnadu 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.

2. 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 |

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

4. Scheme of Examinations
   The scheme of Examinations is given separately.

5. 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).

6. 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 result 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>
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<tbody>
<tr>
<td>90 to 100 marks</td>
<td>Grade 'S'</td>
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<tr>
<td>80 to 89 marks</td>
<td>Grade 'A'</td>
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<tr>
<td>70 to 79 marks</td>
<td>Grade 'B'</td>
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<tr>
<td>60 to 69 marks</td>
<td>Grade 'C'</td>
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<tr>
<td>55 to 59 marks</td>
<td>Grade 'D'</td>
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<tr>
<td>50 to 54 marks</td>
<td>Grade 'E'</td>
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<tr>
<td>Less than 50 marks</td>
<td>Grade 'RA'</td>
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<tr>
<td>Withdrawn from the examination</td>
<td>Grade 'W'</td>
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</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) 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>Sl.No.</th>
<th>Branches of Study</th>
<th>Eligible Diploma Programme (FT / PT / SW)</th>
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<td>1.</td>
<td><strong>Civil Engineering</strong></td>
<td>i. Civil Engineering</td>
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<td>ii. Civil Engineering (Architecture)</td>
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<td>iii. Environmental Engineering and Pollution Control (Full Time)</td>
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<td>iv. Architectural Assistantship</td>
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<td>v. Civil Engineering (Rural Tech.)</td>
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<td>vi. Civil and Rural Engineering</td>
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<td>2.</td>
<td><strong>Civil and Structural Engineering.</strong></td>
<td>i. Mechanical Engineering</td>
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<td>ii. Mechanical and Rural Engineering</td>
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<td>iii. Mechanical Design and Drafting</td>
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<td>iv. Production Engineering</td>
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<td>vi. Automobile Engineering</td>
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<td>vii. Automobile Technology</td>
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<td>viii. Metallurgy</td>
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<td>ix. Mechatronics Engineering</td>
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<td>x. Machine Tool Maintenance and Repairs</td>
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<td>xi. Tool and Die making</td>
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<td>xii. Tool Engineering</td>
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<td>xiv. Foundry Technology</td>
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<td>xv. Refrigeration and Air Conditioning</td>
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<td>xvi. Agricultural Engineering</td>
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<td>xviii. Marine Engineering</td>
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<td>xix. Mechanical Engineering (Production)</td>
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<td>xxv. Mining Engineering</td>
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<td>xxvi. Mechanical Engineering (R &amp; A.C.)</td>
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<td><strong>Mechanical Engineering</strong></td>
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| 5.    | Electrical and Electronics Engineering  | i. Electrical and Electronics Engineering  
       |                                                | ii. Electronics and Communication Engg.  
       |                                                | iii. Electronics and Instrumentation Engg  
       |                                                | iv. Electronics Engineering(Instrumentation)  
       |                                                | v. Instrument Technology  
       |                                                | vi. Instrumentation and Control Engineering  
       |                                                | vii. Electrical Engineering (Instruments and Control)  
       |                                                | viii. Electrical Engineering  
       |                                                | ix. Instrumentation Technology  
       |                                                | x. Electronics (Robotics)  
       |                                                | xi. Mechatronics Engineering  |
| 6.    | Electronics and Instrumentation Engineering |                                                                                                       |
| 7.    | Chemical Engineering                    | i. Petrochemical Engineering  
       |                                                | ii. Chemical Engineering  
       |                                                | iii. Environmental Engineering and Pollution Control  
       |                                                | iv. Leather Technology (Footwear)  
       |                                                | v. Leather Technology  
       |                                                | vi. Plastic Technology  
       |                                                | vii. Polymer Technology  
       |                                                | viii. Sugar Technology  
       |                                                | ix. Textile Technology  
       |                                                | x. Chemical Technology  
       |                                                | xi. Ceramic Technology  
       |                                                | xii. Petro Chemical Technology  
       |                                                | xiii. Pulp & Paper Technology  
       |                                                | xiv. Petroleum Engineering  |
| 8.    | Computer Science and Engineering         | i. Electronics and Communication Engineering  
       |                                                | ii. Computer Technology  
       |                                                | iii. Computer Science and Engineering  
       |                                                | iv. Information Technology  
       |                                                | v. Computer Engineering  
       |                                                | vi. Computer Networking  
       |                                                | vii. Electronics(Robotics)  
       |                                                | viii. Mechatronics Engineering  |
| 9.    | Information Technology                   |                                                                                                       |
| 10.   | Electronics and Communication Engineering |                                                                                                       |
# COURSES AND CREDITS - SUMMARY

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<th>Semester</th>
<th>No. of Courses</th>
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<th>ES</th>
<th>PC</th>
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<th>OE</th>
<th>S&amp;IT</th>
<th>Proj.</th>
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* - No of Credits ;  ** - No of Courses.

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* 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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* Optional

### SEVENTH SEMESTER

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Optional*
## EIGHTH SEMESTER

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(ES) ENGINEERING SCIENCE

1) Engineering Graphics
2) Engineering Workshop
3) Materials Science
4) Basic Civil Engineering
5) Basic Mechanical Engineering
6) Basic Electrical Engineering
7) Basic Electrical Engineering Laboratory
8) Basic Electronics Engineering
9) Basic Electronics Engineering Laboratory
10) Computer Programming
11) Computer Programming Laboratory
12) Computer Practical I (Building Drawings)
13) Construction Engineering
14) Basic Simulation Laboratory
15) Basic Thermodynamics
16) Solid Mechanics
17) Solid Mechanics & Fluid Mechanics
18) Solid Mechanics & Fluid Mechanics Laboratory
19) Engineering Mechanics
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 BOOKS

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.

<table>
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<tr>
<th>00BS102</th>
<th>ENGINEERING MATHEMATICS - I</th>
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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
Characteristic equation – Eigen values and eigen vectors of a real matrix – Properties – Cayley-Hamilton theorem – Orthogonal transformation of a real
symmetric matrix to diagonal form – Quadratic form – Reduction of quadratic form to canonical form by orthogonal transformation.

**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.

<table>
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<tr>
<th>00BS103</th>
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**COURSE OBJECTIVES**

At the end of the course the students would be exposed to fundamental knowledge in various engineering subjects 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 ultrasonics 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 Acoustics - factors affecting acoustics of buildings and their remedies– absorption coefficient– Sabine’s formula for reverberation time.
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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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
Water – Hardness of water – softening of water by ion-exchange process and zeolite process – boiler feed water – specifications – boiler troubles (Sludge and scale formation, priming and foaming, caustic embrittlement and boiler corrosion) – removal of dissolved $\text{CO}_2$, $\text{O}_2$ and acids – internal treatment of boiler feed water (colloidal, carbonate, phosphate, calgon and EDTA conditioning) – disinfection of water – break point chlorination – desalination of brackish water by reverse osmosis method - Determination of total hardness by EDTA method.

Unit–II : Electrochemistry

Unit–III : Fuels and Combustion
cracking – polymerization process – knocking in petrol and diesel engines – octane number and cetane number – properties of straight run, cracked and polymer gasoline.

**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.
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

Basic structure of C Programs – Constants – Variables - Data Types - – Keywords – Identifiers - Operators - Expressions – IF, IF-ELSE, Nested IF-ELSE, Switch, WHILE, DO, FOR and GOTO statements - Arrays: one dimensional and two dimensional – Strings - Functions.

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

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.

**SECOND SEMESTER**

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**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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**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**
Introduction to Dielectrics – Types of Dielectric materials - Dielectric constant – Determination of Dielectric constant (∑r) by Schering Bridge method – Different

**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**

Corrosion: Dry and wet corrosion – Pilling-Bedworth rule – mechanism of wet corrosion – types of wet corrosion – galvanic corrosion – differential aeration

**Unit–IV : ENERGY STORAGE DEVICES**


**Unit–V : ENGINEERING MATERIALS II**

Refractories – classification (acidic, basic and neutral refractories) – properties (refractoriness, refactoriness under load, dimentional stability, porosity, thermal spalling) – fire clay bricks, alumina bricks and zirconia bricks. Abrasives – Moh’s scale of hardness – natural abrasive (diamond, corundum, emery, garnets and quartz) – synthetic abrasives – silicon carbide, boron carbide and their uses.

**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>00ES204</th>
<th>BASIC ENGINEERING (ELECTRICAL)</th>
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COURSE OBJECTIVES

- To impart the basic principles of generation of electrical energy.
- To explain the operation of electrical machines and various measuring instruments.
- To understand the basic concepts of circuit analysis.
- 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.

TEXT BOOKS

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

**REFERENCE BOOKS**
1) Globarena Package for communicative English
2) Cambridge Advanced Learner’s English Dictionary
3) Spoken English (CIEFL) in 3 volumes with 6 cassettes, OUP.
7) A text book of English Phonetics for Indian Students by T.Balasubramanian (Macmillan)
8) English Skills for Technical Students, WBSCTE with British Council, OL.

**COURSE OUTCOMES**
1) Help the students to 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.,
COURSE OBJECTIVES

The ability to offer students a variety of research opportunities

- 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.
- We can use a spectrometer to measure this angle of deviation.
- To measure the modulus of elastic material by torsional pendulum and bending of a beam.
- To determine the resistivity of a given steel and brass wire.
- To find the velocity of ultrasonic waves in a liquid.
- Less viscosity of the liquid by poiseuille’s method.

LIST OF EXPERIMENTS (Any Ten)

1) Non-Uniform Bending - Determination of Young’s modulus of the given scale or beam.
2) Newton’s rings- Determination of Radius of curvature of the given Plano convex lens.
3) Viscosity – Determination of co-efficient of Viscosity of a highly viscous liquid by Stoke’s method.
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.
11) Spectrometer – Determination of wavelength of the prominent spectral lines using Grating.
13) Band gap determination of a Semiconductor.

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 materials.
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
APPLIED CHEMISTRY LABORATORY

COURSE OBJECTIVES

- To appreciate the practical significance of acidimetry, alkalimetry and permanganometry
- To analyse 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.

ENGINEERING GRAPHICS

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

Sections of prism, pyramid, cylinder, cone in simple position – true shape of sections. Intersection of surfaces - cylinder to cylinder and cylinder to cone with axis intersecting at right angles. Development of lateral surfaces of prism, pyramid, cylinder, cone and cut solids.

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.
DEPARTMENT OF CIVIL AND STRUCTURAL ENGINEERING

VISION
The Department of Civil and Structural Engineering came into existence in the year 1978 with a vision to serve the industry, the profession and the society in general. The prime focus is to bring into limelight the inborn and untapped potential of the student fraternity and prepare them to face challenges of the future with confidence, courage and faith.

MISSION
The ultimate goal of the Department of Civil and Structural Engineering is to provide quality education to prepare nationally competitive students and trend setters for the future generation in the realm of technical education. The student should be able to assimilate the available theories, explore new frontiers to propound new theories which will result in improving the quality of the life of the people. It will also to develop their personality in a healthy way and to provide opportunity to acquire knowledge in state-of-the-art research; and to provide service to the university, engineering profession, and the public through consultancy services.

PROGRAMME EDUCATIONAL OBJECTIVES
The following program educational objectives are consistent with the university, college and department missions.

- To develop the technical and engineering skills of the students and to train them in applying fundamental principles in the domain feeding the needs of global expectations with professional competence.
- To explore the students in the field of Civil and Structural Engineering areas both in theory and practice and tuning the academic programmes periodically to make the students fit for a professional job, a research assignment or self-employment.
- To demonstrate their ability to deal effectively with ethical and professional issues, taking into account the broader societal implications.
- To impart communication, analytical and soft skills for the students towards either placing them in a comfort zone in their profession or a path to pursue graduate education master and doctoral degree.

PROGRAMME OUTCOMES
At the completion of the programme the students should be able to;

1) Rudimentary principles of mathematics, basic engineering sciences and their technology applications in the field of Structural engineering problems.
2) Inculcate the analysis and design of concrete and steel structural multistoryed structures, bridge structures, special structures, structural joints etc., under extreme wind and seismic conditions using relevant codal standards.
3) Analyze and to identify the various advancements in Structural engineering materials utilized in the construction industry and its technical knowhow. Also create special concretes with the different waste materials using recycling concept and to reduce the environment pollutions, implementation of suitable
and proper water supply and sanitary systems for the betterment of society and to promote Clean India Movement.

4) Know the advancement in the Engineering measurements using remote sensing techniques to map or survey any inaccessible locations. Also suggest and implement different types of transport systems as per the needs of the society.

5) Understand the fluids characteristics in hydraulic engineering and to know hydraulic machineries performances in industrial design.

6) Assess the soil conditions and their properties for different types of foundations and to carry out relevant sub-structure design.

7) Estimate and to carry out cost analysis of structures with standard format. Also to impart various construction techniques such as PERT/CPM and to manage the construction projects using optimum resources utilization concept.

8) Demonstrate and to conduct different experiments for checking the property and quality of materials, carryout analysis and design of structures using softwares, and exposure in taking up student dissertation works.

9) Gain exposure on curricular, extracurricular activities, different social activities of professionally and ethically responsibility and to apply ethical reasoning to society in case of emergency.

10) Gain knowledge latest and advanced topics in structural engineering like different concreting techniques, selection of concrete, methods of concrete and repair and rehabilitation methodologies and applications for the present and future scenario in the construction of structures.

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(PE) PROFESSIONAL ELECTIVES

1) Environmental Engineering
2) Transportation Engineering
3) Architecture
4) Engineering Geology
5) Irrigation & Water Power Engineering
6) Structural Concrete Design –III
7) Estimation and Valuation
8) Advances in Concrete Technology
9) Scaffolding and Form work Design in Construction
10) Design of Load Bearing masonry
11) Renewal Energy Engineering
12) Water Supply Engineering
13) Engineering Thermodynamics
14) Composites for Construction
15) Bridge Engineering
16) Earthquake Engineering
17) Advanced Structural Analysis and Experimental Techniques
18) Structural Concrete Design –IV

**PE LAB) PROFESSIONAL ELECTIVE LABORATORIES**
1) Fluid Mechanics and Machines Lab
2) Transportation Engineering Lab
3) Computer Practical IV

**OE) OPEN ELECTIVES**
1) Finite Element Methods
2) Tall Buildings
3) Construction Techniques and Management
4) Rehabilitation of Concrete Structures
5) Ground Improvement Techniques
6) Introduction to Soil Dynamics and Machine Foundation
7) Artificial Intelligence
8) Theory of Elasticity and Plasticity
9) Contract Laws and Regulations
10) Design of Plates and Shells
11) Economics and Finance for Civil Engineers
12) Services in High Rise Building
13) Disaster Resistant Design of Structures
14) Waste Water Engineering
15) Solid Waste Management
16) Smart Materials and Smart Structures
17) Remote Sensing & GIS
18) Urban & Rural Planning
19) Digital Signal Processing
20) Computer Network
21) Biology for Engineers
22) Disaster Management
23) Entrepreneurship
24) National Service Scheme
25) Human Rights
THIRD SEMESTER

01HS301 ENVIRONMENTAL STUDIES

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COURSE OBJECTIVES

- To make the students conversant with basic principles of natural resources, forest resources, ecosystem and bio-diversity.
- To get knowledge about pollution and its control.

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

Concept of an ecosystem - Structure and function of an ecosystem - Producers, consumers and decomposers - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological - pyramids - Introduction, types, characteristic features, structure and function of the following ecosystem - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit–III


Unit–IV

Definition - Cause, effects and control measures of Air pollution - Water pollution - Soil pollution - Marine pollution- Noise pollution - Thermal pollution - Nuclear hazards- Solid waste Management: Causes, effects and control measures of urban and industrial wastes - Role of an individual in prevention of pollution -
Disaster management: floods, earthquake, cyclone and landslides. Sustainable development - Urban problems related to energy - Water conservation, rain water harvesting, and watershed management - Resettlement and rehabilitation of people; its problems and concerns. - Environmental ethics: Issues and possible solutions - Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.


Unit-V

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

REFERENCE BOOKS
2) Clark R.S., Marine Pollution, Claderson Press Oxford
4) De A.K., Environmental Chemistry, Wiley Eastern Ltd.
5) Down to Earth, Centre for Science and Environment
7) Hawkins R.E., Encyclopaedia of Indian Natural History, Bombay Natural History Society, Bombay
11) Mhaskar A.K., Matter Hazardous, Techno-Science Publication
16) Survey of the Environment, The Hindu (M)


Note: (M) Magazine

**COURSE OUTCOMES**

Students can able

1) To conversant with basic principles of natural resources, forest resources, ecosystem and bio-diversity.

2) To identify the causes of pollution and its control measures.

3) To get the awareness of human rights and human health in the society.

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**00BS302**

**ENGINEERING MATHEMATICS – III**

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**COURSE OBJECTIVES**

- The students will be trained on the basics of chosen topics of mathematics, namely, Partial Differential equations, Fourier series, Boundary value problems, Fourier transform and Z-transform.

**Unit-I**


**Unit-II**

Dirichle’s conditions - General Fourier series - Odd and Even functions - Half range sine series - Half range cosine series - Complex form of Fourier series – Parseval’s identity.

**Unit-III**

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

**Unit-IV**

Fourier integral theorem (without proof) – Fourier transform pair – Sine and Cosine transforms – Properties – Transforms of simple functions – Convolution theorem - Parseval’s identity
Unit–V


TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the completion of the course students will be able to
1) Do most common partial differential equations, Fourier series, Fourier transform and Z-transform and some methods of solving them.
2) Solve some boundary value problems.
3) Apply the concepts to the engineering problems.

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02ES303 ENGINEERING MECHANICS

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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
Equilibrium of Particle - Vector representation of Space Force - Equilibrium of Particle in Space - Equivalent System of Forces - Principle of Transmissibility.
Unit–II

Free Body Diagram - Types of Supports - Types of loads - Types of beams -
Action and Reaction of Forces - Moments and Couples - Moment of a Force -
Vectorial Representation of Moments and Couples.

Varignon’s Theorem - Stable Equilibrium - Single Equivalent Force -
Equilibrium of Rigid Bodies in Two Dimensions and Three Dimensions.

Unit–III

Centroid and Centre of Gravity - Determination of Centroid of Sections of
Different Geometry - Centre of Gravity of a Body - Area Moment of Inertia – Parallel
Axis Theorem - Perpendicular Axis Theorem - Determination of Moment of Inertia of
Rectangular, Triangular, Circular and Semi-circular areas from the first principle-
Moment of Inertia of structural Steel Sections of Standard Flanged and Composite
Sections.

Polar Moment of Inertia - Radius of Gyration - Principal Moment of Inertia -
Mass Moment of Inertia - Determination of Mass Moment of Inertia of a Rod, Thin
Rectangular Plate, Thin Circular Disc, Solid Prism, Cylinder, Sphere and Cone from
the first principles.

Unit–IV

Introduction - Kinematics and Kinetics - Displacements, Velocity and
Acceleration - Equations of Motion - Types of Motion-Rectilinear Motion - Relative
Motion - Curvilinear Motion - Projectiles.

Newton’s Laws of Motion - Linear Momentum - Impulse and Momentum -

Unit–V

Friction Force - Laws of Sliding Friction - Equilibrium Analysis of simple
systems with Sliding Friction - Wedge Friction.

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
2) Palanichamy M.S and Nagan, S, Engineering Mechanics (Statics and

REFERENCE BOOKS
International (P) Ltd, New Delhi, 1999.
3) Sadhu Sing, Engineering Mechanics, Oxford & IBH Publishing Co., New Delhi,
2000.
Delhi, 2006.


**COURSE OUTCOMES**

Students can:

1) To explain the forces and its related laws of mechanics in static and dynamic conditions.

2) To analyse the forces and its motions on particles, rigid bodies and structures.

3) To 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**

Introduction – Masonry – Types of Masonry – Reinforced Cement Concrete (RCC) works like Footings, Columns, Plinth Beams, Lintels, Sill slab, Sunshades, Roof Beams and Roof Slabs – Fabrication of Steel, Bar Bending as per IS Standards (SP 34: 1987), Cover Blocks, Placing of Bars in Form Work – Types of Roofing

Unit–IV


Unit–V


Cracks in Buildings – Causes – Methods of Repairs– Equipments used for Repair works.

TEXT BOOKS


REFERENCE BOOKS


STANDARDS:

2) SP 34: 1987, Handbook on Concrete Reinforcement and Detailing, Bureau of Indian Standards, New Delhi.

COURSE OUTCOMES

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

- To develop systematic knowledge about the nature and basic properties of the ingredients of concrete.
- To familiarizes the testing procedures for properties of fresh and hardened concrete.
- To introduce fundamentals and principles of mix design.

UNIT– I


UNIT– II


UNIT– III


UNIT– IV

UNIT– V

Objectives of mix design –Concept of concrete mix proportioning- Methods of mix proportioning as per IS: 10262-2009 and ACI Committee 211.1.91 method – Fly ash based concrete mix design – Effect of replacement materials for binder and filler in mix design-sustainable concrete.

TEXT BOOKS
2) Shetty M.S., Concrete Technology, S.Chand & Co., New Delhi, 2002.

REFERENCE BOOKS

STANDARDS:
3) IS516: 1959, Method of Test for Strength of Concrete (with Amendment No.2), Bureau of Indian Standards, New Delhi.
4) IS 2386 (Part I to VIII):1963, Method of Test for Aggregate for Concrete, Bureau of Indian Standards, New Delhi.
7) IS 8112 (re-affirmed in 2000), Specification for 43 grade Ordinary Portland cement, Bureau of Indian Standards, New Delhi.
8) IS 12269-1987, Specification for 53 grade Ordinary Portland cement (with Amendment No. 3) Bureau of Indian Standards, New Delhi.
10) ACI Committee 211.1-91 Standard Practice for Selecting Proportions for Normal, Heavy weight and Mass Concrete, American Concrete Institute, Farmington Hill, Michigan, USA,2002

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

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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

1) Understand properties of fluids and acquire knowledge of fluids in static, kinematic and dynamic equilibrium.

2) Identify type of flow and carry out flow measurements.

3) Apply physical laws in addressing hydraulic problems.

4) Analyse flow through pipes and carryout measurement.

5) Understand the impact of engineering solutions for boundary layer theory in the context of submerged bodies.
### COURSE OBJECTIVES

- To train the students in developing skills in drawings and detailing of the Building components using AUTOCAD and also develop the skills of using MS office Excel for estimating and costing the Buildings.

### LIST OF EXERCISES

- Plate 1. Symbols used in Civil Engineering drawings.
- Plate 2. Doors, Windows and Ventilators (wooden, glazed and aluminium).
- Plate 3. Comprehensive Planning and Drawings of Residential building Layout, plan, elevation & sectional elevation based on the NBC standards
  - Single Room RCC roof building
  - Double Room RCC roof building
  - Bungalow/duplex building with sloped tiled Roof
  - 2BHK types Residential building
  - Two storied Residential building
- Plate 4. Preparation of Layout plan of different types of commercial building Projects.
  - School building,
  - Office building (Bank, Government office, IT park)
  - Hospital building, and
  - Shopping Mall
- Plate 5. Draw the Residential building Layout, plan, elevation & sectional view with all specification and standards of municipal guidelines (Local Bylaws).

### MS Office – EXCEL


Exercise 2. Preparation of building Estimation of the practiced drawing
REFERENCE BOOKS
1) Verma B.P, Civil Engineering Drawing and housing Planning, Khanna Publishers,
5) MSOffice Manual

COURSE OUTCOMES
At the completion of the course students will be able
1) To model the building for practical application.
2) To gain experience/practice on Modern Software in civil engineering field.
3) To understand the design and development of estimation of Building models.

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02CP308 CONSTRUCTION ENGINEERING LABORATORY

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COURSE OBJECTIVES
- To train the students in standard testing procedures for different compositions of building materials and provides them an opportunity to design a concrete mix.

LIST OF EXPERIMENTS:
1) Standard Tests on Cement as per IS Standards
2) Standard test on fine and coarse aggregates as per IS Standards
3) Workability tests on Fresh Concrete
4) Tests on Hardened Concrete, Bricks and Tiles as per IS Standards
5) Concrete Mix design as per IS 10262: 2009
6) Study on Reinforcement Detailing for different Structural Components as per SP34: 1987.

REFERENCE BOOKS
2) Shetty M.S., Concrete Technology, S. Chand & Co., New Delhi, 2002.
6) IS 269: 1989 Specification for Ordinary Portland cement, 33 grade (fourth revision), Bureau of Indian Standards, New Delhi
8) IS 516: 1959, Method of Test for Strength of Concrete (with Amendment No.2), Bureau of Indian Standards, New Delhi
9) IS 2386 (Part I to VIII) :1963, Method of Test for Aggregate for Concrete, Bureau of Indian Standards, New Delhi

COURSE OUTCOMES
At the completion of the course students will be able
1) Identify the concrete properties
2) To test the workability, durability, creep, shrinkage, temperature effects and etc. on concrete.
3) To determine the strength of hardened concrete, bricks, tiles, coarse aggregates, etc.

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FOURTH SEMESTER

00BS401

PRABABILITY, RANDOM PROCESSES

AND NUMERICAL METHODS

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COURSE OBJECTIVES

- To 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

Classification of random processes – Methods of description of a random process – Special classes of random processes – Average values of random process - Stationarity –Autocorrelation function and its properties - Cross correlation function and its properties.

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.


UNIT–V


TEXT BOOKS


**REFERENCE BOOKS**


**COURSE OUTCOMES**

At the completion of the course students will be able to

1) Handling situations involving random variables, random processes and to solve problems for engineers using numerical methods.

2) Apply the concepts in the engineering problems

3) Do numerical integrations and interpolations wherever needs.

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**COURSE OBJECTIVES**

- To understand the concept of stresses and strains and associated deformations of solid bodies due to various loading conditions with the application to bars, beams, columns, etc.
- To understand the concept of determinate structures and their equilibrium conditions.
- To understand the concept in the analysis of plane trusses

**Unit-I**


Stress at a point- Stress tensor- Equations of Equilibrium - Uni-axial state of stress- Stresses on a plane - Transformation of plane stress - Principal stresses and maximum shear stress – Mohr’s Circle for Plane stress
Unit–II

Loads: Gravity and lateral loads, concentrated loads, uniformly distributed loads, Hydro static pressure loads, Soil pressure loads, Temperature loads. Beams: Cantilever beams, simply supported beams, single and double over hanging beams. Support conditions: hinged support, Roller support, guided, fixed or restrained and spring supports - Load and reactions – Bending moment and shear force diagrams – Point of contra flexure- Determinate beams and frames - Additional problems with flexural hinges and elastic supports.

Section Modulus – Neutral axis – Moment of Resistance - Simple Bending Theory (Euler Bernoulli Theory) - Bending stress and strain variations for rectangular sections - Shear stress variations for different cross sections – Problems.

Unit–III

Slope and Deflection of statically determinate beams and frames - Moment area Method - Conjugate Beam Method- Strain energy Method - Double Integration (Macaulay’s Method) - Graphical methods. Determinate Beams and frames subjected to different types of loads-additional problems with flexural hinges and elastic supports.

Torsion- Theory of Pure torsion in circular shafts- Variation of shear stress distribution across the solid (Circular), hollow (Circular), and thin walled sections - Saint Venant’s torsion - warping torsion- Torque transmitted in circular and hollows shafts - combined bending and torsion.


Unit–IV

Strain Energy- Strain Energy stored due to axial force- Strain Energy stored due to bending - Strain Energy stored due to shear - Strain Energy stored due to torsion - Strain Energy stored in an elastic body due to suddenly applied loads or impact loads- Proof resilience.


Unit–V

Columns and Struts –Effective length of column- Euler column- Limitations of Euler column- columns with different end conditions– Failure types- Critical load-Euler’s formula –Secant formula- Rankine’s and Gordan’s formula - I.S.Code formula –Beam- column subjected to distributed lateral load – Columns with initial curvature.
Thin Cylindrical and Spherical shells- Internal pressure - Change in volume - Minimum thickness of wall - Thick Cylindrical and Spherical shells – Lame’s theory - Compound cylinders - Thick spherical shells.

**TEXT BOOKS**

**REFERENCE BOOKS**

**COURSE OUTCOMES**
At the completion of the course students will be able
1) To explain the concepts of stress and strain in solids.
2) To analyse the shear forces, bending moments and deflections of structural members.
3) To analyse plane trusses and assess the stress resultants of columns and cylinders.

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**COURSE OBJECTIVES**
- To understand the fundamentals of the design of steel Structures.
- To design simple steel elements and the corresponding fastening systems.

**UNIT-I**

UNIT–II

Tension members – Types – Design strength due 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


UNIT–V


TEXT BOOKS

REFERENCE BOOKS

STANDARDS
1) IS 800: 2007, General Construction in Steel, Bureau of Indian Standards, New Delhi.
2) IS 813: 1986, Scheme of symbols for welding, Bureau of Indian Standards, New Delhi.
COURSE OUTCOMES
At the completion of the course students will be able
1) To understand the different types of Steel sections available in the market.
2) To design the connections and different types of members subjected to various loading conditions.
3) To understand the Codal provisions.

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02PC404 STRUCTURAL CONCRETE DESIGN I

COURSE OBJECTIVES

- To introduce the different types of Philosophies related to design of basic RCC structural elements such as slab, beam and column which forms the part of any structural system with reference to Indian Standard Code of Practice.

Unit–I


Unit–II


Unit–III

Shear: Shear stresses distribution in rectangular beams-Shear stresses distribution in flanged beams -Shear stresses distribution in rectangular beams due to torsion - Design shear strength of concrete- Flexural shear-Codal provisions for rectangular and flanged sections- Problems. Bond - Factors affecting bond


Unit–IV

Design of Short and Slender Columns as per IS456:2000 standards – Design of Columns subjected to axial compression and uni-axial bending – Columns subjected to axial compression and biaxial bending – Axial load verses moment Interaction charts as per SP-16-1978- Reinforcement detailing as per SP 34: 1987 and IS 13920: 1993.

Unit–V


TEXT BOOKS


REFERENCE BOOKS


STANDARDS

1) IS 456: 2000, Code of Practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi
3) SP 34: 1987, Handbook on Concrete Reinforcement and Detailing, Bureau of Indian Standards, New Delhi
4) SP 16: 1978, Design Aids to IS456: 1978, Bureau of Indian Standards, New Delhi

COURSE OUTCOMES

At the end of the course students will be able

1) To design the structural elements using various design philosophies.
2) To gain knowledge about the rudimentary principles of designing reinforced concrete structural elements as per the existing codes.
3) To understand the details given in the Codes.
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COURSE OBJECTIVES

- To the practical aspects involved in the flow problems through open channels and closed channels like pumps.
- To understand the principles of analysis and evaluation of design parameters are dealt with in this course.

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


Different classification of turbines – Pelton turbine: main components and their functions – design of component parts of Pelton turbine – force, power and efficiency – Francis turbine: different types – main components – design of

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
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 know the surveying practices and topography of the site this influences the competency of a structural engineer.
- To learn the principles and practices of chain and compass surveying, levelling, Theodolite surveying, tachometric surveying and triangulation.

UNIT–I

Chain and Compass surveying - Description of instruments and accessories for chain and compass survey - Chaining methods and booking - Use of prismatic compass - Local attraction and its correction - Traverse by chain and compass - Adjustment of closing error - Plane table surveying - Merits and demerits - Different equipments - Telescopic and prismatic alidades – relative advantages - Different methods-Radiation, resection and intersection-two and three point problems - Traversing.

UNIT–II

Levelling - Description, setting up and use of dumpy level - Levelling staff - Bench marks recording and reducing levels by different methods - Types of levelling - Permanent adjustments sensitiveness of bubble tube, correction for curvature and refraction - Contouring-Areas and volumes of earth work - Types of levels and clinometer.

UNIT–III

Theodolite Surveying - Use of adjustment of transit Theodolite - Measurements of horizontal angles by repetition and reiteration methods - Measurement of vertical angles, height and distance by single and double plane methods - Traversing calculations and plotting by co-ordinate systems - Omitted measurements.

UNIT–IV

Tachometric surveying - Principles of stadia formula - Substance bar - Precise instruments –Microptic and micrometer theodolite -Nautical and box sextants - Range finders - Instruments of strategic importance.

Introduction to Curves – classification – necessity – elements of simple curve – setting out a simple curve – various methods

UNIT–V


TEXT BOOKS

REFERENCE BOOKS


COURSE OUTCOMES

1) Students will possess knowledge about chain surveying, compass surveying, plane table surveying, Levelling, Theodolite survey, Tachometric survey and contouring.

2) Students will have the knowledge about the Survey Instruments, their care and adjustments and the principles of Chain Surveying.

3) Students can able to understand GIS and its principles.

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02CP407  STRENGTH OF MATERIALS LABORATORY  L  T  P

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COURSE OBJECTIVES

- To provide practical training on the testing and studying the stress–deformation response under axial and transverse loading conditions of conventional engineering materials like steel and wood.

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 specimen
5) Impact tests
6) Hardness tests on different metals
7) Test on Helical springs
8) Torsion Test.
REFERENCES BOOKS

COURSE OUTCOMES
At the end of the course students will be able
1) To find out the material properties.
2) To find out the stress, strain, young’s modulus, Poisson’s ratio, etc. for different materials.
3) To understand the materials behaviour by their properties.

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COURSE OBJECTIVES
- To conduct experiments on Surveying and Levelling.
- To understand the principles of Surveying.
- To know about compass surveying and plane table surveying.
- To understand the concepts of levelling and its applications.
- To understand the concepts of Theodolite surveying.

LIST OF EXERCISES
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) Determination of distance of two inaccessible points
III. Levelling
1) Study of Dumpy level and telescopic staff
2) Simple Leveling – Determination of Reduced levels
3) Differential Leveling - Determination of Reduced levels

IV. Theodolite and Trigonometric Surveying
1) Study of transit theodolite, fundamental of various axes
2) Measurement of horizontal angle by repetition method
3) Measurement of horizontal angle by reiteration method
4) Heights and distances

V. Tachometric Surveying
1) Determination of tachometric constants
2) Distance and elevation by stadia method
3) Distance and elevation by tangential method
4) Determination of Gradient of a line

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

The syllabus includes a Survey Camp for about one week

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the completion of the course students will be able to
1) Do chain surveying, compass surveying, plane table surveying, Levelling, Theodolite survey, Tachometric survey and contouring.
2) Handle the Survey Instruments, their care and adjustments and the, principles of Chain Surveying.
3) Understand the concept of total station.

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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 problems shall 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 overhanging beams - ILD for Propped cantilever beams with flexural hinges- simply supported 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 –Absolute maximum bending moment- ILD for Simple Plane truss. 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 different support levels. ILD for moving loads over suspension bridges. Analysis of Beams Curved in Plan – Analysis of Space trusses using tension coefficient method.

**TEXT BOOKS**

**REFERENCE BOOKS**

**COURSE OUTCOMES**
At the completion of the course students will be able
1) To analyze the indeterminate structures like beams and frames with different end conditions.
2) To analyse the arch structures and suspension cable bridges.
3) To solve the structural problems with different methods of analysis.

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COURSE OBJECTIVES

- To make the students conversant with the design procedures and practices of complex steel structures like industrial structures and Gantry girders as per IS 800 – 2007 procedures.

Unit–I


Unit–II


Unit–III


Unit–IV


Unit–V

Cold Form light gauge sections - Type of cross section, stiffened, multiple stiffened and un-stiffened element, Design of light gauge compression, tension and flexural members as per IS 802(Part 1 to 3):1995.

TEXT BOOKS

REFERENCE BOOKS
1) Subramanian.N, Design of Steel Structures, Oxford University Press, New Delhi 2008
3) Shiyekar, Limit State Design of Steel Structures, Phi Learning Pvt. Ltd., Delhi, 2010

STANDARDS
3) Teaching resource materials by INSDAG, Kolkata.
5) IS 806 :1968 Code of practice for use of steel tubes in general building construction, Bureau of Indian Standards, New Delhi
7) SP: 6 (2)– 1962,Hand book for structural Engineers, Steel beams and plate girders, Bureau of Indian Standards, New Delhi
9) IS codes for Aluminium Structures, IS:3908, 3909, 3921, 5384, 6445, 6476, 6475, 6449, 8147, Bureau of Indian Standards, New Delhi

COURSE OUTCOMES
At the completion of the course students will be able
1) To identify the different types of Steel sections available in the market.
2) To design of Connections and Different types of members which are subjected to various loads.
3) To understand the concept of plastic analysis and its effects

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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 principles involved in the understanding of the behavior of soils as a supporting medium for structures.

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
Shear Strength of Soil: Basic concepts, Mohr- Columb’s Theory, Laboratory Determination of soil shear parameter- Direct Shear, Tri-axial Test, Unconfined Compression, Vane Shear Test, Sensitivity & thixotropy of clay as per SP 36 – 1 (1987).Slope failure mechanisms - total stress analysis for saturated clays - friction circle method, tension cracks - use of stability number.
TEXT BOOKS

REFERENCE BOOKS

STANDARDS

COURSE OUTCOMES
At the end of the course students will be able
1) To understand the soil characters such as shear strength and stress distribution.
2) To determine the soil properties.
3) To demonstrate the experiments on different soils.

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02PC504 STRUCTURAL CONCRETE DESIGN II

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COURSE OBJECTIVES
- To understand the concepts of 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
Analysis and design of concrete Building frames: load combinations for gravity and lateral loads (wind or seismic)- Substitute frame method for gravity loads - Portal and Cantilever methods for lateral loads - Analysis and design of two storied
two bay concrete Plane frames under gravity and lateral loads- Reinforcement detailing as per SP 34 : 1987 and IS 13920: 1993.

Unit–II

Unit–III

Unit–IV

Unit–V
Design of cantilever type retaining walls without surcharge - Design of cantilever type retaining walls with surcharge and traffic loads - Design of counter-fort type retaining walls without surcharge - Design of counter-fort type retaining walls with surcharge and traffic loads - Reinforcement detailing as per SP 34: 1987.

TEXT BOOKS

REFERENCE BOOKS

STANDARDS


8) IS 3370 (Part IV) :1967, Code Of Practice For Concrete Structures for the Storage of Liquids, Bureau of Indian Standards, New Delhi

COURSE OUTCOMES

1) The students will have the knowledge of analysis and design of multi-storeyed frames and special foundations such as pile, raft, strap, etc.

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COURSE OBJECTIVES

- To train the students in the use of latest softwares available to solve structural engineering problems and documentations procedures.

LIST OF EXERCISES

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 beam: 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

REFERENCE BOOKS
1) ACAD Manuals.

STANDARDS
1) IS 456: 2000, Code of Practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi
2) IS 13920: 1993, Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces -Code of Practice, Bureau of Indian Standards, New Delhi
7) IS 2911 (Part III): 1980, Code of Practice for Design and Construction of Pile Foundation (Under-reamed piles), Bureau of Indian Standards, New Delhi,

COURSE OUTCOMES
At the completion of the course students will be
1) Having the Structural Engineering knowledge on Reinforced concrete structural elements for practical application.
2) Able to gain experience/practice on Modern Software in Civil Engineering field.
3) Able to understand the design and development of Shop drawing for practical purpose

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**COURSE OBJECTIVES**
- To train the students in various aspects of soil investigation.
- To determine the basic soil properties, strength, deformation and permeability characteristics of soils through which the students can try to be successful geotechnical engineers.

**LIST OF EXPERIMENTS**
The Following Laboratory Tests need to be carried out as per SP 36 – 1:1987.
1) Specific Gravity of Soils
2) Visual Classification of Soils
3) Sieve analysis
4) Hydrometer analysis
5) Atterberg Limits
6) Permeability determination (constant head and falling head methods)
7) Optimum Moisture content determination (Proctor compaction, CBR value test)
8) Shear strength determination (Direct shear test, Unconfined compression test, Tri-axial compression test)
9) One-dimensional consolidation test.
10) Determination of Field density

**REFERENCE BOOKS**


**COURSE OUTCOMES**
At the completion of the course students will be able

1) To understand the soil properties.
2) To gain knowledge about the soil characters.
3) To conduct the different experiments according to the soil types.

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**01EP509 FLUID MECHANICS AND MACHINES LABARATORY**

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**COURSE OBJECTIVES**

- To understand the properties of fluids and fluid statics, methods for determination of co-efficient of discharged are to be explained and computed practically.
- To study of the characteristic features of pumps and turbines using experiments in envisaged.
- 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 Mouth Piece
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 Pipe
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)
14) Study on Flow through Open Channel (Demo Only)

REFERENCE BOOKS

COURSE OUTCOMES
At the completion of this course, a student will be able to
1) Determine the properties of fluids, pressure and their measurements
2) Measure flow in pipes and determine frictional losses
3) Compute forces on immersed plane and curved plates applying continuity equation and energy equation in solving problems on flow through conduits
4) Develop Characteristics of pumps and turbines

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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


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 completion of the course students will be able
1) To analyze the indeterminate structures like beams and frames with different end conditions through various advanced and modern methods.
2) To solve the structural problems with matrix approach.
3) To do the plastic analysis for concrete structures.

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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.

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**


4) Venkatramaiah C. *Geotechnical Engineering*, New Age International Publishers, New Delhi, 2007 (Reprint)


**STANDARDS**


**COURSE OUTCOMES**

At the completion of the course students will be able

1) To select type of foundation required for the soil at a place and able to design shallow, foundation, deep foundation and retaining structures.
2) To calculate the safe bearing capacity of soils
3) To advise the type of foundation suitable for the particular soil type.

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**02CP607**  ADVANCED MATERIAL TESTING LAB  

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**COURSE OBJECTIVES**

- To demonstrate the model analysis to understand the structural elements behaviour.
- To determine the material properties of different cross sections, steel reinforcements, concrete, etc.
- To understand the behaviour of HPC, HSC and SCC.

**LIST OF EXPERIMENTS**

1) Model analysis
   a) Continuous beam
   b) Portal frame
2) Flexure test on beams of various cross sections.
3) Flexure test on Continuous beam.
4) Sand heap analogy
5) Modulus of Elasticity of concrete
6) Modulus of Elasticity of Steel by Ewing’s Extensometer
7) Modulus of Elasticity of Steel by Whitemore’s Strain Gauge
8) Modulus of Elasticity of Steel by Electrical Strain Gauge
9) Unsymmetrical bending
10) Concrete durability tests
11) Preparation of HPC using chemicals and test on HPC
12) Preparation of HSC using chemicals and test on HSC
13) Preparation of SCC using chemicals and test on SCC

REFERENCE BOOKS

COURSE OUTCOMES
At the completion of the course students will be able
1) To understand the behaviour of steel elements for practical application.
2) To get experience in Modal analysis.
3) To understand the development of concrete for durability studies.

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COURSE OBJECTIVES

- This course enables the students in studying and understanding structural drawings by training them in doing the structural drawings themselves for various structural elements and systems.

LIST OF EXERCISES

Plate 1. Draw cross section and longitudinal sections of a steel roof truss with Connection details as per SP:38–1987.

Plate 2. Draw cross section and longitudinal section of a welded plate girder as per SP: 6 (2)- 1962.

Plate 3. Draw cross section, longitudinal section and reinforcement details of bunkers as per IS 4995 (Part I&II): 1974.

Plate 4. Draw cross section, longitudinal section and reinforcement details of silos as per IS 5503 (Part I):1969.

   a. Square or Rectangular
   b. Circular

   a. Square or Rectangular
   b. Circular


TEXT BOOKS


REFERENCE BOOKS


STANDARDS:
12) IS 5503 (Part I) :1969, General Requirements for Silos for grain storage (Construction requirements), Bureau of Indian Standards, New Delhi.

COURSE OUTCOMES
At the completion of the course students will be able
1) To gain knowledge on Steel structural elements for practical application.
2) To get experience / practice on Modern Software in Civil engineering field.
3) To design and development of Shop drawing for practical purpose.

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

LIST OF EXPERIMENTS
1) To Determine the Crushing Value of Coarse Aggregates.
2) To Determine the Impact Value of Coarse Aggregates.
3) To determine the Flakiness Index and Elongation Index of Coarse Aggregates
4) To determine the Abrasion Value of Coarse Aggregates.
5) To determine the fineness modulus and grading curve of coarse aggregates.
6) To Determine the Flash and Fire point of Bitumen
7) To determine the viscosity of Bitumen.
8) To determine the penetration Value of Bitumen.
9) To determine the Softening Point of Bituminous material.
10) To determine the Ductility Value of Bituminous material.
11) To determine the Flash and Fire Point of Bituminous material.
12) To determine the Marshal Stability Value of Bituminous mixture.

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able
1) To gain knowledge about the mechanical properties of materials such as Coarse Aggregate, concrete and bitumen.
2) Check the aggregates quality used for the roads
3) Suggest and advice on the material selection and its purpose.

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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**

At the completion of the course students will be able to

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.

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**02PC702 PRESTRESSED CONCRETE**

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**COURSE OBJECTIVES**

- To inculcate the basics of pre-stressing techniques to understand the design concepts used 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 IS:1343-2012. Design of anchorage zone reinforcement (end block)

**Unit–III**

Composite Sections – Types – Advantages - Analysis of stresses for composite sections – Analysis and Design – Flexural and shear strength of composite members – Shear key.

**Unit–IV**

Factors influencing deflections – Effect of tendon profile on deflections – Calculation of 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 and crack width.

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

**Unit–V**

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the completion of the course students will be able
1) To gain knowledge on methods of pre-stressing.
2) To design various Pre-stressed concrete structural elements.
3) Understand the deflection criteria and its Codal recommendations
4) Understand the concepts of composite section and its analysis

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COURSE OBJECTIVES
This course aims at providing practical training in understanding the behaviour of the building elements subjected to earthquake.

LIST OF EXPERIMENTS
1) Free vibration analysis of wooden cantilever beam model.
2) Free vibration analysis of steel cantilever beam model.
3) Free vibration analysis of aluminium cantilever beam model.
4) Free vibration analysis of glass cantilever beam model.
5) Determination of viscous damping co-efficient for wooden cantilever beam model.
6) Determination of viscous damping co-efficient for steel cantilever beam model.
7) Determination of viscous damping co-efficient for aluminium cantilever beam model.
8) Determination of viscous damping co-efficient for glass cantilever beam model.

ADDITIONAL EXPERIMENTS:
1) Dynamics of a three storied building frame subjected to harmonic motion
2) Dynamics of a three storied building frame subjected to periodic (non-harmonic) base motion.
3) Dynamics of a vibration absorber.
4) Dynamics of one-span beams.

REFERENCE BOOKS

COURSE OUTCOMES
At the completion of the course students will be able
1) To understand the dynamic properties.
2) To gain knowledge about the earthquake occurrence and resistance.
3) To analyse the structure under free and forced vibrations.

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COURSE OBJECTIVES
- This course trains the students to carry out basic build frame analysis for symmetrical and un-symmetrical building frames.

LIST OF EXPERIMENTS
Introduction to STADD PRO and ETABs Software
Plate 1. Analysis of Symmetrical Building Frames (Gravity Load Only) using STADD PRO Software.
Plate 2. Analysis of Symmetrical Building Frames (Wind Load Only) using STADD PRO Software.
Plate 3. Analysis of Symmetrical Building Frames (Earthquake Load Only) using STADD PRO Software.
Plate 4. Analysis of Un-Symmetrical Building Frames (Gravity Load Only) using STADD PRO Software.
Plate 5. Analysis of Un-Symmetrical Building Frames (Wind Load Only) using STADD PRO Software.
Plate 6. Analysis of Un-Symmetrical Building Frames (Earthquake Load Only) using STADD PRO Software.
Plate 7. Analysis of Symmetrical Building Frames (Gravity Load Only) using ETABs Software.
Plate 8. Analysis of Symmetrical Building Frames (Wind Load Only) using ETABs Software.
Plate 9. Analysis of Symmetrical Building Frames (Earthquake Load Only) using ETABs Software.
Plate 10. Analysis of Un-Symmetrical Building Frames (Gravity Load Only) using ETABs Software.
Plate 11. Analysis of Un-Symmetrical Building Frames (Wind Load Only) using ETABs Software.
Plate 12. Analysis of Un-Symmetrical Building Frames (Earthquake Load Only) using ETABs Software.

REFERENCE BOOKS
1) STADD PRO and ETABs Software Working Manuals.

COURSE OUTCOMES
At the completion of the course the student will be able to understand
1) The basic structural analysis of both symmetrical and un-symmetrical frames.
2) Modelling, analysis and design using STAADPro.
3) Modelling, analysis and design using ETABS.

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**COURSE OBJECTIVES**

- To encourage the students to study advanced engineering developments.
- To Prepare and present technical reports.
- To encourage the students to use various teaching aids such as over head projectors, power point presentation and demonstrative models.

**METHOD OF EVALUATIONS**

- During the seminar session each student is expected to prepare and present the topic on the relevant engineering project topics for duration of about 8 to 10 minutes.
- In a session of 3 periods per week, 15 students are expected to present the seminar.
- Each student is expected to present at least twice during the semester and the student is evaluated based on that.
- At the end of the semester, he/she can submit a report on his/her topic of seminar and marks are given based on the reports.
- A faculty guide is to be allotted and he/she will guide and monitor the progress of the student and maintain attendance also.
- Evaluation is 100% Internal.

**EIGHTH SEMESTER**

02PV803  PROJECT WORK AND VIVA VOCE  

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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 concrete and steel or any other construction material to know the behavior and properties
3) Understand the modelling, analysis and design concepts by taking up a structure.

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COURSE OBJECTIVES

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

Unit–I

Unit–II

Unit–III

Unit–IV
Sewage, Sewer and Sewerage- Collections & Conveyance of sewage-Classification of sewerage system- Quantity of sewage- Fluctuation of sewage flow – Hydraulics of sewers-Self cleaning velocity- Shapes of sewers- Hydraulic design of storm water drains.

Unit–V
Primary & Secondary Treatment processes in wastewater treatment - Aerobic, Anaerobic and combinations of processes - Screens, Grit chamber, Settling tanks, Septic tanks and disposal arrangements.

Sources and types of municipal solid wastes - Waste generation rates - Factors affecting generation, characteristics- Methods of sampling and characterization; Effects of improper disposal of solid wastes - Public health and environmental effects. Elements of solid waste management – Social and Financial aspects –
Municipal solid waste (M&H) rules – Integrated management - Public awareness; Role of NGO’s.

**TEXT BOOKS**

**REFERENCE BOOKS**

**COURSE OUTCOMES**
At the completion of the course students will be able
1) To understand the water supply and distribution systems.
2) To understand the sewage and sewerage systems.
3) To understand the pollutions caused due to water supply and sanitary.

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**COURSE OBJECTIVES**
- To impart knowledge on the layout, operations and design of Highways, Railways, Waterways and Airways transportation systems which would be of great use for transport engineers.

**Unit-I**
Highway Planning - Importance of high ways in national development - Highway planning in India - Road Classification in rural and urban areas - Road alignment and surveys - Geometric Design of highways.
Unit–II

Unit–III
Railway Engineering - Reconnaissance and location surveys - Alignments - Permanent way - Ballast - Sleepers - Rail - Chairs and fastenings, gauges, creep and anticreep appliances - Stations and yards - Proposal location and sites - General equipment and layout - Platforms and engine sheds - Points and crossings - Theory and design - Turn out - Cross - over - Signaling and interlocking - system - Types of slotting arrangements.

unit–IV
Airport Engineering - Airports - Their importance - Spacing and position in relation to their zone - Construction and maintenance of auxiliary and terminal building - Location and layout – Traffic control in the vicinity of aero-dromes and its effect on design - International standards. Classification of airports - Structural requirements - Site selection - Airport components – Geometric standards - Runway design - Planning Terminal buildings - Visuals - Air traffic - Airport drainage.

Unit–V
WATERWAYS and other works - Importance of Water Transport- Inland waterways- Components and functions of docks - Harbours and Ports - Classification and requirements - choice of site - Channel regulation - Dredging - Types of dredges - Dock and quay walls - Dock entrances and locks - Floating docks.

TEXT BOOKS

REFERENCE BOOKS
1) Saxena and Arora, Railway Engineering, Dhanpat Rai Publications(P) Ltd., New Delhi, 2010
COURSE OUTCOMES

At the completion of the course students will be able

1) To understand the design of highways
2) To understand the design of airways
3) To understand the design of waterways.

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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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00PEXXX | ENGINEERING GEOLOGY | L | T | P
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COURSE OBJECTIVES
- This course will give the importance of Geology in civil engineering filed during earthquake, volcanism and the action of various geological agencies.
- The students of civil engineering will realize the importance of this knowledge in projects such as dams, tunnels, bridges, roads, airport and harbour.

Unit–I

Geology in civil engineering – structure of earth (Crust, mantle and Core) – Crust formation- layers of crust - weathering of rocks – scale of weathering – soils -
landforms and processes associated with river, wind, groundwater and sea – relevance to civil engineering. Theory of Plate tectonics – origination of Earth quakes – Seismic zones in India.

**Unit–II**


**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**


8) *Engineering Geology for Civil Engineers*, PHI Learning Pvt Ltd, New Delhi, 2012.

**COURSE OUTCOMES**

At the end of the course students will be able

1) To gain knowledge on projects such as dams, tunnels, bridges.
2) To realize the importance of Earthquake, volcanism and the action of various geological agencies.

3) To choose the types of foundations and other related aspects roads, airport and harbour.

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**COURSE OBJECTIVES**

- This course aims at equipping the structural engineers with a basic understanding of the principles and operation of irrigation works and hydroelectric systems which will help them design hydraulic structural systems and water power installations.

**Unit–I**

Necessity for irrigation - Types of irrigation - Duty - Factors affecting duty - Importance - Expressions for duty.

**Unit–II**

Diversion head works - Definition - Weirs - Barrages - Causes of failure - Khoslalas theory – Blighs theory - Factors governing the design of weir or a barrage - Flood banks - Protective works - Retrogression of levels.

**Unit–III**


**Unit–IV**

Distribution Systems - Design and alignment of main canals - Practical selection of canals - Water logging - Alkalinity of soils - Principles of design of drainage canals - Lining of canals - Works for regulation of water levels - Cross drainage and surplus works - Communication works.

**Unit–V**

Water power - History and development in India - General principles - classification - High, low, medium head installations - Components of hydroelectric installations.

**TEXT BOOKS**


REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able to
1) Understand the concepts of irrigation.
2) Identify the different types and methods of irrigation suitable for optimum water management.
3) Plan and design structures for irrigation.
4) Apply irrigation management techniques.

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02PEXXX STRUCTURAL CONCRETE DESIGN - III

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COURSE OBJECTIVES
- To make the students to expose with the design practices of elevated water tanks, deep beams, grid floors, flat slabs, concrete walls.

Unit–I
Design of Elevated square, rectangular and circular shape water tanks with staging – Design includes cover slab; side wall, base slab, columns with staging as per IS 11992: 1995, Reinforcement detailing as per SP 34: 1987.

Unit–II
Unit–III
Design of Ribbed (Voided Slabs), Design of Grid floors - Reinforcement detailing as per SP 34: 1987.

Unit–IV
Design of Flat Slabs using Direct Design Method - Equivalent Frame Method - Reinforcement detailing as per SP 34: 1987.

Unit–V
Design of Concrete Shear Walls - Design of concrete joints - Interior and exterior column beam joints - Reinforcement detailing as per SP 34: 1987.

TEXT BOOKS

REFERENCE BOOKS

STANDARDS
3) SP 34: 1987, Handbook on Concrete Reinforcement And Detailing, Bureau of Indian Standards, New Delhi.
4) IS 3370 (Part IV): 1967, Code Of Practice for Concrete Structures for the Storage of Liquids, Bureau of Indian Standards, New Delhi
5) IS 11992: 1995, Criteria for Design Of RCC Staging For Overhead Water Tanks, Bureau of Indian Standards, New Delhi
6) IS 3370 (PART I): 2009, Concrete Structures for Storage of Liquids, Bureau of Indian Standards New Delhi

COURSE OUTCOMES
At the completion of the course students will be able
1) To design the special structural elements as per relevant IS standards.
2) To design the grid floor and flat slabs as per codal recommendations.
3) To understand the force flow at the joints and design of joints.
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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

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

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COURSE OBJECTIVES
- To develop furtherance of knowledge about advances in concrete technology.
- To introduce concept of mix design for special concretes.
- To develop the principles of special concreting techniques and non destructive testing procedures for concrete structures.

Unit–I
Unit–II

Unit–III

Unit–IV

Unit–V
Scanning Electron Microscopy (SEM) and X-ray microanalysis to examine cement, mortar  concrete - Techniques of SEM and X-ray microanalysis- Simple imaging of fracture surfaces -Advanced techniques using X-ray microanalysis and digital image analysis on polished sections.  X-ray spectra of cement clinker minerals and cement hydration products.  Identify deleterious process in concrete, including alkali-silica reaction and sulphate attack- Interpretation of example images and X-ray spectra of the principal causes of damage to concrete.

TEXT BOOKS
1) Mehta P.K., and Monteiro, P.J.M., Concrete, Microstructure, Properties and Materials, Indian Concrete Institute, Chennai, 2013.
2) Shetty M.S., Concrete Technology, S.Chand&Co. New Delhi, 2007.

REFERENCE BOOKS

COURSE OUTCOMES
At the completion of the course students will be able
1) To understand about various types of special concretes and testing techniques.
2) To understand the principles of special concreting techniques and non destructive testing procedures for concrete structures.
3) To prepare and recommending special concrete using admixtures
4) To understand the behaviour of microstructure of concrete.
MAPPING WITH PROGRAMME OUTCOMES

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COURSE OBJECTIVES

- To study and understand the overall and detailed planning of formwork, plant and site equipment.
- To understand the Design and erection of forms for various elements such as slabs, beams, columns, walls, shells and tunnels.
- To know the latest methods of form construction.

Unit–I
Definition – Economy of formwork and scaffolding – Care of formwork material – Type of form work materials - Allowable stresses in formwork materials – Factors affecting selection of scaffolding and formwork systems – Equipments -.General objectives of formwork building - Planning for safety - Planning for maximum reuse-Scaffold frames.

Unit–II
Qualities of formwork and scaffolding – Types of formwork – Types of scaffolding: Putlog and independent scaffold - Single pole scaffolds - Truss suspended - Gantry and system scaffolds - Stages in formwork and scaffold – Formwork and Scaffold details for different structural members - Maintenance and Cost of formwork, scaffolding– Advantages of formwork and scaffold – Loads on formwork and scaffolds - Forms for foundations, columns, beams walls etc - Formwork hours- Formwork accessories - Formwork elements.

Unit–III
Basic simplification - Beam formulae - Allowable stresses - Deflection, Bending - Lateral stability - Shear, Bearing - Design of Wall forms - Slab forms - Beam forms - Column forms - Slenderness ratio - Allowable load vs. length behaviour in forms - Forms for Footings - Wall footings - Column footings - Sloped footing forms - Strap footing - Stepped footing - Allowable withdrawal load and lateral load -. Various causes of failures - ACI – Design and deficiencies.

Unit–IV
Pressure of concrete on formwork and scaffolding – Lateral pressure of concrete on formwork and scaffolding – Failures of formwork and scaffolding in different structural members- Pressures on formwork - Examples - Vertical loads for design of slab forms - Laterals loads on slabs and walls.
Unit–V

Hemispherical, Parabolic, Translational shells - Forms for Thin Shell roof slabs design considerations - Building the forms - Placing concrete - Form removed - Strength requirements - Tunnel forming components - Curb forms invert forms - Arch forms - Concrete placement methods - Cut and cover construction - Bulk head method - Pressures on tunnels - Continuous Advancing Slope method - Form construction - Shafts - Slip Forms - Principles - Types - advantages - Functions of various components - Planning - Desirable characteristics of concrete - Common problems faced - Safety in slip forms special structures built with slip form Technique.

TEXT BOOKS
2) Safety requirements for scaffolding, American National standards Institute; Broadway; New York.

REFERENCE BOOKS
1) Awad S. Hanna; Concrete formwork systems; Prentice Hall Inc., New Jersy USA 2003.

COURSE OUTCOMES
At the end of the course students will be able
1) To know the detailed planning of framework, design of forms and erection of form work.
2) To select the timbers and wooden planks with quality
3) To have an idea of scaffolding fabrication for different works

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02PEXXX | DESIGN OF LOAD BEARING MASONRY | L | T | P |
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COURSE OBJECTIVES

- Masonry structures need not always be less strong in comparison to structures constructed with other materials.
- If proper principles of analysis and design are scientifically adopted and innovative approach is followed, masonry structures can be as strong and functional as other structures.
- This course deals with the scientific approach to be followed in the design of masonry structures.
Unit–I

Historical development – Classification of masonry construction – Codes and standards – Types of masonry walls – Bricks, Mortar, Grout and Steel reinforcement – Characteristics and Requirements – Loads types and intensities – Basic design data.

Unit–II


Unit–III


Unit–IV


Unit–V

High-rise masonry – Design factors – Reinforcing details – Floor systems – Construction techniques.

TEXT BOOKS


REFERENCE BOOKS


COURSE OUTCOMES

At the end of the course students will be able

1) To understand the scientific approach to be followed in the design of masonry structures.

2) To analyse the application masonry materials and design related to civil engineering problems.

3) To know the testing of masonry structures.
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### COURSE OBJECTIVES

- To prepare students for the challenges of designing, promoting and implementing renewable energy solutions within society’s rapidly-changing energy-related industry cluster.

#### Unit–I

Traditional and modern energy use; Methods of accounting the role of traditional energy in the overall energy system. Energy consumption patterns in rural areas. Trends of rural energy consumption. Need and development of rural energy data bases (REDB); methodologies for building REDB. Case studies of REDB.

#### Unit–II


#### Unit–III

Rural electrification: Overview, current status and future perspectives. Linkages with rural livelihoods, rural industries and social development. Issues of subsidization, last mile access and paying capacity.

#### Unit–IV

Review and critique of various programs of government: National Program for Biogas Development (NPBD), National Program for Improved Cook stoves (NPIC), Village Energy Security Plan (VES), Rajiv Gandhi Grameen Vidyutikaran Yojana (RGVY) etc.

#### Unit–V

Use of efficient/appropriate/renewable energy technologies for rural areas. Technologies/products for cooking, water heating, drying, irrigation pumping, small/micro enterprises, lighting, motive power etc.

### TEXT BOOKS


REFERENCE BOOKS

COURSE OUTCOMES
1) At the end of this course the student is expected to understand what constitutes the renewable energy, how to conserve these resources, what is the role of a human being in using an energy for the future generations.

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COURSE OBJECTIVES
- To make the students conversant with basic principles of water supply engineering, this course covers quantification of water, analysis, sources, conveyance, treatment and distribution of water.

Unit–I
Objectives of public water supply schemes; Health acceptability, adequacy, convenience 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
2) Duggal K.N, Elements of Environmental Engineering, S.Chand & company, New Delhi, 2004

REFERENCE BOOKS
2) ArcadioP.Sincerosr, GregoriaA.Sincero, Environmental Engineering a Design Approach, Prentic Hall, USA, 2002
3) Glynn Henry J & Gary W Heinke, Environmental Science and Engineering, Prentice Hall of India, New Delhi, 2004

COURSE OUTCOMES
At the end of the course students will be able
1) To understand the identification, cost effective collection and distribution of water supply systems.
2) To have a clear idea of basic water treatment and designing water treatment units.

| MAPPING WITH PROGRAMME OUTCOMES |
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COURSE OBJECTIVES

- To achieve an understanding of principles of thermodynamics and to be able to use it in accounting for the bulk behaviour of the simple physical systems.
- To provide in-depth study of thermodynamic principles, thermodynamics of state, basic thermodynamic relations, Principle of Psychrometry & Properties of pure substances.
- To enlighten the basic concepts of vapour power cycles.

Unit–I
Basic concepts - Concept of continuum, macroscopic approach, Thermodynamic systems - Closed, open and isolated. Property, State, Path and Process, Quasi-static process, work, modes of work, Zeroth law of thermodynamics – Concept of temperature and heat. Concept of ideal and real gases. First law of thermodynamics – Application to closed and open systems, internal energy, specific heat capacities, enthalpy, steady flow process with reference to various thermal equipments.

Unit–II
Second law of thermodynamics – Kelvin’s and Clausius statements of second law. Reversibility and irreversibility. Carnot theorem, Carnot cycle, reversed carnot cycle, efficiency, COP. Thermodynamic temperature scale, Clausius inequality, concept of entropy, entropy of ideal gas, principle of increase of entropy – Availability.

Unit–III

Unit–IV
Gas mixtures – Properties ideal and real gases, equation state, Avagadro’s Law, Vander Waal’s equation of state, Compressability factor, compressability chart – Dalton’s law of partial pressure, exact differentials, T-D relations, Maxwell’s relations, Clausius Clapeyron equations, Joule–Thomson coefficient.

Unit–V

(Use of standard thermodynamic tables, Mollier diagram, Psychometric chart and Refrigerant property tables are permitted)
TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the end of the course students will be able
1) To gain knowledge on the basic thermo dynamic principles and its applications.

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COURSE OBJECTIVES
- To develop an understanding of the behavior and design study of Steel concrete composite elements and structures.

Unit–I
Introduction to composite construction – Basic concepts – Types of composite materials - Application of composite construction in Civil Infrastructure – Durability – Physical and Mechanical properties of composite structures – Influence of moisture at consistent level in composite structure – Construction of composite structures.

Unit–II

Unit–III
Introduction – Combustion of Polymer Composites – Fire reaction properties of Polymer Composites – Fire resistant Polymer Composites – Structural properties of
Polymer Composites in Fire – Fire protection coatings – Predictive Modelling of Fatigue – Descriptive Modelling of Fatigue.

Unit–IV


Unit–V


TEXT BOOKS

REFERENCE BOOKS
3) Vistasp M. Karbhari, Durability of composites for civil structure applications, woodhead publishing, 2012.
4) Lawrance C. Bank, Composite Construction, John Weiley sons & inc, USA, 2006

COURSE OUTCOMES
At the end of the course students will be able
1) To gain knowledge on the composites and its applications.
2) To gain knowledge on the polymers, chemicals, resins, adhesives and its applications.
3) To make the composite sections depends on the purpose with different materials.

| MAPPING WITH PROGRAMME OUTCOMES |
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| CO2  | ✓    | ✓    |      |      |      |      |      |      |      |
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COURSE OBJECTIVES

- Bridge engineering is a specialized area in structural engineering practice. In this course, the students are taught the IRC loading standards and analysis and design of different types of bridges.

Unit–I

Unit–II
Pipe culverts - General features - Classification - Analysis and design of Pipe Culvert. Box culverts – General features - Analysis and design of Box culverts as per IRC: 6-2014 and IRC 21: 2000.

Unit–III

Unit–IV

Unit–V

TEXT BOOKS

REFERENCE BOOKS

STANDARDS:
2) IS 13920: 1993, Ductile Detailing of Reinforced Concrete Structures Subjected to Seismic Forces - Code of Practice
3) SP 34: 1987, Handbook on Concrete Reinforcement And Detailing.
4) IRC: 6-2014, Standard Specifications and Code of Practice for Road Bridges Section: II (Loads And Stresses).
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
1) To understand the behaviour of bridge structures.
2) To gain knowledge about the rudimentary principles of designing the bridges as per the existing codes.
3) To understand the Codal recommendations for a bridge design.

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COURSE OBJECTIVES
- To make the students to understand Earthquake and Wind excitations are two major dynamic loadings to be considered for many modern civil engineering structures.
- To understand the seismic loadings 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 Resistance design- Strength and Stiffness, Ductility Design and Detailing (IS13920: 1993), 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


**STANDARDS**


**COURSE OUTCOMES**

At the completion of the course students will be able

1) To design the earthquake resistance structures.

2) To understand the behaviour of structure during earthquake.

3) To recommend the materials used for construction in the earthquake prone areas.

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COURSE OBJECTIVES

- This course provides advanced experimental measurements of strains and deformations in structural elements.
- This course is fundamental to all researchers in structural engineering.

Unit–I


Strain Rosette analysis, Wheatstone bridge and potentiometer circuits for static and dynamic strain measurements, strain indicators.

Unit–II


Unit–III


Unit–IV


Unit–V

Diagnosis of distress in structures – Crack observation and measurements – Corrosion of reinforcement in concrete – Half cell, construction and use – Damage assessment – Controlled blasting for demolition.

TEXT BOOKS


REFERENCE BOOKS


**COURSE OUTCOMES**

At the end of the course students will be able.

1) To know about measurement of strain and vibrations.

2) To analyse the structure by non-destructive testing methods.

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**COURSE OBJECTIVES**

- To understand the concepts of designing bridges deck slab, concrete Pipes, bunkers and silos and chimneys with relevant codal standards.

**Unit–I**


**Unit–II**

Machine Foundations - Types - General Requirements - Design Parameters - Design Criteria and Codal Provisions for Reciprocating and Rotary Type Machines as per IS 2974 (Part I to IV).

**Unit–III**

Design of prestressed bridges for Buried Concrete Pipes to Carry Water and Gas as per relevant codes – Design of Post tensioned Concrete slabs - Design of Post tensioned Concrete T section Girders as per IS 1343:2012.

**Unit–IV**


**Unit–V**

Design of concrete Chimneys as per IS 4998(Part I):1992 - Stresses in chimneys - Reinforcement detailing as per relevant codes.

**TEXT BOOKS**


REFERENCE BOOKS

STANDARDS:
3) SP 34: 1987, Handbook on Concrete Reinforcement And Detailing, Bureau of Indian Standards, New Delhi.
13) IS 9178 (Part II) :1979, Criteria for Design of Steel Bins for Storage of Bulk Materials (Design Criteria), Bureau of Indian Standards, New Delhi.
14) IS 5503 (Part I) :1969, General Requirements for Silos for grain storage
(Construction requirements), Bureau of Indian Standards, New Delhi
Bureau of Indian Standards, New Delhi.

COURSE OUTCOMES
At the end of the course students will be able
1) To design the bridges deck slab as per Indian Standards.
2) To design concrete Pipes as per the codal provisions.
3) To design bunkers, silos and chimneys with relevant IS standards.

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PROFESSIONAL ELECTIVE LABORATORIES

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COURSE OBJECTIVES
To understand the properties of fluids and fluid statics, methods for
determination of co-efficient of discharged are to be explained and computed
practically.
To study of the characteristic features of pumps and turbines using
experiments in envisaged.
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 Mouth Piece
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 Pipe
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)
14) Study on Flow through Open Channel (Demo Only)

REFERENCE BOOKS

COURSE OUTCOMES
At the completion of this course, a student will be able to
1) Determine the properties of fluids, pressure and their measurements
2) Measure flow in pipes and determine frictional losses
3) Compute forces on immersed plane and curved plates applying continuity equation and energy equation in solving problems on flow through conduits
4) Develop Characteristics of pumps and turbines

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<th>MAPING WITH PROGRAMME OUTCOMES</th>
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01EP609 TRANSPORTATION ENGINEERING LABORATORY

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

LIST OF EXPERIMENTS
1) To determine the Flakiness Index and Elongation Index of Coarse Aggregates
2) To Determine the Impact Value of Coarse Aggregates.
3) To Determine the Crushing Value of Coarse Aggregates.
4) To determine the Abrasion Value of Coarse Aggregates.
5) To determine the fineness modulus and grading curve of coarse aggregates.
6) To Determine the Flash and Fire point of Bitumen
7) To determine the viscosity of Bitumen.
8) To determine the penetration Value of Bitumen.
9) To determine the Softening Point of Bituminous material.
10) To determine the Ductility Value of Bituminous material.
11) To determine the Flash and Fire Point of Bituminous material.
12) To determine the Marshal Stability Value of Bituminous mixture.
REFERENCE BOOKS

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

1) Gain knowledge about the mechanical properties of materials such as Coarse Aggregate, concrete and bitumen.
2) Check the aggregates quality used for the roads
3) Suggest and advice on the material selection and its purpose.

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02EPXXX | COMPUTER PRACTICAL IV | L | T | P |
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COURSE OBJECTIVES
- This course trains the students to carry out basic build frame analysis for symmetrical and un-symmetrical building frames.

LIST OF EXERCISES
Introduction to STADD PRO and ETABs Software
Plate 1. Analysis of Symmetrical Building Frames (Gravity Load Only) using STADD PRO Software.
Plate 2. Analysis of Symmetrical Building Frames (Wind Load Only) using STADD PRO Software.
Plate 3. Analysis of Symmetrical Building Frames (Earthquake Load Only) using STADD PRO Software.
Plate 4. Analysis of Un-Symmetrical Building Frames (Gravity Load Only) using STADD PRO Software.
Plate 5. Analysis of Un-Symmetrical Building Frames (Wind Load Only) using STADD PRO Software.
Plate 6. Analysis of Un-Symmetrical Building Frames (Earthquake Load Only) using STADD PRO Software.
Plate 7. Analysis of Symmetrical Building Frames (Gravity Load Only) using ETABs Software.
Plate 8. Analysis of Symmetrical Building Frames (Wind Load Only) using ETABs Software.
Plate 9. Analysis of Symmetrical Building Frames (Earthquake Load Only) using ETABs Software.
Plate 10. Analysis of Un-Symmetrical Building Frames (Gravity Load Only) using ETABs Software.
Plate 11. Analysis of Un-Symmetrical Building Frames (Wind Load Only) using ETABs Software.
Plate 12. Analysis of Un-Symmetrical Building Frames (Earthquake Load Only) using ETABs Software.

REFERENCE BOOKS
1) STADD PRO and ETABs Software Working Manuals.

COURSE OUTCOMES
At the completion of the course the student will be able to understand
1) The basic structural analysis of both symmetrical and un-symmetrical frames.
2) Modelling, analysis and design using STAADPro.
3) Modelling, analysis and design using ETABS.

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</table>
COURSE OBJECTIVES

- To learn the analysis of structures with a versatile technique finite element methods which can accommodate variations in material and engineering properties and can tackle multilayered systems and non linearity with ease.

Unit–I


Unit–II

Finite Element types – Displacement Function - Natural Coordinates – Shape Functions – Shape functions for truss elements in local and global coordinates - Shape function for beam and frame elements, Triangular elements (CST and LST elements), Rectilinear Iso-parametric elements, Solid elements.

Unit–III

Element stiffness formulation for truss elements in local and global coordinates, beams, CST elements, Load vectors for gravity, surface and body forces.

Unit–IV

Numerical Integration for evaluation of element stiffness – Load vectors- Computation of stresses. Use of Static Condensation Techniques, Axi-symmetric elements, Sub-structuring, Plate bending and shell elements.

Unit–V

Pre and Post Processing – Modelling techniques – Complete algorithms with flow chart for solving FEM problems - Solution Techniques – Linear analysis-Non-linear analysis both material and geometric non-linearity Use of Finite element software packages such as ANSYS, SAP 2000N, STAAD Pro, ETABS, ABAQUS, MSC/NASTRAN, etc.

TEXT BOOKS


REFERENCE BOOKS


COURSE OUTCOMES
At the completion of the course students attains
1) The knowledge of solving physical problems using finite element softwares.
2) To develop computer coding for any structural problem and creating software packages.

<table>
<thead>
<tr>
<th>02OE</th>
<th>TALL BUILDINGS</th>
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COURSE OBJECTIVES
- To understand the concept of different structural systems used for tall structures.
- To understand the types and principles of analysis and design of tall structures.

Unit–I

Structural and non-structural systems – Structural system idealisations - Floor slab systems (wall supported slab system, Beam supported slab system, Ribbed slab system, Flat slab system). Vertical framing system (Columns, concrete walls, transfer girders, Suspenders) – Composite floor systems

Modelling for gravity and lateral loads – Assumptions – Modelling for approximate analyses – Modelling for accurate analysis.

Unit–II
Lateral load resisting systems – Behaviour of Rigid frames, Behaviour of Braced Rigid frames, Behaviour of shear wall with Rigid frames, Behaviour of framed-tubes, Behaviour of tube in tube, Behaviour of bundled tubes – Behaviour of In-filled frame structures

Unit–III
Analysis and design concepts of Rigid frames, Rigid frames with bracings, Rigid frames with shear walls, framed-tubes, tube in tube and bundled tubes.

Unit–IV

Unit–V
Importance of dynamic analysis as per IS 875(Part 3) and IS 1893(Part 1): 2002 – Methods of analyses as per code – How to minimise dynamic effect –

**TEXT BOOKS**

**REFERENCE BOOKS**

**STANDARDS**
3) SP:64 (S&T)-2001 Design Loads (other than earthquake) for Buildings and Structures, Bureau of Indian Standards, New Delhi.

**COURSE OUTCOMES**
At the completion of the course students will be able
1) To gain the knowledge about the behaviour of tall buildings subjected to lateral loads and their stability.
2) To design the tall buildings as per the existing codes.

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<tr>
<th>02OEXXX</th>
<th>CONSTRUCTION TECHNIQUES AND MANAGEMENT</th>
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**COURSE OBJECTIVES**
- To introduce the concept of Construction management, use of Construction Techniques for civil engineering activities and the implementation in construction site.
- To study about the project management system for planning, monitoring and controlling of the projects.

**Unit–I**

**Unit–II**
Launching girders, bridge decks, off shore platforms – Special forms for shells – Techniques for heavy decks – In-situ pre-stressing in high rise structures,
Material handling – Erecting light weight components on tall structures – Support structure for heavy equipment and conveyors – Erection of articulated structures, braced domes and space decks.

Unit–III
Selection of equipment for earth work - Earth moving operations - Types of earthwork equipment - Tractors, motor graders, scrapers, front end waders, earth movers – Equipment for foundation and pile driving. Equipment for compaction, batching and mixing and concreting - Equipment for material handling and erection of structures - Equipment for dredging, trenching, tunnelling.

Unit–IV

Unit–V

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
At the completion of the course students will be able
1) To understand the project control and construction management.
2) To gain knowledge about the CPM and PERT.
3) To gain the practical knowledge of construction process and techniques.
- COURSE OBJECTIVES
  - To understand the mechanism of deterioration of concrete, damage assessment, repair materials and rehabilitation techniques.

**Unit–I**

**Unit–II**

**Unit–III**

**Unit–IV**

**Unit–V**

**TEXT BOOKS**

**REFERENCE BOOKS**

**COURSE OUTCOMES**
- At the completion of the course students will be able
  1) To understand about the damages, damage assessments, repair materials and rehabilitation of concrete structures.
  2) Perfectly analyze the damage by testing methods, suggestion and recommendations for different damages.
COURSE OBJECTIVES

- This course teaches the advancement in the subsoil stabilization in a modern approach.
- the real problem, methods of improvement over such problems and the methodology are dealt.

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
Earth reinforcement - concept - Types of reinforcing materials - Application of reinforced earth – Geo-textiles in filtration drainage - Separation and road works.

Unit–V

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
1) At the end of this course the student should have an understanding on the behaviour of ground improvement techniques. The students should have knowledge about the rudimentary principles of designing ground piles as per the existing codes.
INTRODUCTION TO SOIL DYNAMICS AND MACHINE FOUNDATIONS

COURSE OBJECTIVES

- Structures subjected to dynamic loads in turn affect the foundations and the soil below.
- Hence knowledge of dynamic behaviour of soils and foundations will go a long way in the design of structural systems subjected to dynamic loads.
- This course deals with the principles of analysis and design of foundations subjected to dynamic loads.

Unit–I


Unit–II


Unit–III

Machine foundations - Types - General requirements - Design parameters - Design criteria and Codal provisions for reciprocating and rotary type machines

Unit–IV

General requirements - Design parameters - Design criteria for impact type machines Codal provisions - Constructional details of machine foundations.

Unit–V

Vibration isolation - Passive and Active isolation - Mechanical isolation - Foundation isolation - Isolation by locations and barriers.

TEXT BOOKS


REFERENCE BOOKS


COURSE OUTCOMES

1) At the end of this course the student should have an understanding on the behaviour of dynamic behaviour of soils and foundations. The students should have knowledge about the rudimentary principles of Vibration isolation.
COURSE OBJECTIVES

- In the design of intelligent and smart structures, use of artificial intelligence techniques becomes an integral part of structural design. This course is an introductory course to the principles and applications of artificial intelligence in structural engineering.

Unit–I

Definition - The AI problems - Assumptions - AI techniques - Defining a problem as a state space search - Production systems - Problem characteristics - Production system characteristics.

Heuristic search techniques - Hill climbing - Best-First search - Branch and Bound Search - Problem reduction - Constraint satisfaction - Means - Ends analysis.

Unit–II


Unit–III


Unit–IV

Overview of planning - An example domain; The blocks world - Components of a planning system - Goal stack planning.

Introduction to learning - Rote learning - Learning by taking advice - Learning in problem solving - Learning by parameter adjustment - Learning with macro operators - Learning from examples - Introduction - Winstons learning program.


Unit–V

TEXT BOOKS
3) REFERENCE BOOKS

COURSE OUTCOMES
1) Student can design of intelligent and smart structures, use of artificial intelligence techniques.

<table>
<thead>
<tr>
<th>02OEXXX</th>
<th>THEORY OF ELASTICITY AND PLASTICITY</th>
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COURSE OBJECTIVES

- This course helps the students to understand the elastic and plastic behaviours of engineering materials and to evaluate stresses and strains developed in materials more exactly.

Unit–I

Basic equations - Stress and strain at a point - Generalized Hooke’s law - Plane stress and plane strain - Equilibrium conditions - Compatibility conditions. Two-dimensional problems in Cartesian Co-ordinates - Airys stress function.

Unit–II


Unit–III


Unit–IV

Unit–V


TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
1) At the end of this course, students can able to understand the elastic and plastic behaviours of engineering materials.

<table>
<thead>
<tr>
<th>COURSE OBJECTIVES</th>
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<tbody>
<tr>
<td>To study the various types of construction contracts and their legal aspects and provisions. To study the tenders, arbitration, legal requirement, and labour regulations.</td>
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</table>

Unit–I : Construction Contracts


Unit–II : Tenders


Unit–III : Arbitration


Unit–IV : Legal Requirements


Unit–V : LABOUR REGULATIONS

REFERENCE BOOKS

COURSE OUTCOMES
1) At the end of this course the student should have an understanding of the construction bylaw, Basic regulations to be followed in constructions.

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<thead>
<tr>
<th>02OEXXX</th>
<th>DESIGN OF PLATES AND SHELLS</th>
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COURSE OBJECTIVES
- This course provides a brief introduction to the analysis of folded plates and knowledge about the formation and classification of shell structures. Preliminary design is also included.

Unit–I
Introduction to plate structures - Thin and thick plates - Structural action of plates - Assumptions involved in plate theories - Differential equation for cylindrical bending of plates - Cylindrical bending of uniformly loaded rectangular plates with simply supported and built-in edges - Small deflection theory of laterally loaded rectangular plates - Kirchoffs boundary conditions - Corner effects

Unit–II
Simply supported rectangular plates under Sinusoidal load - Navier solution - Levys method - Symmetrical bending of laterally loaded circular plates - Circular plates with simply supported and built-in edges - Bending of annular plates.

Unit–III
Introduction to shell structures - Classification of shells - Membrane action - Stressed shell element and stress resultants - Load transfer mechanism - Characteristics of shell surfaces - Structural behaviour of shells - Membrane theory of cylindrical shells

Unit–IV
Bending theory of circular cylindrical shells - Comparison of various bending theories - Introduction to other types of shells.

Unit–V
Necessary design inputs - Detailed design - Prismatic folded plates - Circular cylindrical barrel shell roofs - Spherical dome - Conical dome - HYPAR shell - Helicoids.

TEXT BOOKS

REFERENCE BOOKS
4) 64 Bairagi N.K, Shell Analysis, Khanna Publishers, Delhi, 1986.

COURSE OUTCOMES
1) At the end of this course the student should have an understanding on the behaviour of thin and thick plates. The students should have knowledge about the rudimentary principles of designing to shell structures.

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<tr>
<th>000EXXX</th>
<th>ECONOMICS AND FINANCE FOR CIVIL ENGINEERS</th>
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COURSE OBJECTIVES
- Business acumen and a deep insight in economics are imminent to be successful in civil engineering practice. This course teaches 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 - Construction workers – Urban problems - Poverty - Migration - Unemployment - Pollution.

Unit–III

Unit–IV
Accounting method - General - Cash basis of accounting - Accrual basis of accounting - Percentage completion method - Completed contract method - Accounting for tax reporting purposes and financial reporting purposes.
Unit–V

Lending to contractors - Loans to contractors - Interim construction financing - Security and Risk aspects - Principles of BOT - Relevance of BOT in the Indian context.

TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
1) At the end of this course the student should have an understanding the basics of economics, finance and accounting necessary for a civil engineering enterprise.

<table>
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<tr>
<th>02OE XXX</th>
<th>SERVICES IN HIGH RISE BUILDINGS</th>
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COURSE OBJECTIVES

- High rise buildings are a pleasure to watch, but they are made a pleasure to live in only when the functional requirements are adequately provided through proper ventilation, sanitation and water supply in addition to safety measures during calamities like fire.
- This course covers the principles and practices to be followed in the provision of good service systems.

Unit–I

Planning of building services - Important considerations - Floor loadings - Building cost – Material requirements.

Unit–II

Water supply services - Collection and examination of water samples - Standards - Internal storage and distribution - Bulk water supply - Water treatment - Selection of pumps - Pump rooms and sump.

Unit–III

Sanitation services - Sewage collection and disposal - Storm water drains - Sewage disposal - Septic tanks - Solid waste disposal - Refuse disposal systems.

Unit–IV

Lift and Escalators - Types - Selection - Codes and Rules - Structural provisions – Strength considerations - Pits and overheads - Safety precautions.

Unit–V


TEXT BOOKS
COURSE OUTCOMES

1) At the end of this course the student should have an understanding the functional requirements are adequately provided through proper ventilation, sanitation and water supply in addition to safety measures, the principles and practices to be followed in the provision of good service systems.

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<th>02OEXXX</th>
<th>DISASTER RESISTANT DESIGN OF STRUCTURES</th>
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COURSE OBJECTIVES

- This course aims in understanding the concept of designing structures to withstand disaster.

Unit–I


Unit–II


Types – Design of Shear walls as per IS: 13920 – Detailing of reinforcements.

Unit–III


Unit–IV


Unit–V

Blast resistant design of structures – Introduction – Blast force on structures – Response of structures to blast loading – Loads – Stresses – Planning for blast

TEXT BOOKS
1) Jaikrishna & Chandrasekar, Elements of Earthquake Engineering.

REFERENCE BOOKS

COURSE OUTCOMES
1) The students can able to design a proper disaster resistant design of structures.

<table>
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<tr>
<th>01OE XXX</th>
<th>WASTE WATER ENGINEERING</th>
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COURSE OBJECTIVES

- The objectives of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena for successful design, operation and maintenance of sewage treatment plants.

Unit–I


Unit–II


Unit–III

Objectives – Selection of Treatment Methods – Principles, Functions, - Activated Sludge Process and Trickling filter- other treatment methods – Oxidation ditches, UASB – Waste Stabilization Ponds – Reclamation and Reuse of sewage -
Recent Advances in Sewage Treatment – Construction, Operation and Maintenance aspects.

Unit IV


Unit V


TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
1) At the end of this course the student should have an understanding on the ability to apply basic understanding of physical, chemical, and biological phenomena for successful design, operation and maintenance of sewage treatment plants.

<table>
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<tr>
<th>SOLID WASTE MANAGEMENT</th>
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COURSE OBJECTIVES
- To make the students conversant with different aspects of the types, sources, generation, storage, collection, transport, processing and disposal of municipal solid waste.

Unit I

Sources and types of municipal solid wastes-waste generation rates-factors affecting generation, characteristics-methods of sampling and characterization; Effects of improper disposal of solid wastes-Public health and environmental effects. Elements of solid waste management –Social and Financial aspects – Municipal solid waste (M&H) rules – integrated management-Public awareness; Role of NGO’s.

Unit II

On-site storage methods – Effect of storage, materials used for containers – segregation of solid wastes – Public health and economic aspects of open storage –
waste segregation and storage – case studies under Indian conditions – source reduction of waste – Reduction, Reuse and Recycling.

Unit–III

Methods of Residential and commercial waste collection – Collection vehicles – Manpower – Collection routes – Analysis of collection systems; Transfer stations – Selection of location, operation & maintenance; options under Indian conditions – Field problems- solving.

Unit–IV

Objectives of waste processing – Physical Processing techniques and Equipments; Resource recovery from solid waste composting and biomethanation; Thermal processing options – case studies under Indian conditions.

Unit–V

Land disposal of solid waste; Sanitary landfills – site selection, design and operation of sanitary landfills – Landfill liners – Management of leachate and landfill gas- Landfill bioreactor – Dumpsite Rehabilitation

TEXT BOOKS


REFERENCE BOOKS


COURSE OUTCOMES

1) At the end of this course the student should have an understanding on the different aspects of the types, sources, generation, storage, collection, transport, processing and disposal of municipal solid waste.

<table>
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<tr>
<th>02OEXXX</th>
<th>SMART MATERIALS AND SMART STRUCTURES</th>
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COURSE OBJECTIVES

- Overview of smart materials, Piezoelectric Ceramics, Piezo-polymers, Magnetostrictive Materials, Electro active Polymers, Shape Memory Alloys, Electro and Magneto Rheological Fluids, Modelling of smart materials, introduction to composite smart materials, Mechanics of smart composite materials, Smart sensors based on high bandwidth low strain smart materials, Low-bandwidth high strain smart actuators, Micro-electro mechanical Smart Systems, Intelligent devices based on smart materials, Applications of Smart Actuators: Active and Hybrid Vibration Control, Active Shape Control, Distributed Sensing and Control of Smart Beams.
Unit–I

Unit–II
Piezoelectric Strain Sensors, In-plane and Out-of Plane Sensing, Shear Sensing, Accelerometers, Effect of Electrode Pattern, Active Fibre Sensing, Magnetostrictive Sensing, Villari Effect, Matteuci Effect and Nagoka-Honda Effect, Magnetic Delay Line Sensing, Application of Smart Sensors for Structural Health Monitoring (SHM), System Identification using Smart Sensors.

Unit–III

Unit–IV
Review of Composite Materials, Micro and Macro-mechanics, Modelling Laminated Composites based on Classical Laminated Plate Theory, Effect of Shear Deformation, Dynamics of Smart Composite Beam, Governing Equation of Motion, and Finite Element Modelling of Smart Composite Beams.

Unit–V

TEXT BOOKS:
2) Gauenzi, P, *Smart Structures*, Wiley, New Delhi, 2009

REFERENCE BOOKS

COURSE OUTCOMES
1) At the end of this course the student should have an understanding on the Modelling of smart materials, introduction to composite smart materials, Mechanics of smart composite materials.

<table>
<thead>
<tr>
<th>COURSE OBJECTIVES</th>
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<tr>
<td>To introduce the basic concepts of remote sensing.</td>
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<tr>
<td>To learn the fundamentals of photogrammetry and image interpretation.</td>
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<tr>
<td>To understand the techniques involved in cartography and GPS.</td>
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<tr>
<td>To impart knowledge on applications of RS and GIS in resource mapping.</td>
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</tbody>
</table>
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.
3) Understand GIS, its structure, quality and standards.
4) Get exposure to several applications of RS and GIS in the various fields of Civil engineering especially resource mapping.

<table>
<thead>
<tr>
<th>01OEXXX</th>
<th>URBAN AND RURAL PLANNING</th>
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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 neighbourhood 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.
3) Plan and analyze socio-economic aspects of Urban and rural planning.
4) Understand functions of local authority with a clear idea of control rules.

<table>
<thead>
<tr>
<th>06OEXXX</th>
<th>DIGITAL SIGNAL PROCESSING</th>
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COURSE OBJECTIVES
- It helps the student to understand the basics of signals and its processing
- Identify the problems in digital signals and make solutions

UNIT–I

UNIT–II

UNIT–III

UNIT–IV
FIR filters - Design criteria – Minimizing design criteria (Fourier design technique), Lengths of the filter- Windowing: window responses – Periodic

Unit-V


TEXT BOOKS

REFERENCE BOOKS

COURSE OUTCOMES
1) Student can able to identify the problems and can solve problems of digital signals and its processing.

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<th>08OEXXX</th>
<th>COMPUTER NETWORKS</th>
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COURSE OBJECTIVES
- To study about Wireless transmission basics and Protocols.
- To explore issues and challenges in designing MAC and TCP Protocols in the context of wireless networks
- To know about Wireless LAN and advanced network architectures.
- To make the students to understand the importance and goals of communication network and information security and introduce him to the different types of attacks.
Unit I


Unit II


Unit III


Unit IV


Unit V

REFERENCE BOOKS

COURSE OUTCOMES
At the end of this course a student can
1) Understand Wireless transmission basics and Protocols.
2) Design MAC and TCP Protocols in the context of wireless networks
3) Understand the importance and goals of communication network and information security and introduce him to the different types of attacks.

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<th>07OEXXX</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.

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<th>02OEXXX</th>
<th>DISASTER MANAGEMENT</th>
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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
Introduction – Disaster- Characteristics and types of Disasters- Causes and effects of Disaster -Risk- Vulnerability – Preparedness- Disaster mitigation and disaster management- Classification of mitigation measures-Vulnerability Analysis- Observation and Perception of Vulnerability- Socio-Economic Factors of Vulnerability- Vulnerability in India- Disaster related policy goals of UNDP UNDRO and Govt. of India- Appraising disaster needs- Needs for technical expertise- Role of various Agencies in Disaster Management and Development -Disaster risk reduction planning- Role of Developmental Planning for disaster Management

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

Tsunamis- Causes of a Tsunami- General Characteristics- Tsunami warning system-Distribution pattern of Tsunami in India- Possible risk reduction measures- Integrated coastal zone management.


Unit–IV

Tropical cyclones- Structure of tropical cyclones- Nature of tropical cyclones- Cyclone experience in India and Tamilnadu- Preparedness- Tropical cyclones and their warning systems- Tropical cyclone warning strategy in India special nature of the problem in the region- Classification- Protection of buildings from cyclones of India- Precautions during and before cyclones.

Unit–V

Coastal floods- Intensification of hazards due to human interference- Management-River and coastal floods- Temperature extremes and wild fires- Physiological hazards- Flood forecasting-mitigation- planning- management- flood prone areas the Indian scenario- Flood experience in India and Tamilnadu.

Environmental hazards- Typology- Assessment and response- Strategies -The scale of disaster-Vulnerability- Disaster trends- Paradigms towards a balanced view- Chemical hazards and toxicology-Biological hazards- Risk analysis- Other technological disasters.

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.
COURSE OBJECTIVES

- Develop an entrepreneurship spirit
- 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) “Creativity, innovation, entrepreneurship and enterprise in construction and development”, University of Reading, Alan Barrell – Entrepreneur in Residence Entrepreneur in Residence, University of Xiamen, Xiamen 2012.
COURSE OUTCOMES

1) At the end of this course the student should have an understanding about entrepreneurship. The students should have knowledge about the principles of business Plan.

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<th>02OEXXX</th>
<th>NATIONAL SERVICE SCHEME (N.S.S.)</th>
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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. C)Advisory committee and their functions with special reference to college principal,
d. 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

b. Training Programme on National Programme scheme, TISS.  
c. Orientation Courses for N.S.S. Programme officers, TISS.  
d. Case material as Training Aid for field workers, Gurmeet Hans.  
e. Social service opportunities in Hospitals, KapilK.Krishan, TISS.  
f. Social Problems in India, Ram Ahuja.

COURSE OUTCOMES

At the end of the course a student can
1) Able to identify the problems and know how to solve according to their needs  
2) Develop capacity to meet emergencies and natural disasters  
3) Practice national integration and social harmony and  
4) Utilize their knowledge in finding practical solutions to individual and community problems

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<th>02OEXXXX</th>
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COURSE OBJECTIVES

- At the end of this course the student is expected to understand what is human rights, how to obey the rights, what is the role of a human being in making a good society for the future generations.

Unit-I


Unit-II


Unit-III


Unit-IV


Unit-V


**REFERENCE BOOKS**

2) Human Rights, Questions and Answers, UNESCO, 1982
3) Mausice Cranston- What is Human Rights
4) Desai, A.R. - Violation of Democratic Rights in India
5) Pandey - Constitutional Law.
7) Human Rights, A Selected Bibliography, USIS.
8) Johari J.C - Human Rights and New World Order.
9) Bajwa G.S- Human Rights in India.
12) Cheous K (Ed) - Social Justice and Human Rights (Vols 1-7).
13) Devasia, V.V. - Human Rights and Victimology.

**COURSE OUTCOMES**

1) After completing the course the student can understand the human rights, and know the role of a human being in making a good society for the future generations.

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