

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat)

SCHEME OF STUDIES & EXAMINATIONS

B.Tech. 3rd YEAR (SEMESTER – V: CIVIL ENGINEERING)

Tentative Choice Based Credit Scheme w.e.f. 2020-21

| S. No. | Course No. | Course Title | Teaching Schedule | | | Marks of Class work | Examination Marks | | Total | Credit | Duration of Exam |
|--------------|------------|---|-------------------|----------|----------|---------------------|-------------------|------------|-------------|-----------|------------------|
| | | | L | T | P | | Theory | Practical | | | |
| 1 | CE301C | DESIGN OF STEEL STRUCTURES – I | 3 | 1 | | 25 | 75 | - | 100 | 4 | 3 |
| 2 | CE 303C | STRUCTURAL ANALYSIS - II | 3 | 1 | | 25 | 75 | - | 100 | 4 | 3 |
| 3 | CE305C | REINFORCED CONCRETE DESIGN – I | 3 | 1 | | 25 | 75 | - | 100 | 4 | 3 |
| 4 | CE307C | CONSTRUCTION ENGINEERING AND MANAGEMENT | 3 | - | | 25 | 75 | - | 100 | 3 | 3 |
| 5 | CE309C | GEO-MECHANICS | 3 | 1 | | 25 | 75 | - | 100 | 4 | 3 |
| 6 | CE 311C | TRANSPORTATION ENGINEERING - II | 3 | - | | 25 | 75 | - | 100 | 3 | 3 |
| 7 | CE | DE – I (SP) | 4 | - | | 25 | 75 | - | 100 | 4 | 3 |
| 8 | HUM301C | ESSENCE OF INDIAN TRADITIONAL KNOWLEDGE | 3 | - | | 25 | 75 | - | 100 | - | 3 |
| 9 | CE313C | REINFORCED CONCRETE DESIGN – I LAB | - | - | 2 | 25 | | 75 | 100 | 1 | 3 |
| 10 | CE315C | GEO-MECHANICS LAB | - | - | 2 | 25 | | 75 | 100 | 1 | 3 |
| 11 | CE317C | SURVEY CAMP* | - | - | 2* | 25 | | 75 | 100 | 1 | 3 |
| Total | | | 25 | 4 | 6 | 275 | 600 | 225 | 1100 | 29 | |

MOOC Geo-environmental Engineering (Environmental Geotechnology): Landfills, Slurry Ponds & Contaminated Sites

Note:

- The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator are prohibited in the examination.
- Electronics gadgets including Cellular phones are not allowed in the examination
- * Assessment of survey camp held after fourth semester.
- DE-I (SP) For only those students opting for degree with specialization
- Student can undertake 20% of the courses of this scheme (Hons./Minor Degree with Specialization in the listed emerging areas) through online platforms SWAYAM/MOOCs/NPTEL etc. with due permission of the chairperson.
- Any students of the B. Tech. of the University can opt for this scheme (Hons./Minor Degree with Specialization in the listed emerging areas), however, minimum 10 students are required for running a particular specialization.

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonapat)

SCHEME OF STUDIES & EXAMINATIONS

B.Tech. 3rd YEAR (SEMESTER – VI: CIVIL ENGINEERING)

Tentative Choice Based Credit Scheme w.e.f. 2020-21

| S. No. | Course No. | Course Title | Teaching Schedule | | | Marks of Class work | Examination Marks | | Total | Credit | Duration of Exam |
|--------|------------|---------------------------------|-------------------|---|---|---------------------|-------------------|-----------|-------|--------|------------------|
| | | | L | T | P | | Theory | Practical | | | |
| 1 | CE302C | ESTIMATING AND COSTING | 2 | - | 2 | 25 | 75 | - | 100 | 3 | 3 |
| 2 | CE304C | DESIGN OF STEEL STRUCTURES - II | 3 | 1 | | 25 | 75 | - | 100 | 4 | 3 |
| 3 | CE 306C | REINFORCED CONCRETE DESIGN – II | 3 | 0 | | 25 | 75 | - | 100 | 3 | 3 |
| 4 | CE 308C | FOUNDATION ENGINEERING | 3 | 0 | | 25 | 75 | - | 100 | 3 | 3 |

B. Tech. 3rd Year (V & VI semester only) Civil Engg.: Approved in 15th meeting of Academic Council held on 14.08.2020. applicable to all students admitted in 2018-19 & onwards and trailing students. The Scheme & Syllabi of VII & VIII semester shall be put up in 16th meeting of Academic Council.

CE301C: DESIGN OF STEEL STRUCTURES I

B. Tech. 3rd Year (Semester - V)

L T P Credits
3 1 - 4

Class Work : 25 Marks
Examination : 75 Marks
Total : 100 Marks
Duration of Examination : 3 Hours

USE OF RELEVANT INDIAN STANDARD IS ALLOWED IN THE EXAMINATIONS.

Course Outcomes :

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

| | |
|-----|---|
| CO1 | Apply the IS codes of practice for the design of steel structural elements. |
| CO2 | Analyze and design the behavior of various connections for both axial and eccentric forces. |
| CO3 | Design of compression and flexural members using simple and built-up sections. |
| CO4 | Analyze and design of column bases, tension members and gantry girder. |

Prepare CO-PO/PSO Articulation Matrix, e.g.:

| | PO1 | PO2 | PO3 | PO4 | PO6 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 3 |
| CO2 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | - | 2 | 2 | 2 |
| CO3 | 3 | 2 | 1 | 2 | - | 2 | 2 | 2 | 2 | 2 | 3 | 3 |
| CO4 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 |

UNIT I

B. Tech. 3rd Year (V & VI semester only) Civil Engg.: Approved in 15th meeting of Academic Council held on 14.08.2020, applicable to all students admitted in 2018-19 & onwards and trailing students. The Scheme & Syllabi of VII & VIII semester shall be put up in 16th meeting of Academic Council.

Introduction: Steel as Structural Material; Advantages and disadvantages of steel, Types of sections, Loads and combinations, design approaches – elastic and limit state methods, Indian standards codes.

Connections: Importance, various types of connections, Advantages and disadvantages of welded and bolted joints, design of bolted connections, efficiency and design of joints, design of welded connections.

UNIT II

Eccentric connections: Types of eccentric connections, Bolted and welded connections, Load lying in plane of joint, Load lying perpendicular to the plane of joint, Design of bolted and welded connections.

Tension Members: Types of failures, gross and net sectional areas, rupture of critical section, strength calculation, block shear failure, slenderness ratio, design of tension members, lug angles and tension splices. Design of tension member subjected to axial and bending.

UNIT III

Compression Members: Types of failures, strength calculation, effective length and slenderness ratio, design of compression member, design of built up compression member, laced and battened columns including the design of lacing and batten plate.

Flexural Members: Introduction to flexural members, Design criteria, permissible stresses, laterally supported beams and their design, laterally unsupported beams and their design, Built-up beams, design of purlins.

UNIT IV

Column Bases: Introduction, types of column bases, design of slab base and gusseted base, design of gusseted base subjected to eccentrically loading.

Plate Girders: Introduction, weight and economic depth, design of flanges, design of web, curtailment of flange plates, intermediate and bearing stiffeners.

Text Books

1. Design of Steel Structures, Dr. Subramanian Narayanan, Oxford publication.
2. Limit state design of Steel Structures, by S K Duggal, Tata McGraw Hill.

Reference Books

1. Design of Steel Structures, P. Dayaratnam, Wheeler Publishing, New Delhi.
2. Design of Steel Structures, M. Raghupathi, Tata McGraw Hill, New Delhi.

NOTE: 1. For the semester examination, nine questions are to be set by the examiner. Question no. 9, containing 5-7 short answer type questions, will be compulsory & based on the entire syllabus. Rest of the eight questions are to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit AND Question no. 9. All questions will carry equal marks.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing / ex-change of calculator or any other items are prohibited in the examinations. No programmable calculators, mobile phones or other electrical/ electronic items are allowed in the examination.

NOTE: For examiner for paper setting:- In semester examinations, examiner is required to set up question paper covering the entire syllabus in accordance with the examination reforms circulated by the AICTE & approved under item No. 14_18 of academic council.

CE303C: STRUCTURAL ANALYSIS - II

B. Tech. 3rd Year (Semester - V)

| L | T | P | Credits |
|---|---|----|---------|
| 3 | 1 | -- | 4 |

| | |
|-------------------------|-------------|
| Class Work | : 25 Marks |
| Examination | : 75 Marks |
| Total | : 100 Marks |
| Duration of Examination | : 3 Hours |

B. Tech. 3rd Year (V & VI semester only) Civil Engg.: Approved in 15th meeting of Academic Council held on 14.08.2020. applicable to all students admitted in 2018-19 & onwards and trailing students. The Scheme & Syllabi of VII & VIII semester shall be put up in 16th meeting of Academic Council.

Course Outcomes :

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

| | |
|-----|---|
| CO1 | Apply the basic concepts of matrix methods in structural analysis. |
| CO2 | Analyze the behavior of beams and frames during uneven support settlements. |
| CO3 | Understand the concept of space frames and its equilibrium conditions |
| CO4 | Identify the different load conditions for analyzing the multistory frames subjected to vertical and lateral loads. |

Prepare CO-PO/PSO Articulation Matrix, e.g.:

| | PO1 | PO2 | PO3 | PO4 | PO6 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 2 |
| CO2 | 3 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 3 | 2 |
| CO3 | 3 | 3 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 2 |
| CO4 | 2 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 2 |

UNIT - I

Introduction: Introduction to matrix algebra, systems approach: force and displacement methods and their comparison. Relationship between force method and displacement method, Design examples

UNIT - II

Slope and Deflection Method: Introduction, slope-deflection equations, analysis of statically indeterminate beams and rigid frames (sway and non-sway type) due to applied loads and uneven support settlements.

Moment Distribution Method: Introduction, absolute and relative stiffness of members, stiffness and carry-over factors, distribution factors, analysis of statically indeterminate beams and rigid frames (sway and non-sway type) due to applied loads and uneven support settlements, symmetrical beams and frames with symmetrical, skew-symmetrical and general loading.

UNIT - III

Kani's Method: Introduction, basic concept, analysis of statically indeterminate beams and rigid frames (sway and non-sway type) due to applied loadings and yielding of supports, symmetrical beams and frames, general case-storey columns unequal in height and bases fixed or hinged.

Approximate Analysis of Frame: Vertical and lateral load analysis of multistory frames, portal, cantilever and substitute-frame methods and their comparison.

UNIT - IV

Space Frames: Introduction, simple space truss, types of supports, equilibrium and stability conditions, analysis of determinate and indeterminate space frames using tension coefficient method.

PLASTIC ANALYSIS: Basics of plastic analysis, static and kinematic theorems for plastic analysis of beams and frames.

REFERENCE BOOKS

1. Indeterminate Structural Analysis C K Wang Tata McGraw Hill

TEXTBOOKS :

1. Basic structural analysis - C.S. Reddy
2. Structural Analysis- Thandvamoorthy TS Oxford University Press
3. Structural Analysis - Devdas Menon Narosa Publishing House

NOTE: 1. For the semester examination, nine questions are to be set by the examiner. Question no. 9, containing 5-7 short answer type questions, will be compulsory & based on the entire syllabus. Rest of the eight questions are to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt

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five questions in all, selecting one from each unit AND Question no. 9. All questions will carry equal marks.
 2. The students will be allowed to use non-programmable scientific calculator. However, sharing / ex-change of calculator or any other items are prohibited in the examinations. No programmable calculators, mobile phones or other electrical/ electronic items are allowed in the examination.

NOTE: For examiner for paper setting:- In semester examinations, examiner is required to set up question paper covering the entire syllabus in accordance with the examination reforms circulated by the AICTE & approved under item No. 14_18 of academic council.

CE 305C: REINFORCED CONCRETE DESIGN - I

B. Tech. 3rd Year (Semester - V)

L T P Credits
 3 1 -- 4

Class Work : 25 Marks
 Examination : 75 Marks
 Total : 100 Marks
 Duration of Examination : 3 Hours

USE OF RELEVANT INDIAN STANDRAD IS ALLOWED IN THE EXAMINATIONS

Course Outcomes :

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

| | |
|-----|---|
| CO1 | Understand design philosophies used in the design of RCC. |
| CO2 | Apply Indian Standards codal provisions correctly. |
| CO3 | Design Different types of beams, slabs and footings. |
| CO4 | Design columns subjected to axial loads and also subjected to moment. |

Prepare CO-PO/PSO Articulation Matrix, e.g.:

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 3 | 2 |
| CO2 | 2 | 2 | 2 | 2 | 3 | 1 | - | - | 2 | 1 | 2 | 2 | 3 | 2 |
| CO3 | 2 | 2 | 3 | 3 | 3 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 3 | 2 |
| CO4 | 2 | 2 | 3 | 3 | 3 | 1 | 1 | 2 | 2 | 1 | 2 | 2 | 3 | 2 |

UNIT I

Working Stress Design Method : Introduction, Assumptions, derivation of design constants, problems on computation of moment of resistance, determination of stresses, and design of rectangular beams reinforced in tension and compression, flanged beams and slabs.
 Design for shear and bond and torsion, Permissible shear strength, maximum shear strength, shear reinforcement and design procedure for shear reinforcement, bond and development length, anchoring and curtailment of bars.

UNIT II

Limit State Design Method : Introduction, Limit States, Characteristic values, characteristic strength, characteristic loads, design values for materials and loads, factored loads. Limit State of Collapse (Flexure) Types of failures, assumptions for analysis and design of singly reinforced, doubly reinforced sections, and flanged sections. design of singly reinforced, doubly reinforced sections, and flanged sections.
 Design of rectangular beam section for torsion, development length, continuation of reinforcement (beyond cut off points). Limit State of Collapse (Compression) Columns and their classification, reinforcement in columns, assumptions, short and long (both tied and helical) columns subjected to axial load, short columns subject to axial, uniaxial and biaxial bending.

UNIT III

Slabs: Introduction to one way and two-way slabs, Design examples. Advantages of flat slabs, general design considerations, approximate direct design method, design of flat slabs, design examples.

Civil Engg.: Approved in 15th meeting of Academic Council held on B. Tech. 3rd Year (V & VI semester only) 14.08.2020. applicable to all students admitted in 2018-19 & onwards and trailing students. The Scheme & Syllabi of VII & VIII semester shall be put up in 16th meeting of Academic Council.

Foundations: Isolated footings, Combined footings, rectangular, trapezoidal, strip, strap, raft footings

UNIT IV

Text Books

1. Reinforced Concrete Design, M.L. Gambhir, Macmillan India Limited, New Delhi
2. Limit State Design of Reinforced Concrete, A.K. Jain, Nem Chand Brothers, Roorkee.
3. Limit State Design, Ram Chandra, Standard Book House, New Delhi

Reference Books

1. Reinforced Concrete Design, Pillai & Menon, Tata McGraw Hill Publishers, New Delhi
2. Reinforced Concrete Structures by Paulay and Thomas Park
3. Reinforced Concrete Design by Nilson and Winter
4. Reinforced Concrete Fundamentals Keith by Ferguson

NOTE: 1. For the semester examination, nine questions are to be set by the examiner. Question no. 9, containing 5-7 short answer type questions, will be compulsory & based on the entire syllabus. Rest of the eight questions are to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit AND Question no. 9. All questions will carry equal marks.

2. The students will be allowed to use non-programmable scientific calculator. However, sharing / ex-change of calculator or any other items are prohibited in the examinations. No programmable calculators, mobile phones or other electrical/ electronic items are allowed in the examination.

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CE307C : CONSTRUCTION ENGINEERING AND MANAGEMENT

B. Tech. 4th Year (Semester-VII)

L T P Credits

3 - - 3

Class Work : 25 Marks

Examination : 75 Marks

Total : 100 Marks

Duration of Examination : 3 hours

Course Outcomes:

Students will be able to:

- 1: Do basic planning for a construction project.
- 2: Draw networks and solve using CPM and PERT.
- 3: Perform resource allocation for a project.
- 4: Do project monitoring and control.
- 5: Perform quality assurance and control.

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|
| CO1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 |
| CO2 | 2 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 1 | 3 | 2 | 3 | 3 | 3 |
| CO3 | 2 | 1 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 |
| CO4 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 |

Unit-I

Basics of Construction- Unique features of construction, construction projects types and features, phases of a project, agencies involved and their methods of execution;

Construction project planning- Stages of project planning: pre-tender planning, pre-construction planning, detailed construction planning, role of client and contractor, level of detail. Process of

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development of plans and schedules, work break-down structure, activity lists, assessment of work content, concept of productivities, estimating durations, sequence of activities, activity utility data; Techniques of planning- Bar charts, Gantt Charts.

Unit-II

Networks: basic terminology, types of precedence relationships, preparation of CPM networks: activity on link and activity on node representation, computation of float values, critical and semi critical paths, calendaring networks.

PERT- Assumptions underlying PERT analysis, determining three time estimates, analysis, slack computations, calculation of probability of completion.

Unit-III

Construction Equipment basics: Conventional construction methods Vs Mechanized methods and advantages of latter; Equipment for Earthmoving, Dewatering; Concrete mixing, transporting & placing; Cranes, Hoists and other equipment for lifting; Equipment for transportation of materials. Equipment Productivities

Planning and organizing construction site and resources- Site: site layout including enabling structures, developing site organization, Documentation at site; Manpower: planning, organizing, staffing, motivation; Materials: concepts of planning, procurement and inventory control; Equipment: basic concepts of planning and organizing;

Funds: cash flow, sources of funds; Histograms and S-Curves. Earned Value; Resource Scheduling- Bar chart, line of balance technique, resource constraints and conflicts; resource aggregation, allocation, smoothening and leveling. Common Good Practices in Construction

Unit-IV

Project Monitoring & Control- Supervision, record keeping, periodic progress reports, and periodical progress meetings. Updating of plans: purpose, frequency and methods of updating. Common causes of time and cost overruns and corrective measures. Basics of Modern Project management systems such as Lean Construction; Use of Building Information Modeling (BIM) in project management;

Quality control: concept of quality, quality of constructed structure, use of manuals and checklists for quality control, role of inspection, basics of statistical quality control. Safety, Health and Environment on project sites: accidents; their causes, effects and preventive measures, costs of accidents, occupational health problems in construction, organizing for safety and health.

Text/Reference Books:

1. Varghese, P.C., "Building Construction", Prentice Hall India, 2007.
2. National Building Code, Bureau of Indian Standards, New Delhi, 2017.
3. Chudley, R., Construction Technology, ELBS Publishers, 2007.
4. Peurifoy, R.L. Construction Planning, Methods and Equipment, McGraw Hill, 2011
5. Nunnally, S.W. Construction Methods and Management, Prentice Hall, 2006
6. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015
7. Punmia, B.C., Khandelwal, K.K., Project Planning with PERT and CPM, Laxmi Publications, 2016.

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B. Tech. 3rd Year (Semester – V)

CE309C : GEO-MECHANICS

L T P Credits
3 1 -- 4

Class Work : 25 Marks
Examination : 75 Marks
Total : 100 Marks
Duration of Examination : 3 Hours

Course Outcomes : After completion of this course the students would be able to:

| | |
|-----|--|
| CO1 | Decide the location of various Civil Engineering projects from Geological considerations. |
| CO2 | Understand Process of weathering of rocks and formation of soil, Properties of different types of soils, and their classifications. |
| CO3 | Analyse the stresses at different points (subsurface), under different loading conditions and Determine the Compaction and Consolidation behavior of soil. |
| CO4 | Understand permeability of the soil and its determination and Analyse the Shear Strength of the soil. |

CO-PO/PSO Articulation Matrix :

| | PO1 | PO2 | PO4 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 3 | 3 | 1 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| CO2 | 2 | 3 | 1 | 2 | 1 | - | 1 | 1 | 2 | 2 | - | 1 |
| CO3 | 2 | 2 | 2 | 1 | - | - | - | 1 | 1 | 1 | 2 | 1 |
| CO4 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 |

UNIT I

Introduction to Engg. Geology: Importance of Engineering Geology, Geological considerations in the Civil Engineering projects, such as Highways, foundations, dams and reservoirs. Weathering: Agents and effects, Geological works of rivers, wind, glaciers and oceans as agents of erosion, transportation and deposition, resulting features and engineering importance.

Basic Soil Properties: Importance of soil mechanics for Civil Engg., Index properties of soils, Phase relationships and their derivations; Sieve & Hydrometer analysis and Particle Size Distribution Curves, Atterberg's limits, Various soil types, Soil map of India, sensitivity, thixotropy. Indian standard and Unified classification systems of soils.

UNIT II

Permeability of soil: Relevance of permeability in Civil engineering, Darcy's law, Discharge Velocity and Seepage Velocity, Validity of Darcy's Law, Factors affecting permeability, Laboratory and field determination of permeability. Average permeability of layered soils.

Seepage Analysis: Types of head, seepage forces, quick sand condition and critical hydraulic gradient. Flow net and its properties, Laplace equation, methods of drawing flownet. Seepage through earth dams, exit

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gradient and seepage pressures, Determination of Phreatic Line of an earth dam with or without filter, Phenomenon of piping.

UNIT III

Compaction: Concept of Compaction, Water Content Density relationship, Zero Air Voids Line, Standard Proctor and Modified Proctor test, OMC, Placement Water Content, Field Compaction Control, Factors affecting compaction, Field Compaction Methods, Suitability of various compaction equipment.

Consolidation: One dimensional consolidation, Terzaghi's spring analogy of consolidation process, Difference between Primary and Secondary Consolidation, Pressure Void Ratio relationships for the consolidation of laterally confined soil, Normally Consolidated, Over Consolidated and Under consolidated soils, determination of pre-consolidation pressure, Coefficient of Compressibility, Coefficient of Volume Change, Coefficient of Consolidation and its relationship (derivation also) with coefficient of permeability.

UNIT IV

Stresses in Soils: Boussinesq Equations, its assumptions and Pressure distribution diagrams such as stress isobar or Pressure Bulb, Vertical Pressure distribution on a horizontal plane, Influence Diagram, Vertical pressure distribution on vertical line, Vertical Pressure under a uniformly loaded circular area, Vertical Pressure under Strip load, Vertical Pressure due to a Line Load, Equivalent Point Load Method, Newmark's Influence Chart.

Shear Strength: Concept, Mohr's circle of Stress, Mohr Coulomb Failure Theory, Effective Stress principle, Measurement of Shear strength (Direct Shear Test, Triaxial Shear Test, Unconfined Compression Test, Vane Shear Test), Drainage conditions.

Text Books:

1. Basic and Applied Soil mechanics by Gopal Ranjan & A.S.R. Rao, New Age Publisher, New Delhi.
2. Soil Mechanics and Foundations by B. C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publications, New Delhi.
3. A text book on Soil Mechanics and Foundation Engineering by V.N.S. Murthy, U.B.S. Publisher, New Delhi.
4. Geotechnical Engg. by Parshotham Raj, Tata McGraw Hill, New Delhi.

Reference Books:

1. Soil Mechanics by R. F. Craig, Chapman and Hall, U.K.
2. Principles of Soil Mechanics by B.M. Das, PWS and Kent Publisher USA.
3. Geotechnical Engg. by Venkatramaiah, New Age Publisher, New Delhi.
4. Modern Geotechnical Engineering Alam Singh

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2. The students will be allowed to use non-programmable scientific calculator. However, sharing / ex-change of calculator or any other items are prohibited in the examinations. No programmable calculators, mobile phones or other electrical/ electronic items are allowed in the examination.

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CE311C: TRANSPORTATION ENGINEERING – II

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L T P Credits
3 - - 3

B. Tech. 3rd Year (Semester – V)

Class Work : 25 Marks
Examination : 75 Marks
Total : 100 Marks
Duration of Examination: 3 Hours

COURSE OUTCOMES:

After completion of this course the students will be able to:

1. Design structural and geometric components of permanent way.
2. Design of signaling and interlocking systems.
3. Understand methods of railway tunneling.

CO-PO/PSO Articulation Matrix

| | PO1 | PO2 | PO4 | PO6 | PO7 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 3 | 3 | 1 | 2 | - | - | 1 | 1 | 1 | 3 | - |
| CO2 | 2 | 2 | 1 | 2 | - | 2 | 1 | 1 | 1 | 3 | - |
| CO3 | - | - | 1 | 1 | 1 | - | 1 | 1 | 1 | - | 2 |
| CO4 | - | - | 1 | 1 | - | - | 1 | 1 | 1 | - | 2 |
| CO5 | 3 | 3 | 1 | 2 | - | - | 1 | 1 | 1 | 3 | - |

1: Slight (Low); 2: Moderate (Medium); 3: Substantial (High) “-”: no correlation

UNIT – I

Introduction: Role of railways in transportation, historical development of railways.

Permanent way and components: gauges in railway tracks, typical railway track cross-section, coning of wheels, Function of rails, requirement of rails, types of rail sections – comparison of rail types, length of rail, rail wear, rail failures, creep of rails, rail fixtures and fastenings – Fish plates, spikes, bolts, chairs, keys, bearing plates. Sleepers: Functions and requirements of sleepers, classification of sleepers, timber, metal and concrete sleeper, comparison of different types of sleepers, spacing of sleepers and sleeper density. Ballast: Function and requirements of ballast, types, comparison of ballast materials.

UNIT – II

Geometric design: Vertical and horizontal alignment, horizontal curves, super elevation, equilibrium, cant and cant deficiency, length of transition curve, gradients and grade compensation. Stations and yards, and their classification, Points and crossings: introduction, necessity of points and crossings, turnouts, points and crossings, design of a simple turnout.

UNIT – III

Track safety; Signaling and Interlocking: objects of signaling, engineering principle of signaling, classification control of train movements, absolute, automatic block system, centralized control system, AFS. Interlocking: definition, necessity and function, methods of interlocking, mechanical devices for interlocking. Traction and tractive resistance, stresses in track, Equipments, Mechanized Maintenance, modern methods of track maintenance, rehabilitation and renewal of track; Track Recording & track Tolerances, Mass Rapid Transport Systems, High Speed Trains, Present & Future, modernization of railway tracks, railway systems in modern era.

UNIT – IV

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Railway tunneling: Necessity/advantage of a tunnel, Classification of Tunnels, Size and shape of a tunnel, Alignment of a Tunnel, Portals and Shafts, , Mucking, Lighting and Ventilation in tunnel, Dust control, Drainage of tunnels, Safety in tunnel construction. Methods of Tunneling in Hard Rock and Soft ground: Cut and cover method, Bored tunnel method, Clay kicking method, Shaft method, Pipe jacking method, Box jacking method, Underwater tunnels.

Text Books

- 1.Railway Engineering by Arora and Saxena, Dhanpat Rai & Sons, New Delhi
- 2.Railway Engineering by Rangawala, Charotar Publishing House, Anand
- 3.Railway Engineering by M.M. Aggarwal

Notes:

NOTE: 1.For the semester examination, nine questions are to be set by the examiner. Question no. 9, containing 5-7 short answer type questions, will be compulsory & based on the entire syllabus. Rest of the eight questions are to be set by setting two questions from each of the four units of the syllabus. The candidates will be required to attempt five questions in all, selecting one from each unit AND Question no. 9. All questions will carry equal marks.

2.The students will be allowed to use non-programmable scientific calculator. However, sharing / ex-change of calculator or any other items are prohibited in the examinations. No programmable calculators, mobile phones or other electrical/ electronic items are allowed in the examination.

NOTE: For examiner for paper setting:- In semester examinations, examiner is required to set up question paper covering the entire syllabus in accordance with the examination reforms circulated by the AICTE & approved under item No. 14_18 of academic council.

CE313C: REINFORCED CONCRETE DESIGN-I LAB

B. Tech. 3rd Year (Semester - V)

| L | T | P | Credits |
|---|---|---|---------|
| - | - | 2 | 1 |

| | |
|-------------------------|-------------|
| Class Work | : 25 Marks |
| Examination | : 75Marks |
| Total | : 100 Marks |
| Duration of Examination | : 3Hours |

Course Outcomes :

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

| | |
|-----|--|
| CO1 | Use the software tool Auto Cad. |
| CO2 | Understand the structural drawings of various building components. |
| CO3 | Understand the codal provisions of Indian Standards for detailing. |
| CO4 | Test various types of aggregates and cement |

Prepare CO-PO/PSO Articulation Matrix, e.g.:

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 2 | 2 | 2 | 2 | 3 | 1 | 1 | 1 | 2 | 2 | 3 | 2 |
| CO2 | 2 | 2 | 2 | 1 | 3 | 1 | 2 | 1 | 1 | 2 | 3 | 2 |
| CO3 | 2 | 2 | 2 | 2 | 3 | 1 | 1 | 2 | 2 | 2 | 3 | 2 |

A. Structural Drawings through AUTOCAD of the followings

1. Reinforced concrete beams
2. Simply supported and cantilever slabs
3. Flat slabs
4. Columns.

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5. Footings.

B. Testing of cement:

1. Setting time
2. Fineness
3. Specific gravity
4. Compressive strength

C. Testing of aggregates:

1. Specific gravity
2. Water absorption
3. Fineness modulus
4. Bulking of fine aggregates

D. Testing of Concrete for Strength

B. Tech. 3rd Year (Semester – V)
CE315C : GEO-MECHANICS LAB

| L | T | P | Credits |
|---|---|---|---------|
| | | 2 | 1 |

| | |
|-------------------------|-------------|
| Class Work | : 25 Marks |
| Examination | : 75 Marks |
| Total | : 100 Marks |
| Duration of Examination | : 3 Hours |

Course Outcomes: Upon successful completion of the course, the students will be able to:

| | |
|-----|--|
| CO1 | Understand variation of Geological features and variation of soil in India, from maps. |
| CO2 | Have clear understanding of Folds and Faults and various other geological features. |
| CO3 | Analyze and Determine various properties of soils and their classification. |
| CO4 | Work with various laboratory equipment and test procedures. |

CO-PO/PSO Articulation Matrix :

| | PO1 | PO2 | PO4 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|
| CO1 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| CO2 | 2 | 3 | 2 | 2 | 2 | - | 2 | 1 | 2 | 2 | 2 | 1 |
| CO3 | 2 | 2 | 1 | 1 | 2 | - | 1 | 1 | 1 | 2 | 1 | 1 |
| CO4 | 2 | 1 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 |

List of Experiments:

1. Study of Geological features, from the maps.
2. Study of Folds, from the models.
3. Study of Faults, from the models.
4. Study of Soil map of India.
5. Determination of water content of soil, by Oven Drying method.
6. Determination of water content of soil, by Pycnometer.
7. Determination of field density and dry unit weight by Core cutter method.
8. Determination of Specific Gravity of soil, by Pycnometer.
9. Determination of field density by Sand replacement method.
10. Grain size Analysis by Mechanical Method.
11. Grain size Analysis by Hydrometer Method.
12. Determination of Liquid Limit.
13. Determination of Plastic Limit.

13. Determination of Plastic
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14. Classification of a given soil sample based on the above determined properties.

References Books:

1. Soil Mechanics and Foundations by B. C. Punmia, Ashok Kumar Jain & Arun Kumar Jain, Laxmi Publications, New Delhi.

Note: Ten experiments are to be performed in the Semester taking atleast seven experiments from the above list. Remaining three experiments should be performed as designed & set by the concerned Institution as per the scope of the syllabus.

CE 317C: Survey Camp

B. Tech. 3rd Year (Semester - V)

L T P Credits
-- -- 2 1

Class Work : 25 Marks
Examination : 75 Marks
Total : 100 Marks
Duration of Examination : 3 Hours

Course Outcomes: This training of survey camp will provide a student
ii. Knowledge of different components of surveying such as triangulation, topography, mapping
iii. Utilization of equipment used in surveying

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO9 | PSO1 | PSO2 | PSO3 |
|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3 | 2 | 2 | 2 | 2 | 3 | 1 | 3 | 2 |
| CO2 | - | 1 | - | - | 3 | 3 | 1 | 3 | 1 |

Survey Camp: Civil Engineering Surveying Practical Experience is a Two-Three week course between the spring and summer semesters. Each day is about eight hours long and full of hands-on experience with surveying and map preparation. Teams of 4-6 students will work with faculty, practicing surveyors and use their equipment out in the field. The camp will provide a necessary foundation for any engineer. It will teach them how surveying is applied to engineering projects and what they need to know in order to review survey data. The students will prepare map of an area following various steps like establishment of control points, Triangulation, computations, error adjustment, plotting details on map and contouring .

The students for this course shall be evaluated in 5th semester by a Committee consisting of three teachers to be constituted by the Chairperson of the Department.

Teachers associated with evaluation work will be assigned 2 periods per week load.

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