REGULATIONS, CURRICULUM AND SYLLABUS

for

B. TECH

CIVIL ENGINEERING

(w.e.f. 2009-2010)

PONDICHERRY UNIVERSITY
PONDICHERRY-605 014
1. **Conditions for Admission:**

(a) Candidates for admission to the first semester of the 8 semester B.Tech Degree programme should be required to have passed:

The Higher Secondary Examination of the (10+2) curriculum (Academic Stream) prescribed by the Government of Tamil Nadu or any other examination equivalent there to with minimum of 45% marks (a mere pass for OBC and SC/ST candidates) in aggregate of subjects – Mathematics, Physics and any one of the following optional subjects: Chemistry / Biotechnology/ Computer Science / Biology (Botany & Zoology) or an Examination of any University or Authority recognized by the Executive Council of the Pondicherry University as equivalent thereto.

(b) For Lateral entry in to third semester of the eight semester B.Tech programme:

The minimum qualification for admission is a pass in three year diploma or four year sandwich diploma course in engineering / technology with a minimum of 60 % marks ( 50% marks for OBC and a mere pass for SC/ST candidates) in aggregate in the subjects covered from 3rd to final semester or a pass in any B.Sc. course with mathematics as one of the subjects of study with a minimum of 60 % marks ( 50% marks for OBC and a mere pass for SC/ST candidates) in aggregate in main and ancillary subjects excluding language subjects. The list of diploma programs approved for admission for each of the degree programs is given in Annexure A.

2. **Age Limit:**

The candidate should not have completed 21 years of age as on 1st July of the academic year under consideration. For Lateral Entry admission to second year of degree programme, candidates should not have completed 24 years as on 1st July of the academic year under consideration. In the case of SC/ST candidates, the age limit is relaxable by 3 years for both the cases.

3. **Duration of Programme:**

The Bachelor of Technology degree programme shall extend over a period of 8 consecutive semesters spread over 4 academic years – two semesters.
4. **Eligibility for the award of Degree:**

No candidate shall be eligible for the award of the degree of Bachelor of Technology, unless he/she has undergone the course for a period of 8 semesters (4 academic years) / 6 semesters (3 academic years for Lateral Entry candidates) in the faculty of Engineering and has passed the prescribed examinations in all the semesters.

5. **Branches of Study:**

- Branch I - Civil Engineering
- Branch II - Mechanical Engineering
- Branch III - Electronics & Communication Engineering
- Branch IV - Computer Science & Engineering
- Branch V - Electrical & Electronics Engineering
- Branch VI - Chemical Engineering
- Branch VII - Electronics & Instrumentation Engineering
- Branch VIII - Information Technology
- Branch IX - Instrumentation & Control Engineering
- Branch X - Biomedical Engineering

or any other branches of study as and when offered. The branch allocation shall be ordinarily done at the time of admission of the candidate to the first semester.

6. **Subjects of Study:**

The subjects of study shall include theory and practical courses as given in the curriculum and shall be in accordance with the prescribed syllabus. The subjects of study for the first two semesters shall be common for all branches of study.

7. **Examinations:**

The theory and practical examinations shall comprise continuous assessment throughout the semester in all subjects as well as university examinations conducted by Pondicherry University at the end of the semester (November / December or April / May).

(a) Theory courses for which there is a written paper of 75 marks in the university examination.

The Internal Assessment marks of 25 has to be distributed as 10 marks each for two class tests and 5 marks for class attendance in the particular subject. The distribution of marks for attendance is as follows.

- 5 marks for 95% and above
- 4 marks for 90% and above but below 95%
3 marks for 85% and above but below 90%
2 marks for 80% and above but below 85%
1 mark for 75% and above but below 80%

In total, three tests are to be conducted and the better two are to be considered for assessment.

(b) Practical courses for which there is a university practical examination of 50 marks:
The internal assessment marks of 50 has to be distributed as 20 marks for the periodic practical works and records submitted thereof, 15 marks for an internal practical examination, 5 marks for an internal viva voce, and 10 marks for class attendance in the particular subject. The distribution of marks is as given below.

   10 marks for 95% and above
   8 marks for 90% and above but below 95%
   6 marks for 85% and above but below 90%
   4 marks for 80% and above but below 85%
   2 marks for 75% and above but below 80%

8. Requirement for appearing for University Examination:

A candidate shall be permitted to appear for university examinations at the end of any semester only if:

(i) He / She secures not less than 75% overall attendance arrived at by taking into account the total number of periods in all subjects put together offered by the institution for the semester under consideration.

   (Candidates who secure overall attendance greater than 60% and less than 75% have to pay a condonation fee as prescribed by University along with a medical certificate obtained from a medical officer not below the rank of Asst. Director)

(ii) He / She earns a progress certificate from the Head of the institution for having satisfactorily completed the course of study in all the subjects pertaining to that semester.

(iii) His / Her conduct is found to be satisfactory as certified by the Head of the institution.

A candidate who has satisfied the requirement (i) to (iii) shall be deemed to have satisfied the course requirements for the semester.

9. Procedure for completing the course:

A candidate can join the course of study of any semester only at the time of its normal commencement and only if he/she has satisfied the course...
requirements for the previous semester and further has registered for the university examinations of the previous semester in all the subjects as well as all arrear subjects if any.

However, the entire course should be completed within 14 consecutive semesters (12 consecutive semesters for students admitted under lateral entry).

10. Passing Minimum:

(i) A candidate shall be declared to have passed the examination in a subject of study only if he/she secures not less than 50% of the total marks (Internal Assessment plus University examination marks) and not less than 40% of the marks in University examination.

(ii) A candidate who has been declared “Failed” in a particular subject may reappear for that subject during the subsequent semesters and secure a pass. However, there is a provision for revaluation of failed or passed subjects provided he/she fulfills the following norms for revaluation.

(a) Applications for revaluation should be filed within 4 weeks from the date of declaration of results or 15 days from the date of receipt of marks card whichever is earlier.

(b) The candidate should have attended all the college examinations as well as university examinations.

(c) If a candidate has failed in more than two papers in the current university examination, his/her representation for revaluation will not be considered.

(d) The request for revaluation must be made in the format prescribed duly recommended by the Head of the Institution along with the revaluation fee prescribed by the University.

The internal assessment marks obtained by the candidate shall be considered only in the first attempt for theory subjects alone. For the subsequent attempts, University examination marks will be made up to the total marks. Further the University examination marks obtained in the latest attempt shall alone remain valid in total suppression of the University examination marks obtained by the candidate in earlier attempts.

11 Award of Letter Grades:

The assessment of a course will be done on absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain points, will be awarded as per the range of total marks (out of 100) obtained by the candidate, as detailed below:
### Range of Total Marks, Letter Grade, and Grade Points

<table>
<thead>
<tr>
<th>Range of Total Marks</th>
<th>Letter Grade</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 to 100</td>
<td>S</td>
<td>10</td>
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<tr>
<td>80 to 89</td>
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<td>B</td>
<td>8</td>
</tr>
<tr>
<td>60 to 69</td>
<td>C</td>
<td>7</td>
</tr>
<tr>
<td>55 to 59</td>
<td>D</td>
<td>6</td>
</tr>
<tr>
<td>50 to 54</td>
<td>E</td>
<td>5</td>
</tr>
<tr>
<td>0 to 49</td>
<td>F</td>
<td>0</td>
</tr>
<tr>
<td>Incomplete</td>
<td>FA</td>
<td></td>
</tr>
</tbody>
</table>

‘F’ denotes failure in the course. ‘FA’ denotes absent / detained as per clause 8.

After results are declared, grade sheets will be issued to the students. The grade sheets will contain the following details:

(a) The college in which the candidate has studied.

(b) The list of courses enrolled during the semester and the grades scored.

(c) The Grade Point Average (GPA) for the semester and The Cumulative Grade Point Average (CGPA) of all enrolled subjects from first semester onwards.

(d) GPA is the ratio of sum of the products of the number of credits (C) of courses registered and the corresponding grades points (GP) scored in those courses, taken for all the courses and sum of the number of credits of all the courses

\[
GPA = \frac{\text{Sum of (C \times GP)}}{\text{Sum of C}}
\]

CGPA will be calculated in a similar manner, considering all the courses enrolled from first semester. FA grades are to be excluded for calculating GPA and CGPA.

The conversion of CGPA into percentage marks is as given below

\[
\% \text{ Marks} = (CGPA - 0.5) \times 10
\]

### Award of Class and Rank:

(i) A candidate who satisfies the course requirements for all semesters and who passes all the examinations prescribed for all the eight semesters (six semesters for lateral entry candidates) within a maximum period of 7 years (6 years for lateral entry candidates) reckoned from the commencement of the first semester to which the candidate was admitted shall be declared to have qualified for the award of degree.

(ii) A candidate who qualifies for the award of the degree passing in all
subjects pertaining to semesters 3 to 8 in his/her first appearance within 6 consecutive semesters (3 academic years) and in addition secures a CGPA of 8.50 and above for the semesters 3 to 8 shall be declared to have passed the examination in FIRST CLASS with DISTINCTION.

(iii) A candidate who qualifies for the award of the degree by passing in all subjects relating to semesters 3 to 8 within a maximum period of eight semesters after his/her commencement of study in the third semester and in addition secures CGPA not less than 6.5 shall declared to have passed the examination in FIRST CLASS.

(iv) All other candidates who qualify for the award of degree shall be declared to have passed the examination in SECOND CLASS.

(v) For the Award of University ranks and Gold Medal for each branch of study, the CGPA secured from 1st to 8th semester alone should be considered and it is mandatory that the candidate should have passed all the subjects from 1st to 8th semester in the first attempt. Rank certificates would be issued to the first ten candidates in each branch of study.

13. Provision for withdrawal:

A candidate may, for valid reasons, and on the recommendation of the Head of the Institution be granted permission by the University to withdraw from writing the entire semester examination as one Unit. The withdrawal application shall be valid only if it is made earlier than the commencement of the last theory examination pertaining to that semester. Withdrawal shall be permitted only once during the entire course. Other conditions being satisfactory, candidates who withdraw are also eligible to be awarded DISTINCTION whereas they are not eligible to be awarded a rank.

14. Discontinuation of Course:

If a candidate wishes to temporarily discontinue the course for valid reasons, he/she shall apply through the Head of the Institution in advance and obtain a written order from the University permitting discontinuance. A candidate after temporary discontinuance may rejoin the course only at the commencement of the semester at which he/she discontinued, provided he/she pays the prescribed fees to the University. The total period of completion of the course reckoned from the commencement of the first semester to which the candidate was admitted shall not in any case exceed 7 years, including of the period of discontinuance.

15. Revision of Regulations and Curriculum:

The University may from time to time revise, amend or change the
regulations of curriculum and syllabus as and when found necessary.
## ANNEXURE – A

<table>
<thead>
<tr>
<th>B.Tech courses in which admission is sought</th>
<th>Diploma courses eligible for admission</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civil Engineering</td>
<td>Civil Engineering</td>
</tr>
<tr>
<td></td>
<td>Civil and Rural</td>
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<tr>
<td></td>
<td>Engineering Architectural</td>
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<tr>
<td></td>
<td>Assistantship Architecture</td>
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<td>Agricultural Engineering</td>
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<tr>
<td>Mechanical Engineering</td>
<td>Mechanical Engineering</td>
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<td></td>
<td>Automobile Engineering</td>
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<td></td>
<td>Agricultural Engineering</td>
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<tr>
<td></td>
<td>Mechanical and Rural</td>
</tr>
<tr>
<td></td>
<td>Engineering Refrigeration and</td>
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<td></td>
<td>Air-conditioning Agricultural</td>
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<td></td>
<td>Engineering &amp; Farm Equipment</td>
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<tr>
<td></td>
<td>Technology</td>
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<td></td>
<td>Metallurgy</td>
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<tr>
<td></td>
<td>Production Engineering</td>
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<tr>
<td></td>
<td>Machine Design &amp; Drafting</td>
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<td></td>
<td>Machine tool maintenance and Repairs</td>
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<td></td>
<td>Printing Technology / Engineering</td>
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<td></td>
<td>Textile Engineering / Technology</td>
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<td></td>
<td>Tool Engineering</td>
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<td>Electrical and Electronics Engineering</td>
<td>Electrical Engineering</td>
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<tr>
<td>Electronics &amp; Communication Engineering</td>
<td>Electrical and Electronics Engineering</td>
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<td>Electronic and Instrumentation Engineering</td>
<td>Instrumentation Engineering / Technology</td>
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<td>Bio Medical Engineering</td>
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<td>Technology Petroleum</td>
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<td>Engineering Ceramic Technology</td>
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<td>Plastic Engineering</td>
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<td>Paper &amp; Pulp Technology</td>
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<td>Information Technology</td>
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<td>Instrumentation Engineering / Technology</td>
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http://civil.pec.edu  8  Curriculum & Syllabi (B.Tech. Civil)
# CURRICULUM
## B.Tech. – CIVIL ENGINEERING

### I SEMESTER

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Name of the Subjects</th>
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<td>Physics</td>
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<td>T 103</td>
<td>Chemistry</td>
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<td>T 105</td>
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### II SEMESTER

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<td>T 108</td>
<td>Material Science</td>
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<td>3</td>
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<tr>
<td>T 109</td>
<td>Environmental Science</td>
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<tr>
<td>T 110</td>
<td>Basic Civil and Mechanical Engineering</td>
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*To be completed in I and II semesters, under Pass / Fail option only and not counted for CGPA calculation.*
### III SEMESTER

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<th>Marks</th>
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<tr>
<td>MA T31</td>
<td>Mathematics-III</td>
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<td>Building Construction</td>
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<td>CE T34</td>
<td>Mechanics of Solids-I</td>
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<td>Mechanics of Fluids</td>
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<td>Surveying-I</td>
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<td>Survey Lab-I</td>
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<td>CE P33</td>
<td>Building Planning and Drawing</td>
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|        |                                   |       |       |     |     |     |     |
|        |                                   |       |       |     |     |     |     |
|        |                                   | 24  | 2    | 9   | 28  | 300 | 600 | 900 |

### IV SEMESTER

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<td>Survey Lab-II</td>
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<td>Material Testing Lab-II</td>
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<td>PE P44</td>
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|        |                                   |       |       |     |     |     |     |
|        |                                   |       |       |     |     |     |     |
|        |                                   | 24  | 2    | 9   | 28  | 300 | 600 | 900 |

*Under pass/fail option only and not counted for CGPA calculation*
### V SEMESTER

<table>
<thead>
<tr>
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<th>Name of the Subject</th>
<th>Periods</th>
<th>Marks</th>
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<td>Computational Methods</td>
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<td>Transportation Engineering-I</td>
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<td>CE T56</td>
<td>Hydrology and Water Resources Engineering</td>
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<td>Geotechnical Engg. Lab</td>
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<tr>
<td>CE P52</td>
<td>Fluid Flow and Hydraulic Machinery</td>
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<td>Transportation Engineering Lab</td>
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|        |                                             | 22 | 2 | 12 | 31 | 400| 600| 1000|

http://civil.pec.edu
### VI SEMESTER

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<th>Code</th>
<th>Name of the Subject</th>
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<td>Estimation, Costing and Valuation</td>
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**List of Electives to be offered in VI Semester**

- CEE 61 Pre-stressed Concrete Structures
- CEE 62 Coastal Engineering
- CEE 63 Industrial Waste Disposal and Treatment
- CEE 64 Irrigation and Drainage Engineering
- CEE 65 Architecture and Town Planning
- CEE 66 Mass Transportation System
- CEE 67 Construction Methods and Equipment
## VII SEMESTER

<table>
<thead>
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<td>CE T73</td>
<td>Coastal and Offshore Structures</td>
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<td>3</td>
<td>25</td>
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</table>

List of Electives to be offered in VII Semester

- CEE 71 Geotechnical Processes and Application
- CEE 72 Geographical Information System
- CEE 73 Hydraulic Structures
- CEE 74 Finite Element Analysis
- CEE 75 Advanced Structural Design - RCC
- CEE 76 Failure Analysis and Rehabilitation of Structures
- CEE 77 Bridge Engineering
- CEE 78 Hydro Power Engineering
- CEE 79 Site Investigation Methods and Practices
- CEE 710 Highway and Airport Pavement Design
- CEE 711 Matrix methods of structural analysis
- CEE 712 Experimental Measurements and Analysis
### VIII SEMESTER

<table>
<thead>
<tr>
<th>Code</th>
<th>Name of the Subject</th>
<th>Periods</th>
<th>Cr</th>
<th>Marks</th>
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<td>CE T82</td>
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<td>Disaster Mitigation and Management</td>
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<td>Practical</td>
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<td>Project Work Phase-II</td>
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<td>6</td>
</tr>
</tbody>
</table>

**List of Electives to be offered in VIII Semester**

- CEE 81 Advanced Structural Design - Steel
- CEE 82 Optimization Techniques for Civil Engineering
- CEE 83 Advanced Open Channel Flow
- CEE 84 Ground Water Hydrology
- CEE 85 Water Resources System Engineering
- CEE 86 Machine Foundations
- CEE 87 Earth Retaining Structures
- CEE 88 Air and Noise Pollution
- CEE 89 Environmental Impact Assessment
- CEE 810 Dock and Harbour Engineering
- CEE 811 Traffic Engineering and Management
- CEE 812 Photogrammetry and Remote Sensing
- CEE 813 Prefabrication and Construction Techniques
- CEE 814 Earthquake Resistant Design of Structures.
- CEE 815 Structural Dynamics
- CEE 816 Theory of Elasticity and Plasticity
- CEE 817 Design of Industrial Structures
T 101 MATHEMATICS – I

Unit I - Calculus
Curvature, radius of curvature, evolutes and involutes. Beta and Gamma functions and their properties.

Unit II - Multiple Integrals And Applications
Multiple integrals – change of order of integration. Applications: Areas (double integration) and volumes by triple integration (Cartesian and polar) – mass and center of mass (constant and variable densities).

Unit III - Analytical Solid Geometry
Directional cosines and ratios – angle between two lines – the equation of plane - equations to a straight line and shortest distance between two skew lines.

Unit IV - Differential Equations
Exact equations, First order linear equations, Bernoulli’s equation, orthogonal trajectories, growth and decay, geometrical applications and electric circuits. Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut’s type.

Unit V - Differential Equations (Higher order)
Linear differential equations of higher order – with constant coefficients, the operator D - Euler’s linear equation of higher order with variable coefficients - simultaneous linear differential equations – solution by variation of parameters method – simple applications to electric circuits.

Text Books

Reference Books
Unit I – Acoustics & NDT
ultrasonics - Ultrasonic Waves Productions (Piezoelectric & Magnetostriction method) – Detections (Acoustic Grating)

Acoustics - Factors affecting Acoustic of Buildings (Reverberation, Loudness, Focusing, Echo, Echelon Effect and Resonance) and their Remedies - Sabine’s formula for Reverberation Time
NDT applications - Pulse Echo Method - Liquid Penetrant Method

Unit II – Optics
Interference - Air Wedge – Michelson’s Interferometer – Wavelength Determination – Interference Filter – Antireflection Coatings
Diffraction - Diffraction Grating – Dispersive power of grating - Resolving Power of Grating & Prism

Unit III – Lasers & Fiber Optics

Fiber Optics - Principle and Propagation of light in optical fiber – Numerical aperture and acceptance angle – Types of optical fibers (material, refractive index, mode)

Unit IV – Wave mechanics

Unit V – Nuclear energy source

Text Books

Reference Books
Unit I - Water


Unit II – Polymers


Unit III - Electrochemical Cells


Unit IV - Corrosion And Its Control


Unit V - Phase Rule

Definition and derivation of phase rule. Application to one component system - water and sulphur systems. Thermal analysis, condensed phase rule. Two component alloy systems - Pb-Ag, Cu-Ni and Mg-Zn systems.

Text books

Reference Books
T 104  BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Part A - Electrical

Unit – I

Unit – II
Node and mesh methods of analysis of DC circuits and simple AC circuits. Introduction to three phase circuits, Introduction to three phase system - phase and line parameters – relations, power measurement – voltmeter and ammeter method, two and three wattmeter methods.

Unit – III
Principle of DC generator and motor, Transformer, synchronous generator, induction motor (single phase). Sources for electrical energy conversion-thermal and hydraulic plant (Block diagram approach only). Components of AC transmission and distributions systems – line diagram.

Part B – Electronics

Unit – IV
Half-wave rectifier and Full-wave rectifier- filters - Amplifiers-common emitter and common collector amplifiers- Hartley oscillator and RC phase shift oscillator. Transducers – Resistance temperature detector (RTD) – Linear variable differential transformer (LVDT) - Strain gauge – Piezo electric transducer.

Unit – V

Unit – VI
Model of communication system – Analog and digital – Wired and wireless channel. Block diagram of various communication systems – Microwave, satellite, optical fiber and cellular mobile system. Network model – LAN, MAN and WAN – Circuit and packet switching – Overview of ISDN.

Text Books

Reference Books
T 105 ENGINEERING THERMODYNAMICS

Unit I - Basic Concepts and Definitions
Energy conversion and efficiencies - System, property and state - Thermal equilibrium - Temperature - Zeroth law of Thermodynamics.

Unit II - First Law of Thermodynamics
The concept of work and adiabatic process - First law of thermodynamics - Conservation of Energy principle for closed and open systems - Calculation of work for different processes of expansion of gases

Unit III - Second Law of Thermodynamics
Equilibrium and the second law - Heat engines - Kelvin-Planck statement of second law of thermodynamics - Reversible and irreversible processes - Carnot principle - Clausius inequality - Entropy

Unit IV - Gas Power Cycles
Air standard cycles: The air standard Carnot cycle - Air standard Otto cycle, diesel cycle, dual cycle and Bryton cycles and their efficiencies

Unit V - Refrigeration Cycles and Systems
Reverse Carnot cycle - COP - Vapor compression refrigeration cycle and systems (only theory) - Gas refrigeration cycle - Absorption refrigeration system (only theory) - Liquifaction and solidification of gases

Text Books

Reference Books
T 106 COMPUTER PROGRAMMING

Unit – I

Unit – II
Problem solving techniques – Program – Program development cycle – Algorithm design – Flowchart - Pseudo code.
Introduction to C – C tokens – data types – Operators and expressions – I/O functions

Unit – III
Decision making statements – branching and looping – arrays – multidimensional arrays – Functions – Recursion – Passing array to functions
Storage classes – Strings – String library functions

Unit – IV
Structures – Arrays and Structures – nested structures – passing structures to functions – user defined data types– Union
Pointers – pointers and arrays – pointers and functions - pointers and strings - pointers and structures

Unit – V
Files – operations on a file – Random access to files – command line arguments
Introduction to preprocessor – Macro substitution directives – File inclusion directives – conditional compilation directives – Miscellaneous directives

Text Books

Reference Book
P 101 COMPUTER PROGRAMMING LAB

List of Exercises

OS Commands, Word Processor and Spreadsheets
1. Study of OS commands-Compilation and execution of simple C programs
2. Use of mail merge in word processor
3. Use of spreadsheet to create Charts(XY, Bar, Pie) and apply the formulae wherever necessary C Programming (Flowcharts and algorithms are essential for the programming exercises)
4. Greatest of three numbers using conditional operator and if statement
5. Read two numbers and swap those two numbers using temporary variable and without using temporary variable.
6. Solve quadratic equation for different sets of inputs.
7. Use of Switch....Case statements
8. Generation of prime and Fibonacci series
9. Evaluate the COSINE series using for, while and do while loops
10. Matrix operations
   a) Addition
   b) Transpose
   c) Multiplication
11. Evaluate the sin(x) series using functions and recursive functions
12. Read a string and find solution to remove the duplicates of a given string from the given sentence
13. Create an array of structures for a list of items with the following details

<table>
<thead>
<tr>
<th>Item - Code</th>
<th>Item_ Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>102</td>
<td>Paste – Colgate</td>
</tr>
<tr>
<td>102</td>
<td>Paste – Pepsodent</td>
</tr>
<tr>
<td>102</td>
<td>Paste – Close-up</td>
</tr>
<tr>
<td>101</td>
<td>Soap - Cinthol</td>
</tr>
<tr>
<td>101</td>
<td>Soap - Lux</td>
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<td>101</td>
<td>Soap - Hamam</td>
</tr>
<tr>
<td>101</td>
<td>Soap - Dove</td>
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</tbody>
</table>

Arrange the set of items in ascending order of its Item_Code and descending order of its Item_ name as given below

<table>
<thead>
<tr>
<th>Item-Code</th>
<th>Item_ Name</th>
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<tbody>
<tr>
<td>101</td>
<td>Soap - Lux</td>
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<td>101</td>
<td>Soap - Hamam</td>
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<td>102</td>
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<td>102</td>
<td>Paste – Colgate</td>
</tr>
<tr>
<td>102</td>
<td>Paste – Close-up</td>
</tr>
</tbody>
</table>

14. Use of Structure to define a user defined data types, input the data and write the data into the file
15. Use of pointers and array of pointers
16. Functions with static data types
17. Write command line program to implement the following DOS commands using files
   - Del
   - Copy
Unit 0
Introduction to Standards for Engineering Drawing practice, Lettering, Line work and Dimensioning

Unit I
Conic sections, Involutes, Spirals, Helix. Projection of Points, Lines and Planes

Unit II
Projection of Solids and Sections of Solids.

Unit III
Development of surfaces - Intersection of surfaces (cylinder-cylinder, cylinder-cone)

Unit IV
Isometric projections and Orthographic projections

Unit V
Computer Aided Drafting: Introduction to Computer Aided Drafting hardware - Overview of application software - 2D drafting commands (Auto CAD) for simple shapes - Dimensioning.

Text Books

Reference Books
P 103 BASIC ELECTRICAL AND ELECTRONICS LAB

Electrical Lab

1. Study of tools and accessories
2. Study of joints
3. Staircase wiring
4. Doctor’s room wiring
5. Godown wiring
6. Tube Light and Fan connection
7. Lamp controlled from three different places-wiring

Electronics Lab

1. Rectifiers
   Construction of half wave and full wave rectifiers with and without filters – Calculation of ripple factors.

2. Frequency Response of RC Coupled Amplifiers
   Determination of frequency response of given RC coupled amplifier - Calculation of bandwidth.

3. Verification of Kirchoff’s Voltage and Current Laws
   Determine the voltage and current in given circuits using Kirchoff’s laws theoretically and verify the laws experimentally.

4. Study of Logic Gates
   a. Verification of Demorgan’s theorems
   b. Verification of truth tables of OR, AND, NOT, NAND, NOR, EX-OR, EX-NOR gates and Flipflops - JK, RS, T and D
   c. Implementation of digital functions using logic gates

5. Study of CRO
   a. Measurement of AC and DC voltages
   b. Frequency and phase measurements (using Lissajou’s figures)

6. Study of Transducers
   a. Displacement and load measurements with transducers
   b. Temperature measurement with thermocouple
T 107 MATHEMATICS – II

Unit I - Algebra
Binomial, exponential and logarithmic series (without proof) – problems on summation, approximation and coefficients.

Unit II – Matrices
Inverse of matrix by row transformation – Eigen values and Eigen vectors - Cayley-Hamilton theorem (without proof) – Diagonalisation – rank of matrix – solution of a general system of m linear algebraic equations in n unknown (m ≤ n).

Unit III – Trigonometry
Expansions for \( \sin^n \theta, \cos^n \theta, \tan^n \theta, \sin (n\theta), \cos(n\theta), \tan (n\theta) \). Exponential, circular, hyperbolic, inverse hyperbolic and logarithmic functions of a complex variable – separation of real and imaginary parts.

Unit IV - Vector Analysis
Scalar fields and Vector fields – Gradient, Divergence and Curl – their properties and relations – Gauss and Stokes theorems (without proof), simple problems for their verification.

Unit V - Statistics
Moments, kurtosis and skewness based on moments only. Probability distributions: Binomial, Poisson and Normal - evaluation of statistical parameters for these three distributions. Correlation and regression – rank correlation.

Text Books

Reference Book
T 108 MATERIAL SCIENCE

Unit I - Crystal structure and Defects

Crystal Systems – Bravais Lattices – Coordination Number, Atomic Radius, Packing Factor for FCC & HCP structures – Miller Indices for a cubic crystal– Powder X Ray Diffraction Method - Lattice defects – Qualitative ideas of point, line, surface and volume defects

Unit II – Dielectric properties

Dielectric Polarization and Mechanism – Internal or local Field - Clausius-Mossotti relation – Dielectric loss - Temperature and frequency dependence of dielectric constant – Measurement of Dielectric constant and loss using Scherring bridge – Elementary ideas of Piezoelectrics, Ferroelectrics and Pyroelectric materials and its Applications

Unit III – Magnetic Properties


Unit IV – Semiconductors and superconductors


Unit V – Advanced Materials

Liquid Crystals – Types – Application as Display Devices – Metallic Glasses – Nanomaterials (one, Two & three Dimensional) – Physical Properties and Applications of Carbon Nano Tubes

Text books


Reference Books

7. T 109 ENVIRONMENTAL SCIENCE

Unit I - Environmental Segments And Natural Resources


Unit II - Ecosystem & Biodiversity


Unit III - Air Pollution

Air pollution—sources of air pollution. Sources, effects and control measures of oxides of nitrogen, oxides of sulphur, oxides of carbon, hydrocarbon, chlorofluoro carbons and particulates. Green house effect—causes and effects on global climate and consequences. Ozone depletion—causes, mechanism and effect on the environment. Smog—sulfurous and photochemical smog—effect on the environment. Acid rain—theory of acid rain and effects.

Unit IV - Water Pollution And Solid Waste Management

Sources, effects and control measures of —water pollution, soil pollution, marine pollution, noise pollution, thermal pollution and radioactive pollution. Solid waste management — causes, effect and control measures of urban and industrial wastes.

Unit V - Social Issues And The Environment


Text Books

Reference Books
2) Sodhi G. S., Fundamental concepts of environmental chemistry, Narosa publishing house, New Delhi
T 110  BASIC CIVIL AND MECHANICAL ENGINEERING

Part-A  Civil Engineering

Unit I - Buildings, Building Materials
Buildings-Definition-Classification according to NBC-plinth area, Floor area, carpet area, floor space index- construction materials-stone, brick, cement, cement-mortar, concrete, steel- their properties and uses.

Unit II - Buildings and their components
Buildings- Various Components and their functions. Soils and their classification Foundations-Functions and types of foundations, Masonry, Floors-functions and types of floors, Roofs and types of roofs.

Unit III - Basic Infrastructure

PART - B  Mechanical Engineering

Unit IV - Internal and external combustion systems
Working principles of IC engines – Classification – Diesel and petrol engines: two stroke and four stroke engines. Steam generators(Boilers) – Classification – Constructional features (of only low pressure boilers) – Boiler mountings and accessories.

Conventional Power Generation Systems
Hydraulic, steam and gas turbines power plants – Schemes and layouts – Selection criteria of above power plants.

Unit V - Non-Conventional Energy Systems (Description Only)
Solar thermal systems – Solar photovoltaic – Solar pond – wind, wave, tidal, geothermal and ocean thermal energy conversion systems.

Casting
Green and dry sand moulding processes for ferrous and non-ferrous metals – applications.

Unit VI - Metal Joining
Elements of arc and gas welding, brazing and soldering – Bolted joint types – Adhesive Bonding; classification of adhesives – applications. Sheet Metal Processing Punching, blanking, shearing, bending, and deep drawing processes; descriptions and applications

Text Books

For Part –A


For Part –B


Reference Books

http://civil.pec.edu
T 111 ENGINEERING MECHANICS

Unit I - Fundamental of Mechanics

Basic Concepts Force System and Equilibrium, Definition of Force, Moment and Couple, Principle of Transmissibility, Varignon’s theorem, Resultant of force system – Concurrent and non concurrent coplanar forces, Condition of static equilibrium for coplanar force system, stability of equilibrium, concept of free body diagrams, applications in solving the problems on static equilibrium of bodies.

Unit II - Plane Trusses

Degrees of freedom, Types of supports and reactions, Types of loads, Analysis of Trusses-method of joints, method of sections.
Friction. Introduction, Static dry friction, simple contact friction problems, ladders, wedges, screws and belt friction.

Unit III - Properties of Surfaces

Properties of sections – area, centroids of lines, areas and volumes, moment of inertia first moment of inertia, second moment of inertia and product moment of inertia, polar moment of inertia, radius of gyration, mass moment of inertia.

Unit IV - Kinematics and Kinetics of Particles


Unit V - Kinematics and Kinetics of Rigid bodies

Plane motion, Absolute motion, Relative motion, translating axes and rotating axes, work and energy, impulse and momentum

Text Books


Reference Books

T112 COMMUNICATIVE ENGLISH

Unit I – Basic Communication Theory
Importance of Communication – stages of communication, modes of communication – barriers to communication – strategies for effective communication – Listening: Importance, types, barriers – Developing effective listening skills.

Unit II – Comprehension And Analysis
Comprehension of technical and non-technical material – Skimming, scanning, inferring(Note making and extension of vocabulary, predicting and responding to context- Intensive Reading and Reviewing

Unit III – Writing
Effective sentences, cohesive writing, clarity and conciseness in writing – Introduction to Technical Writing – Better paragraphs, Definitions, Practice in Summary Writing – Four modes of writing – Use of dictionaries, indices, library references – making bibliographical entries with regard to sources from books, journals, internet etc.

Unit IV – Business Writing / Correspondence

Unit V – Oral Communication

Reference Books
List of experiments (Any 10 Experiments)

1. Thermal conductivity – Lee’s DISC
2. Thermal conductivity - Radial flow
3. Spectrometer – Prism or Hollow prism
4. Spectrometer – Transmission grating
5. Spectrometer - Ordinary & Extraordinary rays
6. Newton’s rings
7. Air – wedge
8. Half shade polarimeter – Determination of specific rotatory power
9. Jolly’s experiment – determination of α
10. Magnetism: i – h curve
11. Field along the axis of coil carrying current
12. Vibration magnetometer – calculation of magnetic moment & pole strength
13. Laser experiment: wavelength determination using transmission grating, reflection grating (vernier calipers) & particle size determination
14. Determination of optical absorption coefficient of materials using laser
15. Determination of numerical aperture of an optical fiber

Demonstration Experiments( Any two of the following )

1. Determination of COD of water sample.
2. Determination of lead by conductometry.
3. Percentage composition of sugar solution by viscometry.

List of experiments (Any 10 Experiments)

1. Determination of dissolved oxygen in water.
2. Determination of total hardness of water by EDTA method.
3. Determination of carbonate and bicarbonate in water.
4. Estimation of chloride content in water.
5. Estimation of magnesium by EDTA.
7. Estimation of ferrous by permanganometry.
8. Estimation of ferrous and ferric iron in a solution mixture by dichrometry.
10. Estimation of copper in copper sulphate solution.
11. Estimation of calcium by permanganometry.
12. Estimation of iron by colorimetry.
<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Trade</th>
<th>List of Exercises</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Fitting</td>
<td>Study of tools and Machineries. Exercises on symmetric joints and joints with acute angle.</td>
</tr>
<tr>
<td>2.</td>
<td>Welding</td>
<td>Study of arc and gas welding equipment and tools – Edge preparation – Exercises on lap joint and V Butt joints – Demonstration of gas welding</td>
</tr>
<tr>
<td>3</td>
<td>Sheet metal work</td>
<td>Study of tools and Machineries – exercises on simple products like Office tray and waste collection tray.</td>
</tr>
<tr>
<td>4.</td>
<td>Carpentry</td>
<td>Study of tools and Machineries – Exercises on Lap joints and Mortise joints</td>
</tr>
</tbody>
</table>

List of Exercises

I Fitting
1. Study of tools and Machineries
2. Symmetric fitting
3. Acute angle fitting

II Welding
1. Study of arc and gas welding equipment and tools
2. Simple lap welding (Arc)
3. Single V butt welding (Arc)

III Sheet metal work
1. Study of tools and machineries
2. Funnel
3. Waste collection tray

IV Carpentry
1. Study of tools and machineries
2. Half lap joint
3. Corner mortise joint.

NCC/NSS training is compulsory for all Undergraduate students
1. The activities will include Practical/field activities/Extension lectures.
2. The activities shall be carried out outside class hours.
3. For the above activities, the student participation shall be for a minimum period of 45 hours.
4. The activities will be monitored by the respective faculty in charge and the First Year Coordinator.
5. Pass/Fail will be determined on the basis of participation, attendance, performance and behavior. If a candidate Fails, he/she has to repeat the course in the subsequent years.
6. Pass in this course is mandatory for the award of degree.
MAT 31 MATHEMATICS -III

Unit - I

Unit – II

Unit – III
Complex Integration: Cauchy’s theorem - Cauchy’s integral formula - Taylor’s and Laurent series - Residue theorem - Contour integration round the unit circle and semi-circular contour.

Unit – IV

Unit – V
Fourier Transform: Fourier Integral (statement only) - Fourier transform, Inverse Fourier transform, Fourier sine and cosine transforms, definitions and properties.

Text Books

Reference Books
CE T32 BUILDING MATERIALS

Unit-I

Unit-II

Unit-III
Materials for building services-Timber-Market forms-Industrial Timber-Plywood Veneer-Thermo Cole-Panels of laminates-Steel-composition-Uses-Market forms-Mechanical Treatment- Aluminium and plastics - Paints-Varnishes-Distemper

Unit IV

Unit-V

Text Books

Reference Books
CE T33   BUILDING CONSTRUCTION

Unit-I
Introduction-basic functions of building- building component and their basic requirements
Foundation-need for foundation-Concept of bearing capacity-types of foundation-recommended foundation for different soils.

Unit –II
Walls-types and their uses. Floors and roofs-different types of floors and their suitability. floor finishes-Roofs-different types of flat, pitched and curved roofs- roof coverings.

Unit-III

Unit –IV

Unit –V
Temporary structures- form work-scaffolding- shoring-underpinning.
Acoustics of buildings – sound absorbent material and sound insulation
Ventilation, air conditioning and thermal insulation-functional requirement of ventilation system-system of ventilation and their choice. Air conditioning-purposes and classification- systems of air conditioning.
Thermal insulation-principles-heat insulating materials and methods of heat insulation

Text Books
Unit – I

Unit – II
Shear force and bending moment diagrams for beams and simple frames - Theory of simple bending – Bending stress distribution at sections.

Unit – III

Unit – IV
Shear stress distribution due to bending – Shear center. Springs – Closed and open coiled springs – Leaf springs. Complex stresses – Principal planes and stresses-Mohr’s circle.

Unit – V

Text books
CE T35  MECHANICS OF FLUIDS

Unit - I

Fluid Properties: Density, specific weight, specific volume, specific gravity, compressibility, viscosity, surface tension, capillarity, vapour pressure. Fluid Statics: Pressure in a fluid, pressure head, Measurement of pressure, Hydrostatic forces on submerged plane and curved surfaces, Buoyancy, Metacentre, stability of floating and submerged bodies.

Unit - II

Fluid Kinematics: Stream line, streak line, Path line and stream tube. Types of flow, steady, unsteady, uniform, non-uniform, laminar, turbulent, rotational and irrotational flows. Equation of continuity for one, two, three dimensional flows, Stream function and velocity potential function, flow net analysis.

Dynamics of Flow: Euler’s equation of motion, Bernoulli’s equation, simple applications of Bernoulli’s equation, Momentum equation. Kinetic energy and Momentum correction factors.

Unit - III


Unit - IV

Flow measurement: Pitot tube, Venturimeter, orificemeter, Flow nozzle, and mouthpieces, flow over notches and weirs, Venturiflume and Standing wave flume, Velocity measurement in open channel.

Unit - V

Dimensional Analysis and Similitude: Dimensional analysis - Rayleigh’s method, Buckingham’s fi theorem, Dimensionless numbers, Laws of similitude, Model Analysis, Distorted models, Principles of analogy.

Text Books


Reference Books

Unit –I

Introduction


Unit –II

Compass surveying – Basic terms and definitions – Bearing and angles – compass types – Magnetic declination – Dip – Traversing – Local attraction


Unit –III

Leveling and applications


Unit –IV

Traversing – Basic terms and definitions – Chain and compass traversing – checks in closed traverse – plotting a traverse – coordinate systems – closing errors – balancing a traverse – degree of accuracy in traversing – omitted measurements – cases

Unit –V


Text Books

CE P31 SURVEY LAB-I
1. Measurement with chain and tape, ranging, offsets (perpendicular and oblique)
2. Offset survey over an ear-marked boundary.
3. Closed traverse by chain and plotting
4. Study of prismatic compass and setting out a regular polygon
5. Closed traverse by chain and compass, plotting and adjustment (graphical and analytical.
6. Plane table survey by radial resection and traverse method.
7. Two point problem
8. Three points problem (Bessels method)
9. Three point problem (Trial and error method and mechanical method)
10. Study of levelling instruments and observation of staff reading
11. Differential levelling
12. Fly levelling
13. Reciprocal levelling
14. Check levelling
15. Contour survey and plotting
16. L.S. and C.S. and plotting

CE P32 MATERIAL TESTING LAB-I
I Tests on Metals (Ferrous and Non - Ferrous)
Tension Tests: To find yield stress, ultimate stress, percentage elongation and reduction of area of cross-section, Young’s modulus and Barba’s constants.
Double Shear test, 180° bend test
Hardness Test: Vickers, Brinell, and Rockwell
Torsion Test: Wires and Rods
Impact Test: Charpy and Izod
Ductility Test: Erichsen cupping test
Fatigue Test (demonstration)
II Test on Timber:
Compression, tension, shear, bending and hardness
III Test on Plastics.
IV Test on Springs.
CE P33 BUILDING PLANNING AND DRAWING

I Planning Aspects

II Computer Aided Drafting
Planning and drafting with AutoCAD and other Auto CAD layered software.

III Preparation of working drawings
Preparation of line sketches – development of line sketches - preparation of working drawing for the following types of buildings – Residential buildings, framed structures, schools, hospitals, hostels, commercial buildings, banks and factory buildings. Working drawing of doors, windows, ventilators and stair cases.

Text Books
MA T41 MATHEMATICS-IV

Unit – I


Unit – II

Solution of partial differential equation by the method of separation of variables - Boundary value problems - Fourier series solutions - Transverse vibration of an elastic string.

Unit – III

Fourier series solution for one dimensional heat flow equation - Fourier series solutions for two dimensional heat flow equations under steady state conditions (Cartesian and polar forms).

Unit - IV

Applied Statistics: Curve fitting by the method of least squares- fitting of straight lines, second degree parabolas and more general curves. Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, and difference of standard deviations.

Unit - V

Small samples: Test for single mean, difference of means and correlation coefficients, test for ratio of variances - Chi-square test for goodness of fit and independence of attributes.

Text Books


Reference Books

CE T42 CONCRETE TECHNOLOGY

Unit – I

Unit – II

Unit – III

Unit – IV

Unit – V

Text Books

Reference Books
6. **CE T 43 ENGINEERING GEOLOGY**

**Unit-I**

**Unit-II**

**Unit-III**
Petrology: Classification of rock - mode of formation - distinction between igneous, sedimentary and metamorphic rocks - Physical and Mechanical properties of rocks. Study of important rocks - granite, syenite, diorite, gabbro, pegmatite, dolerite, basalt, sand stone, limestone, shale, breccia, conglomerate, gneiss, quartzite, marble, slate, schist, phyllite and conglomerate - role of petrology in the field of construction.

**Unit-IV**
Structural Geology and Geophysical methods: Attitude of beds - out crops, study of structures such as folds, faults, joints, unconformities in lier and out lier their brief classification and their bearing on engineering construction – principles of geophysical methods, electrical resistivity method, seismic method and its applications in civil engineering.

**Unit-V**
Geology and construction: Role of geology in site investigation, Geotechnical classification of rock, geological considerations in open excavation, tunnels and dam site, reservoir site, buildings, road cuttings, study of air photographs and satellite images and interpretation for civil engineering projects, landslides - its causes, classification and preventive measures, groundwater - types of aquifers, properties of geological formations affecting groundwater and its role as a geological hazard.

**Text Books**

**Reference Books**
CE T44 MECHANICS OF SOLIDS-II

Unit – I
Deflection of beams – Macaulay’s method, moment area method -conjugate beam Methods.

Unit – II
Strain energy due to axial, bending, shear and torsional forces – Impact loads. Principle of virtual displacement – principle of minimum potential energy –Castigliano’s Theorems – Maxwell – Betti’s theorem.

Unit – III
Deflection of trusses and frames – strain energy and dummy/unit load methods.

Unit – IV

Unit – V

Text Books
CE T45 HYDRAULICS AND HYDRAULIC MACHINERY

Unit – I
Open Channel flow: Types of flow, Types of Channel, Velocity distribution, Chezy, Manning and Basin formulae, for uniform flow, Most economical section , critical flow ,Specific energy, specific force. Computation of uniform flow and critical flow.

Unit-II
Open channel flow: Non-Uniform flow, Dynamic equation for Gradually varied flow, computation for length of backwater curve, Rapidly Varied flow - hydraulic jump, types, uses. Surges in open channels.

Unit-III
Basics of Turbo machinery : Impulse momentum equation, Hydrodynamic forces of jets on vanes, velocity Triangles, Angular momentum principle, application to radial flow turbines.

Unit-IV
Turbines: Classification, impulse and reaction turbines, characteristic curves, draft tubes, governing of turbines, specific speed, unit quantities concept, similarity, cavitation,

Unit-V
Pumps: Centrifugal pumps - classification, work done, minimum starting speed, losses and efficiencies, specific speed, multistage pumps, specific speed, characteristic curves, NPSH, Cavitation in pumps. Reciprocating pumps - types, effects of acceleration and frictional resistance, separation, Air vessels, work saved by fitting air vessels.

Text Books

Reference Books
CE T 46 SURVEYING-II

Unit-I
Theodolites description and uses- temporary and permanent adjustments of Theodolite – horizontal angles – vertical angles – Trignometrical Levelling – Base of the Object Accessible – Inaccessible :for instruments at same and different plane of observation

Unit-II
Tacheometric surveying –Principle of stadia measurement –Basic systems of tacheometric measurement - Determination of Tacheometric measurements – subtense bar – Errors in tacheometry

Unit-III
Setting out curves: Horizontal curves – Elements of a circular curve and notations –Designation of a curve – Setting out a simple circular curve – Compound curve – Reverse curve – Transition – vertical curve

Unit-IV
Horizontal and vertical control, triangulation - Classification of triangulation system, network, signals, satellite stations - base line measurement - corrections, extension of base- Theory of error and adjustments - true and most probable value, residual error, weighted observation, principle of least square, normal equations, correlatives, adjustment of simple triangulation figure, station and figure adjustment

Unit-V
Hydrographic surveying – shore line measurement, soundings – tides and tide gauge – Mine surveying- Equipment for Mine survey- station and station markers – measurement of distance and difference in elevation- Introduction to– EDM and total station – Remote sensing – GIS

Text Books

Reference Books
CE P41 SURVEY LAB-II

(A) List of Field Work

1. Study of Theodolite, Measurement of horizontal angle (Repetition and reiteration),
   Measurement of Vertical angle.
2. Theodolite closed traverse, plotting and adjustment.
3. Heights and Distances (Base of the object accessible & inaccessible)
4. Heights and Distances - Instrument station in the same vertical plane
5. Heights and Distances (Base of the object in accessible - Instrument station not in the
   same vertical plane)
6. Determination of tacheometric constant
7. Tacheometric survey - Distance and Elevation by stadia method.
8. Tacheometric survey - Distance and Elevation by tangential method.
9. Tacheometric survey - Contouring and plotting
10. Use of Subtense bar.
11. Setting out for building.
12. Setting out curves

(B) List of Demonstration Only

1. Interpretation of Aerial Photographs- Demonstration
2. EDM, Total Station and GPS- Demonstration

CE P42 MATERIAL TESTING LAB-II

1) Tests on Cements
Specific Gravity, Fineness, Standard Consistency, Soundness, Setting times, Compressive strength of mortar cubes.

II) Tests on Aggregates- Gradation, Modulus, Bulking of Sand, water absorption

III) Tests on Concrete
   (i) Fresh Concrete: Workability Tests, Setting time, Mix Design by IS guide lines.
   (ii) Hardened Concrete: Compressive and Tensile strengths, effect of w/c ratio on strength of concrete, ultimate strength of beams

IV) Non-destructive tests (demonstration only)
Rebound hammer test and Ultrasonic pulse velocity test on concrete specimens.

V) Tests on Bricks and Tiles
Water absorption, compressive strength and flexural strength.
CE P43 ENGINEERING GEOLOGY LAB

1. Minerology: Megascopic study of important silicate, and non-silicate minerals.
2. Petrology: Megascopic study of important igneous, sedimentary and metamorphic rocks.
5. Aerial photographs: Interpretation of Aerial photographs. (not recommended for examination)

SP P 44 PHYSICAL EDUCATION

Physical Education is compulsory for all the Undergraduate students
1. The activities will include games and sports / extension lectures.
2. Two Hrs. / Week will be allocated for physical education in the third and fourth semesters. The student participation shall be for a minimum period of 45 hours in both the semesters put together.
3. These activities will be monitored by the Director of Physical Education.
4. Pass /Fail will be determined on the basis of participation, attendance, and performance. If a candidate fails, he/she has to repeat the course in the subsequent years.
5. Pass in this course is mandatory for the award of degree.
MA T51 COMPUTATIONAL METHODS

Unit – I
Solution Of Algebraic And Transcendental Equations And Eigen Value Problem : The method of bisection, the method of false position, Newton-Raphson method (single and system of two equations) and Graeffe’s Root squaring method. Eigen value and Eigen vector by power method.

Unit-II
Solution of linear simultaneous equations and matrix inversion:

Unit-III

Unit-IV
Solution of Ordinary Differential Equations:

Unit – V
Solution of Partial Differential Equations:

Text Book

Reference Book
CE T52 STRUCTURAL ANALYSIS-I

Unit – I
Static indeterminancy – Analysis of statically indeterminate beams and frames by consistent deformation/force method.

Unit II
Analysis of plane trusses with one or more redundant members by force method - trusses with lack of fit - Thermal stresses - Settlement of supports – analysis of trussed beams.

Unit – III
Slope Deflection Method - Continuous beams and rigid frames (with and without sway) - Symmetry and antisymmetry – Simplification for hinged end - Support displacements.

Unit IV
Moment Distribution Method - Stiffness and carry over factors – Distribution and carry over of moments - Analysis of continuous Beams - Plane rigid frames with and without sway

Unit – V

Text Books

Reference Books
CE T53 GEOTECHNICAL ENGINEERING-I

Unit-I
Soil formation – soil minerals – soil structure - three phase system – definitions- inter- relationships – Index properties - IS soil classification – sol deposits in India.

Unit-II

Unit-III
Stress Analysis- Stress due to concentrated load, due to uniformly loaded area, line load strip load-pressure distribution diagrams - contact stress - Westergarrd's analysis.

Unit-IV

Unit-V

Text Books

Reference Books
CE T54 ENVIRONMENTAL ENGINEERING –I

Unit – I
Introduction: Water supply Scheme - objectives and requirements - Domestic, commercial and public requirements - Various methods of estimating population Variations in rate of demand and its effects on design.

Unit-II
Sources of Water and intakes: Surface and groundwater sources - Computation of storage capacity of reservoirs by analytical and graphical methods - Forms of underground sources like wells, Infiltration wells and galleries, Intake structures, tube wells - Sanitary protection of wells,

Unit-III
Quality of Water: Indian and W.H.O. Standards for drinking water - Impurities in water - Physical, chemical and bacteriological tests for water - quality of water for trade purpose and swimming pools

Unit-IV
Water Treatment system: Unit process of water treatment - Principles, functions and design of flocculators, sedimentation tanks, sand filters, principles of disinfection, water softening, aeration, Iron and manganese removal.

Unit-V
Conveyance and distribution –Service reservoir location, determination of capacity – Leak detection - lining of pipes, various materials used for pipes, selection and class of pipes -. - Method of Layout of distribution systems, analysis of pipe networks by different methods, pipe appurtenance for distribution system – Plumbing works and layout of water supply system for buildings, Effects of corrosion and its prevention.

Text Books

Reference Books
CE T55 TRANSPORTATION ENGINEERING.-I

Unit – I
Importance Road transportation, Highway alignment - Requirement, Engineering surveys for highway location. Maps & drawings to be prepared. Geometric design - Cross section element, width, camber, design - Speed, sight distances, requirements and design of horizontal and vertical alignments.

Unit – II

Unit – III
Traffic Engineering – Fundamentals of traffic flow, Level of service, analysis of Speed studies. Accident studies and analysis. Principles and design of signalized and un-signalized intersections as per IRC standards

Unit – VI

Unit – V
Airport planning - Aircraft characteristics - Zoning laws and site selection. Runway & taxiway design - runway orientation and configuration, Basic runway length and corrections. Taxiway design, airport marking and lighting, Drainage

Text Books

Reference Books
CE T56 HYDROLOGY AND WATER RESOURCES ENGINEERING

Unit – I
Precipitation: Hydrologic cycle, precipitation, stream flow, evaporation, transpiration and infiltration, types and measurement of precipitation, gauge networks, hyetographs, average depth of precipitation over the basin, mass rainfall curves, intensity duration curves - estimates of missing data and adjustment of records.

Unit – II

Unit – III
Groundwater: Occurrence and movement of ground water, Darcy’s law, aquifers - types and specific yield of aquifers and basin, steady & unsteady flow in wells in confined and unconfined aquifers, well loss and specific capacity of a well.

Unit – IV

Unit – V
Floods: Design flood, estimation by empirical and statistical methods, Flood control Measures - Levees and flood walls, Flood control reservoirs, Water shed management, Flood forecasting methods, Flood routing (elementary treatment only)
Planning for Water Resources Development: Level, phases, objectives, Project formulation, systems analysis, multipurpose projects.

Text Books

Reference Books
1. CE P51 GEOTECHNICAL ENGG. LAB

(A) List of Experiments

2. Liquid limit and Plastic limit Test
3. Shrinkage limit and Free swell Test
4. Grain size analysis. – Mechanical Method
5. Grain size analysis. – Sedimentation Analysis
6. In situ Unit weight determination.
7. Laboratory Permeability test
8. Proctor compaction test.
10. Direct shear test.
11. Triaxial compression test

(B) Demonstration Tests

1. Consolidation test.
2. Swell Pressure Test
3. Insitu Field Tests (SPT, SCPT, VST, Pressuremeter)

Reference Books


CE P52 FLUID FLOW AND HYDRAULIC MACHINERY LAB

A. Fluid Flow Laboratory

1. Calibration of rectangular, triangular, trapezoidal notches
2. Determination of coefficient of discharge for orifices and mouthpieces
3. Calibration of venturimeters, orifice meters and Rota Meters
4. Verification of Bernoullis theorem
5. Determination of pipe friction
6. Determination of minor losses in pipe due to bends, elbows, sudden contraction, expansion etc.,
7. Determination of Metacentric height of various ship models
8. Determination of force due to Impact of jet on vanes

B. Fluid Machinery Laboratory

1. Study of performance characteristics of centrifugal pump (constant speed)
2. Study of performance characteristics of Reciprocating pump
3. Study of performance characteristics of Submersible pump
4. Tests on Turbine
CE P53 TRANSPORTATION ENGINEERING LAB

I. Test on Highway Materials

Testing of sub-grade soil

1. C.B.R. Test - (on sub grade soil)
2. Sand-Gravel mix design -(on sub grade soil)

II. Tests on Aggregate:

1. Crushing value
2. Los Angeles Abrasion test
3. Impact test
4. Shape Tests (elongation index, flakiness index, angularity number)
5. Specific gravity & Water absorption

III. Tests on Bitumen:

1. Penetration Value
2. Ductility
3. Softening point
4. Flash & fire point
5. Specific gravity
6. Viscosity of cutback Bitumen
7. Tests on rubberized/polymer bitumen
8. Marshall’s test on bituminous mixes
9. Bitumen content
HS P54 GENERAL PROFICIENCY –I

Unit -I   Art Of Communication

Verbal and Non-verbal Communication – Barriers to Communication – Importance of Body Language – Effective Listening – Feedback

Unit - II : Introduction To Soft Skills


Unit – III  Writing

Importance of Writing – Written Vs Spoken Language – Formal and Informal Styles of writing – Resources for improving writing – Grammar and Usage – Vocabulary Building – SWOT analysis

Unit – IV  Speaking Practice


Unit – V  Aptitude

Verbal and Numerical aptitude

References

CE T61 STRUCTURAL ANALYSIS-II

Unit – I
ILD for shear, moment and reactions for statically determinate beams and pin jointed trusses.

Unit – II
Moving loads for statically determinate structures – single and several points loads – maximum bending moment and maximum shear force – equivalent u.d.l. - absolute maximum bending moment - determination of equivalent UDL.

Unit – III

Unit – IV
Theory of arches - Analysis of three hinged, two hinged and fixed arches - influence lines, rib shortening, settlement, and temperature effects. Analysis of forces in cables - Suspension bridges.

Unit – V

Text Books

Reference Books
CE T62 GEOTECHNICAL ENGINEERING-II

Unit-I

Unit-II

Unit –III
Lateral earth pressure: Active, passive and earth pressure at rest, Rankine and Coulomb’s theory – Rebhann’s Method. Earth pressure due to inclined back fill, line load and earth quake load - Cantilever sheet pile wall in granualr and clay soil. Design of braced excavations.

Unit –IV

Unit-V

Text Books

Reference Books
Unit-I
Definitions - General considerations- Interdependence of water supply and waste water disposal - source and nature of waste water - Combined and separate system – surface drainage - storm water flow – Investigation and design of sewerage schemes – Data collection - Design flow for separate, storm and combined systems.

Unit-II

Unit –III

Unit-IV

Unit V
Wastewater Disposal and Reuse - Disposal of sewage - Reduction of BOD - Land disposal - Discharge in to rivers. lakes, estuaries and ocean – River pollution - Oxygen sag curve - recycle and reuse of waste effluents. –Disinfection –Chlorination and odour prevention. Introduction to Low cost treatment methods -Special nature of problem of industrial water - Population equivalent – Process modifications and by product recovery

Text Books

Reference Books
Sons, 1981
CE T64 STRUCTURAL DESIGN

Unit-I

Unit-II

Unit-III

Unit-IV
Limit State Design of Short Columns and Long Columns subjected to combined axial load and bending using interaction diagram.

Unit-V
Design of Footings (Limit State method)- Isolated footing with axial and eccentric loading- Combined Rectangular and Trapezoidal footing, Design of Stair Cases.

Text Books

Reference Books
4. Park R and Pauloy T, Reinforced Concrete Structures, John Wiely & Sons Inc.
5. Mallick S.K., Reinforced Concrete, Oxford & IBH Publishing Company
CE T65 TRANSPORTATION ENGINEERING.-II

Unit – I
Traffic engineering: road user and vehicle characteristics; Traffic volume and composition, speed, headway, concentration, delay; flow principles; micro and macroscopic stream characteristics

Unit – II
Traffic studies - Volume, Speed, Delay, O-D and Parking surveys; statistical applications in traffic engineering.

Unit – III
Traffic regulations and control - Traffic signs, Signals, Markings, Islands, and Rotaries; Traffic signals - Basic concepts and principles, Analysis and design; Types and layout of at-grade and grade separated intersections.

Unit – IV
Parking facilities; Capacity analysis and Level of Service (LOS) for uninterrupted flow facilities – performance measures, LOS analysis, Design; Intelligent Transportation Systems (ITS) – Components, Advanced Traffic Management Systems (ATMS), Advanced Traveller Information System (ATIS)

Unit – V
Railway engineering: location surveys and alignment; permanent way – gauges, components of permanent way; points and crossings; stations and yards.

Text Books

Reference Books
CE P61 ENVIRONMENTAL ENGG. LAB

1. Determination of Turbidity, pH, Conductivity and Residual Chlorine.
2. Determination of Alkalinity.
3. Determination of Chlorides.
4. Determination of Hardness.
5. Determination of Iron
6. Determination of Manganese.
7. Determination of Fluorides.
11. Jar test for the determination of optimum coagulant Dose.
12. Determination of B.O.D.
13. Determination of C.O.D.
15. Plate count (for bacterial analysis of water)

CE P62 ESTIMATION, COSTING AND VALUATION

Introduction: Types of estimate – Methods of measurement – Units of measurement for various item of work – Factors to be considered in the preparation of detailed estimate – Methods of measurement as per IS,1200.

Methods of Estimation: Centerline and crossing methods of estimation – Examples using the above methods. Detailed estimates: Detailed estimates of a simple residential building, Multi-storied building, culverts and bridges, road network inclusive of earth work. Detailed estimates of water tanks and sumps, water supply distribution network, sewer lines man holes, Aqueduct and canal falls and structural steel work.

Specifications: Purpose and basic principles of general and detailed specifications of various item of work.

Costing, Analysis of rate – Purpose – Quantity of materials per unit rate of work – Estimating labours – Task of out turn work – Quantity of materials for different item of works.

Valuation: Valuation – Purpose, Common terms used in valuation – Valuation of building using different methods (with example) – Fixation of rent for a building. Valuation of land.

Reference Books
CE P63 COMPUTER AIDED DESIGN LAB


GIS Software


Mat Lab Software

Introduction to Mat lab 6 software – Roots of an equation – Solution of simultaneous equations – Matrix Inversion – Linear Regression line of given points – Curve fitting using polynomial regression – Eigen value extraction and Eigen vectors.

Reference Books

1. Rajaraman, V. Computer Oriented Numerical Methods Prentice Hall of India, 2002
2. Rudra Pratap, Introduction to Mat Lab 6, Oxford Press, 2002
5. GeoMeida Professional 6 Manual, 2001

http://civil.pec.edu

Curriculum & Syllabi (B.Tech. Civil)
HS P 64 GENERAL PROFICIENCY –II

Unit – I : Composition Analysis
Technical and Non-Technical Passages (GRE Based) – Differences in American and British English – Analyzing Contemporary issues – Expanding Terminology

Unit – II : Writing
Job Application Letter Writing – Resume Writing

Unit – III : Oral Skills
Group Discussion – Introduction and Practice – Team Work – Negotiation Skills – Organizing and Attending Meetings – Facing Interviews

Unit – IV : Adapting To Corporate Life
Corporate Etiquette – Grooming and Dressing

Unit – V : Aptitude
Verbal and numerical aptitude

References
HS T71 ENGINEERING ECONOMICS

Unit-I

Unit-II

Unit-III

Unit-IV
Replacement and Maintenance Analysis- Types of Maintenance, Types of Replacement Problem, Determination of Economic Life of an Asset, Replacement of an Asset with a New Asset - Capital Recovery with Return and Concept of Challenger and Defender, Simple Probabilistic Model for items which fail Completely.

Unit -V

Text Book

2. Reference Books
CE T72 STRUCTURAL DESIGN-II

Unit-I
Types of Steel and their permissible stresses, Design of Joints - Riveted, Bolted and Welded Connections under axial and eccentric loadings.

Unit-II
Compression Members: Design of axially and eccentrically loaded members, Built-up columns, Design of Lacings and Battens, Design of Column Splices.

Unit-III
Tension Members: Design of Axially and Eccentrically Loaded Tension Members - Tension Splices- Design of Lug Angles, Column bases: Design of Column bases, Slab Bases, Gusseted base,

Unit-IV

Unit-V
Design of Plate Girder (both welded and riveted), Wind load calculations - Design of Roof Truss Elements.

Text Books

Reference Books
CE T73 COASTAL AND OFFSHORE STRUCTURES

Unit I
Growth and regulation of Ports: History of Port – Classification of Harbours - Factors affecting the growth of Port. - Requirement of a Harbour - General Planning - Site investigation Description of selected Indian ports.

Unit – II

Unit - III

Unit – IV

Unit - V
Foundations for offshore structures – Introduction to design and installation of offshore piled platforms, concrete offshore platforms, Moored floating structures and Submarine pipelines

Text Books
Detailed Design and Drawing of the following RCC elements/Structures:

1. Continuous beams and slab systems
2. Isolated footings - for axial load and with moments
3. Combined footings - for axial loads and with moments
4. Cantilever retaining walls
5. Elevated - circular and rectangular water tanks (excluding staging)
6. Slab culvert bridges

Reference Books

CE P72 SEMINAR

Each one of the students will be assigned a Seminar Topic in the current and frontier areas. The student has to conduct a detailed study/survey on the assigned topic and prepare a report. The student will make an oral presentation followed by a brief question and answer session. The Seminar (presentation and report) will be evaluated by an internal assessment committee for a total of 100 marks.

CE P73 INDUSTRIAL VISITS /TRAINING

During the course of study from 3rd to 7th semester each student is expected to undertake a minimum of four industrial visits or undertake a minimum of two weeks of industry/field training. The students are expected to submit a report, which shall be evaluated by an internal assessment committee at the end of seventh semester for 100 marks.

CE PW7 PROJECT WORK (PHASE-I)

The objective of the project is to enable the students to work in groups of not more than four members in each group on a project involving analytical, experimental, design or combination of these in the area of Civil Engineering. Each project shall have a guide. The student is required to do literature survey, formulate the problem and form a methodology of arriving at the solution of the problem. The evaluation is based on continuous internal assessment by an internal assessment committee for 100 marks.
CE T81 CONSTRUCTION MANAGEMENT

Unit – I

Unit-II

Unit-III
Resource planning - planning for manpower, materials, costs, equipment. Labour, -Scheduling –Forms of scheduling - Resource allocation – budget and budgetary control methods

Unit-IV

Unit-V

Text Books
CE T82 DISASTER MITIGATION AND MANAGEMENT

Unit-I
Introduction to Disaster Management- Natural and Man made Disasters- International Year of Disaster Reduction

Unit-II

Unit-III
Man made Disasters- Chemical Industrial hazards, major power break downs, traffic accidents, Fire hazards etc.

Unit –IV
Use of remote sensing and GIS in disaster mitigation and management.

Unit- V
Risk and Vulnerability to disaster mitigation and management options- Warning and Forecasting.

Text Books

Reference Books
1. Selected Resources Published by the National Disaster Management Institute of Home Affairs, Govt. of India, New Delhi.
CE P81 DESIGN AND DRAWING – II

Detailed design and drawing of the following steel elements/structures.

1. Bilt-up columns with lacing and batten plates.
2. Column bases for columns subjected to axial force and bending moment
3. Beams and beam column joints.
4. Welded plate girder.
5. Gantry girder.
6. Roof trusses and joints including purlins.

Reference Books

2. Punmia, B.C., Ashok Kumar Jain and Arun Kumar Jain, Comprehensive design of steel structures, 2000

CE P82 COMPREHENSIVE VIVA-VOCE

The student will be tested for his understanding of basic principles of the core Civil Engineering subjects. The internal assessment for a total of 50 marks will be made by an internal assessment committee. The committee will conduct two written examinations of objective or short questions type from the all the core subjects. The external university examination, which carries a total of 50 marks, will be a Viva Voce examination conducted by a committee of one external examiner and one internal examiner appointed by the University.

CE P83 PROFESSIONAL ETHICAL PRACTICE

The course should cover the following topics by way of Seminars, Expert Lectures and Assignments:

Engineering Ethics – Moral issues, Ethical theories and their uses
Engineering as Experimentation – Code of Ethics
Engineer’s responsibility for safety
Responsibilities and rights
Global issues of engineering ethics,
Constitution of India

Reference Book

CE PW8 PROJECT WORK (PHASE II)

Project work phase II will be an extension of the project work started in the seventh semester. On completion of the work, a project report should be prepared and submitted to the department. The project work and the report will be evaluated by an internal assessment committee for 50 marks. The external university examination, which carries a total of 50 marks, will have report evaluation and viva voce examination conducted by a committee of one external examiner and one internal examiner appointed by the University.
ELECTIVES

CEE 61 PRE-STRESSED CONCRETE STRUCTURES

Unit – I
Introduction-Principles of pre-stressing-Materials-Losses-Systems of pre-stressing-Simple cable profiles-
Load balancing method.

Unit – II

Unit – III
Deflection of pre-stressed concrete members – Methods of pre-stressing-principles of partial pre-stressing –non-pre-stressed reinforcements-Analysis and Design of composite beams.

Unit-IV
Design of Tension and Compression members-Circular pre-stressing-Pipes- Water Tanks- Analysis and design –IS-Code provisions

Unit- V
Analysis of continuous beams –Primary moment-secondary moment-cable layout-Linear Transformation – Concordant cable.

Text Books

Reference Books
CEE 62 COASTAL ENGINEERING

Unit – I
Coastal zone: Definition and sub division – Factors influencing coastal topography - Waves: Definitions - Classification – Linear wave theory – Assumptions and derivations of relationships – Pressure within progressive wave – Wave energy – Problems

Unit – II

Unit – III
Wave forces on Structures: Force due to non breaking, breaking and broken waves on vertical, sloping, curved, stepped barriers and on piles – Problems.

Unit – IV
Sediment Movement : Types – Littoral Drift – Erosion process – Near shore, long shore currents and effects - Beach profile changes – case studies – Beach process - Environmental parameters- Coastal erosion in India - Dredging – Dredgers - Environmental effects of dredging - Remote sensing and GIS application in coastal engineering

Unit – V

Text Book

Reference Books
3. CEE 63 INDUSTRIAL WASTE DISPOSAL AND TREATMENT

Unit-I
Uses of water by Industry - Sources and types of wastewaters, quality criteria, effluent standards- Individual and common effluent treatment plants - Population equivalent, Effects of industrial wastes on streams, land, air and waste water treatment plants

Unit II
Pretreatment Methods: Process modification – methods and materials changes – Reduce, reuse and recycle methods, house keeping etc. to reduce waste discharge and strength of the waste and established methods for by products recovery within the plant operations

Unit-III

Unit-IV
Residuals of Industrial waste treatment —Characteristics of sludge – Thickening, digestion, conditioning, dewatering and disposal of sludge.

Unit –V

Text Books

Reference Books
Unit-I
Introduction: Need, advantages and disadvantages of Irrigation - Environmental effects - Types of Irrigation systems - Gravity irrigation, canals, Tanks, Wells and Irrigation galleries - Water lifts.

Unit - II
Irrigation Requirement: Evaporation, Evapo transpiration, Consumptive use and its estimation - Crop factor - Lysimeters - Effective rain fall and irrigation requirements - Water requirements of various crops - Duty of water - Quality of irrigation water.

Unit –III
Methods of Irrigation: Surface, subsurface and overhead methods - Check basin, border & furrow, Drip and sprinkler irrigation - Irrigation efficiency, Depth, Rate and frequency of irrigation - Irrigation schedule.

Unit – IV
Design of channels: Design of unlined and lined channels for irrigation - Location and design of canal regulation structures - Cross drainage structures - Measuring devices.

Unit – V
Land Development: Reclamation and management of saline & alkaline soils, water logging, Causes and remedial measures - Design, construction and maintenance of drainage systems.
Irrigation Management: Management of irrigation system - water charge assessment and water use management.

Text Books

Reference Books
Unit-I

Unit-II
Basic Principles: Concepts of beauty, unity, balance, composition, rhythm, harmony, style, character, integration, scale, proposition, contrast, shape and structure.

Unit-III

Unit-IV
Evolution of planning legislation in India – Organisation and administration of planning agencies at national, state, regional level and metropolitan level – building bye law – Function of local Authority – Provision of Building regulations.

Unit-V
Planning of Land uses: Residential area planning - Site & service programmes - Commercial areas - Industrial sites - rectangular areas, Principles of planning for traffic and transportation facilities - transport terminals pedestrian path and bikeways.

Text Books

Reference Books
CxEE 66 MASS TRANSPORTATION SYSTEMS

Unit-I
Role of Transportation: History of transit, Recent Trends in transit, Mass transportation characteristics, Demand Characteristics: Spatial, temporal and behavioral characteristics.
Mass Transportation Planning: Transportation demand surveys, Mass transportation demand estimation, Demand projection, Trip generation, Trip distribution, Model split and route assignment.

Unit-II
Terminals: Functions of terminals, Design, Typical Terminal characteristics.

Unit-III
Scheduling and Routes: Service analysis, Vehicle dispatch policy, Vehicle Requirements, Spacing of bus stops, Route spacing and performance.

Unit-IV
Management: Operational and management issues in transport planning, Reserved buslanes and signals, Vehicle monitoring and control system, Nodal coordination.

Unit-V
Special Systems: People mover systems, Underground transportation, para transit, RailTransit system, case studies.

Text Books

Reference Books
Unit - I
Modern Construction Methods - Open excavation, shafts and tunnels, pier and caisson foundation. Basement construction - construction Methods – supporting the excavations- control of ground water-shoring and underpinning- basement waterproofing.

Unit –II
Construction Methods for Bridges, roads railways, dams, harbours, river works and pipelines

Unit –III
Construction equipment and techniques for Earth moving, excavating, drilling, blasting, tunneling and hoisting and erection

Unit –IV
Equipment for: Dredging, tunneling, dewatering- Equipment for Flooring – dewatering and floors finishing

Unit –V
Equipment for production of aggregate and concrete – Crushers- feeders- screening equipment – batching and mixing equipment – hauling, pouring and pumping equipment – transporters

Reference Books
Unit-I


Unit-II

Drainage methods: Well point systems, deep well drainage, vacuum dewatering system, design of dewatering system – field permeability tests, dewatering by electro osmosis. Preloading, sand drains, wick drains- Thermal methods case studies.

Unit-III


Unit-IV


Unit-V

Geo synthetics: Geotextiles, Geogrids, Geomembranes, Geonets, Geomats, Geomeshes, principles Design and applications – Case studies.

Text Books

1. Koerner, R.M., Construction & Geotechnical methods in foundation engineering, MGH, New York, 1985
3. Purushothama raj. P. Ground improvement techniques, Laxmi Publications (P) Ltd, India

Reference Books

CEE 72 GEOGRAPHICAL INFORMATION SYSTEM

Unit I
Data entry, storage and maintenance Types of data – spatial and non-spatial information, Geographical concepts and terminology, Advantages of GIS. Basic Concepts of GIS, organisation of data in GIS.

Unit II
Field data, Statistical data, Maps, Aerial photographs, Satellite data, points, lines and areas features, Vector and Raster data, Advantages and Disadvantages, Data entry through keyboard, digitizers and scanners, digital data. Preprocessing of data – Rectification and registration, Interpolation techniques.

Unit III
Data analysis and modelling

Unit IV
Data output and error analysis Types of output data – display on screen – printer – plotter – other output devices – sources of errors – types of errors – elimination- accuracies

Unit V GIS Application
Application areas- resource management – agriculture- soil – water resources management – cadastral records and LIS integrated remote sensing application with GIS- knowledge based techniques - multi-criteria evaluation in GIS – introduction to object oriented data base models

Text Books
1. Geo Informational systems –Applications of GIS and related spatial information technologies, ASTER publications co., Chestern ( England) , 1992
CEE 73 HYDRAULIC STRUCTURES

Unit-I
Planning and Selection of Dams:
Planning, environmental considerations, storage requirements, sedimentation in reservoir, wave height and free board, selection of type of dam. Geological investigation, classification of insitu, rocks for Engineering purposes, foundation treatment, river diversion works.

Unit-II
Gravity dams: Definition, forces acting on the dam, nonoverflow and overflow sections, causes of failure, design principles, elementary profile of a dam, high and low dam, stability analysis, temperature control in dams, construction and contraction joints, Galleries in dams.

Unit-III
Arch Dam: Classification and type, factors affecting layout, simple design criteria – thin cylinder theory trial load analysis, elastic theory, cantilever and Arch analysis. Earth & Rock fill Dams: Types, profile and design principles of earth dams, height and top width, side slopes and its protection, core and casing, cutoff and seepage control, drainage system, construction methods and quality control.

Unit-IV
Spillways, sluices and crest gates: Definition and types of spillways, design storm and spillways capacity, energy dissipation, design criteria – design of crest gates and high head gates, supply and power sluices.

Unit-V
Instrumentation- Embedded instruments in dam section, foundation measurements of dam body, analysis of strain data, automatic control of dam safety.

Text Books
1. Sharma, H.D., Concrete Dams, Metropolitan, 2002,

Reference Books
2. Creager, Justin and Hinds Engineering for dams. Vol I.II.III
3. Das, M.M, Saikia, M.D Irrigation and Water Power Engineering, PHI, Learning (P) Ltd, 2009,
4.  CEE 74 FINITE ELEMENT ANALYSIS

Unit –I

Unit –II

Unit –III

Unit –IV
Basic concepts beam elements – Axisymmetric elements Tetrahedral, hexahedral elements – Formation of shape functions - mesh generation techniques – reduction of band width – static condensation.

Unit –V
Solution Techniques- Gauss elimination – Matrix Decomposition – Based a and Frontal solvers. Requirements of Pre and post processor in GUI based FE packages.

Text Books

Reference Books
Unit-I
Building Frames- Approximate methods – substitute frame analysis- Design of beam column joints -

Unit-II
Yield line theory- Equilibrium and Virtual Work method- Analysis and Design of Square, Rectangular and
Circular Slabs with different boundary conditions subjected to UDL and Concentrated loads, Hillerborg’s

Unit-III
Design of Deep Beams, Design of beams curved in plan.-Design of Silos and Bunkers,

Unit-IV
Redistribution of moments in RC beams- introduction-conditions- advantages- moment curvature relation-
ACI guidelines , Design for serviceability Limit states – Design calculations of deflections and crack width as
per IS456-2000.

Unit –V
Requirements for good formwork- Materials for forms- Loads on formwork - - Design of formwork –
Introduction to Composite Construction – behavior and design principles. Steel – Concrete Composite
Beams, Beams with in – situ slab and pre cast rib

Text Books
1. Purushothaman ,P, Reinforced concrete structural elements : Behavior, analysis and       design, Tata
2. Varghese P.C, Advanced Reinforced Concrete Design — Prentice- Hall of India Private
    Limited , New Delhi, 2002
    Company Ltd., New Delhi, 2002

References
CEE 76 FAILURE ANALYSIS AND REHABILITATION OF STRUCTURES

Unit – I

Unit-II
Agencies causing material deterioration - shrinkage, settlement, weathering, chemical attack, creep, fire, honey combing etc., durability of materials –Safety evaluation of existing structures

Unit-III
Structural and non structural cracks -Types of structural distress in foundations, roofs, floors, walls etc.

Unit-IV

Unit-V
Factors influencing corrosion of steel – Corrosion protection of steel structures – Masonry deterioration, Biocidal treatment and use of preservatives – Factors influencing deterioration of wood, use of sealants and adhesives and their role in repair of structures.

Text Books

Reference Books
CEE 77 BRIDGE ENGINEERING

Unit –I
History and Development of Bridges, Classification of Bridges-Investigations for culverts and minor bridge, Investigations for major bridge – Topography, catchment, hydrology, Geotechnical aspects, Construction Resources – Design Flood Discharge-Methods, Linear waterway.

Unit – II

Unit –III
Loading standards for road and railway bridges- Setting out for piers and abutments, Minor Bridges and Culverts, Single span Bridge, Multispan Bridge, Major/Important Bridges.

Unit –IV
Bridge superstructure – supports and centering for RC bridges – erection process of RC girders and steel girder bridges.

Unit –V
Maintenance-Inspection of bridges, Maintenance of substructure girders-Load testing on bridges-Temporary and movable bridges- Re-building of bridges- bridge failure.

Text Books

Reference Books
2. Singh, V.P Wells and Caissons, Nemchand & Sons,1979
Unit-I
History and types of water power development: History of water power development - water power development in India - Comparison of water power with thermal, nuclear and wind mills - Classification - High, Medium and Low Head schemes - Run off river plants - Storage power station - Tidal power plant - Recent experiences in wave power development - Underground power plants - Pumped storage schemes - Small and mini Hydropower systems - Power demand - Role of Hydropower in a grid.

Unit-II
Planning and Layout of Hydropower schemes: Investigation connected with hydropower development - Site selection, layout of hydro power plant- Capacity - Load factor and Load curve.

Unit-III
Design of Hydroelectric works: Necessities for the construction of a dam - Selection of type of Dam - Spillway, types and design – In take works, types - Design of Intake transition - Trashrack - Design of power canals and penstocks, penstock joints support structures, Elements of laying penstock lines – Water hammer - Rigid and elastic column theory - Characteristics Methods of determining pressure surges in penstocks –surge tanks

Unit-IV
Selection of suitable type and number of turbines - Layout and spacing of turbines. Types and spacing of turbines, tanks, and design, Power house - Types - Layout and spacing of units. Economics of Hydropower Installation: Basic factors in economic Analysis -, Cost of Hydroelectric power.

Unit-V
Mini Hydropower Systems: Small and min hydropower systems - Site selection, Hydrologic computations, Site development, Environmental Impact - Economic and Financial Feasibility.

Text Books

Reference Books
CEE 79 SITE INVESTIGATION METHODS AND PRACTICES

Unit- I
Objections, site investigation in Civil Engineering process, problem solving and various stages in site investigation process. Planning and Desk Study - topographic maps, aerial photographs, applications in site investigation and interpretation of aerial photographs, Geological maps, soil and planning maps, site reconnaissance and local enquiries.

Unit - II
Geological methods - different stages, Geological exploration methods - General principle distribution of physical field in subsurface - Electrical resistivity, Seismic refraction methods, their principle, methods of survey, correction to field data, Interpretation and limitations. Index and Mechanical properties of rocks, Laboratory and insitu tests.

Unit- III
Trial pits, shafts, tunnels, auguring, and different types of drilling methods, their merits and demerits, Bore hole logging techniques (subsurface geophysical exploration) - Need for logging techniques, classification and different types logging methods.

Unit - IV
Soil Exploration methods, samples, sampling procedure, sample disturbances, samplers, Factors controlling spacing and depth of bore hole, Insitu tests, SPT, SCPT, Pressure meter tests, interpretation and application, Laboratory testing, Index properties.

Unit - V
Technical Report writing, report format, recommendations for earth work structures, highway excavations and drainage works, dams, check report site preparation, investigation during construction and operation.

Text Books

References Books
Unit-I
Introduction: Pavement types, components, highway and airport pavements, complexities in pavement design. Design Factors: Sub grade - Significance, soil classification, assessment of strength characteristics, Traffic Loads, Climatic factors - variation in moisture content and applications, wheel load stresses, wheel load configurations in highway and airport pavements, ESWL, repetition of loads and EWL factors, transient loads. Problems.

Unit-II

Unit-III
Flexible pavement Design Methods: General design approaches; Design methods for highway and airport pavements - Group Index, FAA, CBR, Wyoming, Stabilometer, Triaxial test Mc Leod and by Burmister’s two layer theory. Problems.

Unit-IV
Stresses in Rigid Pavements and Design: Stresses due to wheel load and temperature, Westergard’s analysis, ESWL in rigid pavements, spacing of joints in CC Pavements, thickness design method, IRC design method for highway Pavement, Design of expansion and longitudinal joint details.

Unit-V

Text Books

Reference Books
5. CEE 711 MATRIX METHODS OF STRUCTURAL ANALYSIS

Unit – I

Unit – II
Matrix flexibility method Analysis of pin–jointed frames – effects due to lack of fit and temperature changes. Application to space frames – Direct flexibility approach.

Unit – III
Matrix stiffness method – Transformation of displacements – Elements stiffness to system stiffness – Application to continuous beams – effects of support settlements and elastic supports.

Unit – IV
Matrix stiffness method — Application to pin-jointed plane frames - support settlements – lack of fit and temperature effect. Analysis of three dimensional pinned frames.

Unit – V
Special analysis techniques – Condensation, Substructuring – reanalysis techniques – transfer matrix method. Analysis of frames with semi rigid connections.

Text Books

Reference Books
Unit I
Displacement and Load measurement devices - Strain gauges, principle, types, performance and uses – principle and applications - Hydraulic jacks and pressure gauges – Electronic load cells – Proving Rings – Calibration of testing Machines.

Unit II

Unit III

Unit IV

Unit V

Reference Books
Unit-I
Design of Portal Frames and Gable Frames

UNIT-II
Chimneys: Design of Self Supporting Chimney- Design principles of Guyed Chimney

Unit-III

Unit – IV
Design of steel storage structures – pressed steel tank – tanks with hemispherical bottom and supporting structures.

Unit – V
Introduction to design of semi rigid connections – cold formed steel structures – Pre-Engineered buildings- Construction: Tolerances: Fabrication tolerances- Erection Tolerances, Erection methods and stresses.

Text Books
4. Arya A.S.& Ajmani A.L.,” Design of Steel Structures”, Nemchand and Brothers, Roorkee

Reference
CEE 82 OPTIMIZATION TECHNIQUES FOR CIVIL ENGINEERING

Unit-I

Unit-II
Non-Linear Optimization-I: Single and multiple variable optimization algorithms, Search methods, gradient methods.

Unit-III
Non-Linear Optimization-II: Multi variable optimization Algorithms, constrained and unconstrained problems - search methods, gradient methods, Kuhntucker conditions.

Unit-IV
Dynamic programming Concepts: Backward recursion method - genetic programming, principle and concepts, simulated ANN, genetic Algorithms

Unit-V
Computer application in optimization: Optimization software for various Civil Engineering problems.

Text Books

Reference Books
Unit-I
Introduction: Geometrical Elements of open channel - Velocity distribution, Coefficients and their determination - Pressure distribution.
Uniform Flow: Energy and momentum Principles applied to prismatic and non-Prismatic channels - Critical flow - Computation and applications. Uniform flow-Manning’s and Chezy’s equations, Determination of Manning’s and Chezy’s constants - Computation of uniform flow - Applications of uniform flow concepts, Design of channels for uniform flow - Non-Erodable channels.

Unit-II

Unit-III
Spatially varied flow: Spatially varied flow - Dynamic equation, analysis flow profile, Numerical integration and isoclinal method.

Unit-IV
Rapidly Varied Flow: Rapidly varied flow - characteristics - Flow over spillways.

Unit-V
Flood Routing: Introduction to Flood routing.

Text Books

Reference Books
CEE 84 GROUND WATER HYDROLOGY

Unit-I

Unit-II
Well Hydraulics: Steady flow to a well in a confined aquifer, unconfined aquifer and a leaky confined aquifer - Unsteady flow to a well in a confined aquifer, an unconfined and a leaky confined aquifer-Effect of storage in a well of finite diameter - Partially penetrating wells - Method of images - Analysis of pump test data for the above aquifers - Problems.

Unit-III
Water wells: Types of wells - well design - construction - well development - Testing of wells for well yield - well completion and sanitary protection of wells.

Unit-IV
Model studies of Groundwater: Sand models - Electrical analog models -Viscous models - Membrane - Digital computer models, application of F.D. and F.E. methods (Elementary Treatment only).

Unit-V

Text Books

Reference Books
CEE 85 WATER RESOURCES SYSTEM ENGINEERING

Unit-I
Introduction: Scope and steps in systems Engineering - History of systems approach to water resources planning and management - Role of optimization models.

Unit-II
Optimization Techniques: Introduction to optimization - Classical optimization techniques, single and multivariable optimizations with and without constraints - Linear programming, simplex and revised simplex methods.

Unit-III
Duality in linear programming - Non linear programming - Dynamic and mixed integer programming - application of simulation techniques to water resources systems - Statistical decision theory and queueing theory.

Unit-IV
Application to water resources engineering: Objective and valuation criteria - input and demand analysis - System element and planning of subsystem, conveyance and storage subsystems and Irrigation system.

Unit-V
Application of various optimization techniques to water resources systems.

Text Books

Reference Books
CEE 86 MACHINE FOUNDATIONS

Unit-I
Introduction, nature of dynamic loads free vibrations of spring mass systems, forced vibrations viscous damping, principles of vibration measuring equipments.

Unit-II
Dynamic properties of soils: Elastic properties of soils, coefficient of elastic uniform and non uniform compression and shear, effect of vibration on the dissipative properties of soils, determination of dynamic properties of soils, Codal provisions.

Unit-III
Analysis and design of block type machine foundations: Review of methods for dynamic analysis- modes of vibration, foundations for machines inducing periodical forces and impact type forces.

Unit-IV
Design of framed foundations for high speed machinery: Special consideration in planning, principles design criteria, structural design- foundations for miscellaneous machines.

Unit-V
Vibration isolation, passive and active isolation, use of springs and springs and damping materials, construction aspects of machine foundations.

Text Books

Reference Book
Unit-I
Introduction, development of earth pressure theory, classical solutions, graphical techniques, active, passive cases, earth pressure due to external loads, Empirical approaches, arching of soil pressure in soils, grain elevators and coal bunkers.

Unit-II
Soil properties for retaining walls, forces on retaining walls, stability of retaining walls. Design of gravity and semi gravity, counter fort, cantilever retaining walls.

Unit-III
Types of sheet pile walls, analysis of cantilever and anchored sheet pile walls, Row’s theory and moment reduction, soil pressure on braced sheeting.

Unit-IV
Types and uses of coffer dams- analysis and design of cofferdams and design of diaphragm cofferdam, construction methods of double wall sheet pile cofferdams and moveable cofferdams.

Unit-V
Shoring and underpinning- earth pressure measuring techniques- load test on anchors prevention of slope failure.

Text Books

Reference Books
CEE 88 AIR AND NOISE POLLUTION

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

Unit-II
Meteorology and Air pollution – Atmospheric stability – Inversions – Mixing height –Plume behaviour –
Plume rise estimation – Effluent dispersion theories –Air pollutants Modelling.

Unit-III
Control of Air pollutants: particulates – Filters – Gravitational settling chambers – Centrifugal-multiple
type cyclones – Collection efficiency - Electrostatic precipitators – Wet collectors-Centrifugal spray
scrubbers - Venturi scrubbers.

Unit IV
Gaseous pollution control – Absorption - Principles – Description of equipment, Adsorption – Principal
adsorbents – Equipment descriptions – Condensation – Contact condensers Incineration –Equipment
description

Unit-V
Sound and noise - Source of noise pollution - Environmental and industrial noise -Effects of noise pollution
- Fundamentals of sound - generation, propagation, etc., Sound measurement, sound level meters –
Measures for prevention and control of noise -Environmental and industrial noise - Noise control
legislation.

Text Books
2. Environmental Pollution Control Engineering By C.S. Rao, New Age International
Publishers, 2006

Reference Books
CEE 89 ENVIRONMENTAL IMPACT ASSESSMENT

Unit-I

Unit-II
EIA methodologies – Appropriate Methodologies, Quantification, Cost benefit analysis - Risk assessment, Test Model format - Preliminary assessment

Unit-III

Unit-IV
Energy Impact: Energy impact considerations, data sources, energy conservation data, EIA of hydro, thermal and nuclear power plants, Vegetation and Wild life impact: Biological concepts and terms, impact on flora and fauna, mitigating measures, alternatives - Types, steps in performing socio economic impact assessment, analysis of public services and facilities, impacts, social impacts

Unit-V
Summarization of environmental impacts - Environmental Management plan, Public involvement - impacts of economic profile of the community, Exchange of information - comparison of alternatives-Training

References Books
CEE 810 DOCK AND HARBOUR ENGINEERING

Unit –I

Unit – II

Unit-III

Unit-IV

Unit – V

References
CEE 811  TRAFFIC ENGINEERING AND MANAGEMENT

Unit – I
Elements of Transportation Engineering: vehicle characteristics like weight, size, turning radius, concept of design vehicle. Human and Driver characteristics – PIEVE theory, comfort, concept of design driver. Road characteristics – surface conditions, slopes and curves. Control mechanisms. Terminal facilities.

Unit – II
Highway geometric design: introduction, road cross section parameters. Horizontal curves, vertical curves, channelization design. Fundamentals of traffic flow, uninterrupted traffic flow, interrupted traffic flow, speed studies and analysis, Highway capacity studies and analysis.

Unit – III

Unit-IV
Traffic Regulation and Safety: Regulation of speed - Vehicle and road users – Parking regulations - Parking and Traffic Control : Parking studies - Design of parking lots - Traffic signs - Road markings at different locations - Speed breaker Accident investigation - Accident data analysis.

Unit-V
Traffic Management: Legislation enforcement and education for traffic safety, Cost of road accidents, Measures for accident reduction Segregation of traffic, Tidal flow operation, Exclusive bus lane, oneway streets, Street lighting, Noise barrier.

Text Books

Reference Books
Unit-I
Introduction: History – distinction between aerial & terrestrial photographs – comparison of map and aerial photographs.

Unit-II
Tilted photographs, oblique photographs, rectification, ortho photographs (elementary treatment only). Fight planning – end lap and side lap – scale, flying height, season year.

Unit-III

Unit-IV

Unit-V

Text Books
CEE 813 PREFABRICATION AND CONSTRUCTION TECHNIQUES

Unit – I

Unit – II
Precast concrete components – Precasting and Prefabrication techniques, Planning, analysis and design considerations – Handling techniques – Transportation and erection of structures.

Unit- III
Skeletal and large panel construction, space structures – Joints in construction – curing techniques.

Unit- IV
Appropriate technology for cost effective techniques for roof, wall, door, water tanks etc.

Unit- V
Quality control –Repairs and economical aspects in prefabrication.

Text Books

Reference Books
3. Large Panel Prefabricated Constructions, Proc. of course conducted by SERC, Chennai.
CEE 814 EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Unit – I
Elements of seismology - Definitions of Magnitude, Intensity, Epicenter, etc., General features of tectonics of seismic regions, Seismographs. Seismic zones as per IS 1893-2002.

Unit – II
Theory of vibrations - Free vibrations of single degree, two-degree and multiple degree freedom systems, damping ratio, logarithmic decrement, Transmissibility, Response spectra

Unit – III
Principles of earthquake resistant design – Methods of dynamic analysis – Choice of the method - Architectural requirements of buildings – Plan and vertical irregularities.

Unit – IV

Unit – V

Textbooks

Reference Books
Unit- I

Unit- II
SDOF system subjected to periodic & impulsive loading, Fourier series loading, Rectangular pulse, Introduction to Frequency Domain analysis

Unit- III
SDOF systems subjected to general dynamic loading, Duhamel’s integral, Application to simple loading cases, numerical evaluation of response integral.

Unit- IV

Unit- V
Distributed- parameter Systems Free and forced Vibration of beams.

Text Books

References
CEE 816 THEORY OF ELASTICITY AND PLASTICITY

Unit I
Analysis of stress and strain - state of strain at a point - compatibility equations - generalized Hooke's Law - plane stress and plane strain.

Unit II
Airy's stress function - polynomials - biharmonic equations - Two dimensional problems in cartesian coordinates - Bending of a simple beam under uniform load – Triangular Gravity Wall.

Unit III
Solution of plane problems in Polar coordinates – Differential equation in polar coordinates – Hollow cylinder subjected to uniform pressure – Pure bending of curved beams – Rotating Disks

Unit IV
General solution of problems - Torsion of prismatic bars by displacement (warping function) force (Prandtls stress function) torsion of shafts of circular and non circular cross sectional shapes only (Elliptic, Triangular and Rectangular) - Torsion of thin rectangular sections and hollow thin walled sections.

Unit V

References
CEE 817 DESIGN OF INDUSTRIAL STRUCTURES

Unit I
Classification of Industrial Structures - Layout requirements - lighting and Ventilation - protection against noise and vibration - fire safety - factories act.

Unit II
Roofing configuration – types of trusses - Beams and lattice trusses - Type of roof covering materials - purlins - detailed design.

Unit III
Silos and Bunkers - Shape of hopper for different materials - design of vertical sides - hopper bottom - stiffening girder - staging -design - Conveyors and supporting structures.

Unit IV
Gable frames of uniform cross sections - varying depth – pin-jointed knee bracings - design of joints - analysis by various methods.

Unit V
Load Analysis and design of Transmission line Towers - Substation structures - Foundation analysis - Design Principle only.

Reference Books
2. Lother, "Advance Design in Steel Structure", Prentice Hall, USA, 1980
5. Arya and Ajmani, "Design of Steel Structures" Nem Chand Bros, Roorkee, 1990