

Title of Subject	:	<u>Environmental Engineering-I (Th + Pr)</u>	
Code	:	CE351	
Discipline	:	Civil Engineering (6 th Semester)	
Effective	:	19-Batch and onwards	
Pre-requisite	:	---	Co-requisite: Nil
Assessment	:	Theory: 20% Sessional, 80% Written Semester Examination (20% Mid, 60% Final) Practical: 40% Sessional, 60% Final Examination	
Credit Hours	:	02 + 01	Marks: 50 + 50
Minimum Contact Hours:	:	30 + 45	

Course Learning Outcomes (CLOs):

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

CLO	Description	Taxonomy Level	PLO
1	DESCRIBE the characteristics of potable water used in daily life, environmental legislations and management.	C2	1
2	<i>EVALUATE the water treatment plant unit and water distribution networks.</i>	C5	4
3	PRACTICE various laboratory and field tests to obtain physical, chemical and biological properties of water.	P3	4

Course outline:

PART I. INTRODUCTION TO ENVIRONMENTAL ENGINEERING

Understanding the environment (basic concepts) and environmental engineering, Importance for civil engineers, Basic facts.

PART II. ENVIRONMENTAL LEGISLATION AND MANAGEMENT

Environmental issues of urban and rural areas, Environment and sustainable development, Role of various environmental agencies and NGOs to prevent environmental degradation, National Environmental Quality Standards (NEQS). Environmental Impact Assessment (EIA).

PART III. WATER SUPPLY ENGINEERING

Subject Overview, Water demands, Water quality, Water treatment

- **Water Demands**

Various types of water demand, Estimation of water use: per capita demand, factors affecting water use, variations in demand and their effects on the design of a water supply project components, Design periods and factors governing design periods, Pollution forecast, and methods of population forecast, Water sources.

- **Water Quality**

Hydrological cycle and water quality, Water characteristics, Sampling methods, Water quality analysis, Water quality parameters/monitoring.

- **Water Treatment Unit Processes/Operations**

Standard water treatment methods: screening, sedimentation, coagulation, filtration and disinfection, water softening, special water treatment methods.

- **Water Supply Projects**

Importance and necessity of planned water supplies, Planning and preparing a water supply project: data to be collected, analysis of data and project formulation, project drawings, project estimates, project supervision and reporting.

- **Water Collection**

Water collection methods, Intakes, factors governing location of intake, types of intake, design of intake.

- **Water Conveyance**

Conduit and its types, Pumps, types of pumps and design of a pumping Station.

- **Design of Water Treatment Plant**

Design of various water treatment unit operations: screens, plain sedimentation tanks, coagulant dose, coagulation-cum-sedimentation tanks/clarifiers/dissolved air floatation tanks, filters, chlorination dose, dewatering and sludge disposal.

- **Water Distribution**

Water supply system, Water distribution methods: requirements of a good distribution system, design of distribution systems forces (stresses) acting on pipes, materials for pressure conduits, pipe appurtenances, pipe fittings, laying and testing of water supply lines, Design of service reservoirs, Detection of water wastage in distribution pipes, House water connections.

Practical Work to be carried out:

1. Introduction of Environmental Engineering lab and HSE measures.
2. Sample preparation techniques including Dilution, Filtration/Centrifugation, Solid phase extraction, Digestion and Distillation.
3. To determine the Turbidity contents of given sample of water.
4. To determine the Suspended Solids / Non-filterable residue in sample of water.
5. To prepare different water samples of varying pH and Total Dissolved Solids (TDS) and to determine pH, TDS and Electrical Conductivity (EC) of prepared water samples.
6. To determine the Taste and Odour value of given water sample.
7. To determine the Acidity of given sample of water.
8. To determine the Alkalinity of given sample of water.
9. To determine the Hardness of given sample of water.
10. To determine the Chloride Concentration in given sample of water.
11. To determine the Sulphates in given sample of water.
12. To determine the Total Chlorine Concentration in given sample of water.
13. Determination of Jar Test (Alum dose selection) for turbid waters.
14. Determination of Dissolved Oxygen (D.O).
15. To perform an open-ended lab.

Recommended Books:

1. Water Supply Engineering, S. K. Garg, Khana Publication Delhi. Latest Edition
2. Water Supply Engineering and Sewerage, E. W. Steel and T.J. Mcghee, Me Graw Hill Company, Latest Edition
3. Environmental Pollution and control, P.Aarne. Ves. Lined and J.Jaffery Peirce, Me Graw Hillinc USA, Latest Edition
4. Environmental Management, Dr. Biswaryo Mukherjee, Viskas Publishing House Pvt Ltd, Latest Edition

Approval:

Board of Studies:

Resolution No. 32.3

Dated: 03-10-2020

Board of Faculty:

Resolution No. 20.11

Dated: 07-10-2020

Academic Council:

Resolution No. 98.7(ii)

Dated: 22-10-2020

Title of Subject	:	<u>Soil Mechanics (Th + Pr)</u>	
Code	:	CE326	
Discipline	:	Civil Engineering (6 th Semester)	
Effective	:	18-Batch and onwards	
Pre-requisite	:	Engineering Geology	Co-requisite: ----
Assessment	:	Theory: 20% Sessional, 80% Written Semester Examination (20% Mid, 60% Final) Practical: 30% Sessional, 60% Final Examination	
Credit Hours	:	03 + 01	Marks : 100 + 50
Minimum Contact Hours:		45 + 45	

Course Learning Outcomes (CLOs):

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

CLO	Description	Taxonomy Level	PLO
1	DEMONSTRATE index properties of soils and carry out classification of soils.	C3	4
2	ANALYZE the range of soil related problems especially those involving in-situ stresses, flow of water through soils and consolidation settlement of soils.	C4	4
3	PRACTICE laboratory testing to determine index properties of soil, flow of water through soil and consolidation parameters of soil.	P3	4

Course outline:

- **Introduction**

Importance of mechanics of soils in Civil Engineering, Difficulties in predicting the behaviour of soils as a construction and load bearing material, Formation and type of soils.

- **Index Properties of Soil**

Phase diagrams of soil, Phase relations of soil: water content, void ratio, porosity, degree of saturation, air content, percentage air voids, unit weights and specific gravity, Weight-Volume relationships and their derivations, Consistency of soils, States of consistency and Atterberg's limits, Determination of Atterberg's limits and consistency indices, Grain Size distribution of soils: particle size distribution curves, sieve analysis, Stoke's law, hydrometer analysis.

- **Soil Classification**

Particle size classification systems, AASHTO classification system, Unified soil classification system, Identification and classification of expansive soils, Collapsible and dispersion soils.

- **Soil Water**

Modes of occurrence of water in soil absorbed / adsorbed water, Capillary water.

- **In Situ Stresses**

Stress condition in soil: effective and neutral stresses, stresses in saturated soils with upward and downward seepages.

- **Permeability of Soil**
Permeability, Darcy's law, Factors affecting permeability, Permeability of stratified soils, Laboratory and field determination of permeability.
- **Seepage in Soils**
Seepage, Hydraulic potential, Hydraulic gradient, and seepage pressure, Quick sand condition and critical hydraulic gradients, Introduction to Flow nets: Flow lines, equipotential lines, seepage calculation from a flow net, Liquefaction, Piping.
- **Consolidation**
Settlement and its types, Consolidation and its importance, Mechanics of consolidation, Spring water analogy, Theory of one-dimensional consolidation: assumptions and validity, Laboratory consolidation tests, Graphical representation of data, Compression index, Coefficient of compressibility, Time factor, Calculation of voids ratio and coefficient of volume change, Degree of consolidation, Primary and secondary consolidation, Normally and pre-consolidated clays, Determination of pre-consolidation pressure and over consolidation ratio.

Practical Work to be carried out:

1. Introduction to the Soil Mechanics Laboratory and HSE (Health, Safety and Environment) measures.
2. Collection of soil samples from field and to prepare the representative soil sample for laboratory testing:
 - a). Quartering Method
 - b). Riffle Box Method
3. To determine the water content of soil sample by:
 - a). Oven Drying Method
 - b). Hot Plate Method
 - c). Sand Bath Method
 - d). Speedy Moisture Tester
 - d). Infrared Moisture Tester
4. To determine the particle size distribution of coarse grained soil by Sieve Analysis.
5. To determine the particle size distribution of fine grained soil by Hydrometer Analysis.
6. To determine the liquid limit of fine grained soil by Casagrande Apparatus
7. To determine the liquid limit of fine grained soil by Fall Cone (Penetrometer) Method.
8. To determine the plastic limit of the fine grained soil by Glass Plate/Fall Cone Method.
9. To determine the shrinkage limit of fine grained soil.
10. To determine the specific gravity of fine grained soil by Density Bottle Method.
11. To determine the coefficient of permeability of coarse grained soil by Constant Head Method.
12. To determine the coefficient of permeability of fine grained soil by Falling Head Method.
13. To determine consolidation parameters of saturated fine grained soil by One Dimensional Consolidation Test.
14. To determine free swell of clayey soils.
15. To perform an open-ended lab.

Recommended Books:

- Soil Mechanics and Foundations, Punmia, B.C, Standard Book Company, Delhi, Latest Edition
- Principles of Geotechnical Engineering, Das, B.M, Brook/Cole. Latest Edition
- Soil Mechanics and Foundations, Garg, S. K, Khanna Publishers, Delhi, Latest Edition

Approval:

Board of Studies:	Resolution No. 32.3	Dated: 03-10-2020
Board of Faculty:	Resolution No. 20.11	Dated: 07-10-2020
Academic Council:	Resolution No. 98.7(ii)	Dated: 22-10-2020

Title of Subject :	<u>Reinforced and Prestressed Concrete</u>	
Code :	CE337	
Discipline :	Civil Engineering (6 th Semester)	
Effective :	20-Batch and onwards	
Pre-requisite :	Plain and Reinforced Concrete	Co-requisite: Nil
Assessment :	Theory: 20% Sessional, 80% Written Semester Examination (20% Mid,60% Final)	
Credit Hours :	03 + 00	Marks : 100 + 00
Minimum Contact Hours:	45 + 00	

Course Learning Outcomes (CLOs):

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

CLO	Description	Taxonomy Level	PLO
1	DISCUSS various reinforced and prestressed concrete members	C2	1
2	ANALYZE and design various Reinforced and Prestressed concrete members.	C6	3

Course outline:

• **Reinforced Concrete**

Analysis and design of doubly reinforced and continuous beams, Shear stress in reinforced concrete sections, Columns, types of columns, Analysis and design of short columns subjected to combined flexural and axial loading, Footing, types of footings, Analysis and design of isolated, combined, strip and raft/mat footing, Analysis and design of two-way solid slabs, Design of staircase.

• **Prestressed Concrete**

Basic concepts of prestressing, Classification and methods of prestressing, Advantages and applications of prestressed concrete, Properties and importance of high strength materials used in prestressed concrete, Losses of prestressing: Immediate and time dependents losses, lump sum and detailed estimation of prestress losses, Analysis and design of simply supported prestressed beams for flexure and shear.

Recommended Books:

- Advanced Concrete Technology: Constituent Material, J. Newman and B.S. Choo, Publisher: Butterworth Heinemann, Latest Edition
- Design of Concrete Structures, A.H. Nilson, D. Darwin and C.W. Dolan, Publisher: McGraw Hill Company, Latest Edition
- Structural Concrete: Theory and Design, M.N. Hassoun and A.A. Manaseer, Publisher: John Wiley & Sons. Inc., Latest Edition
- Reinforced & Prestressed Concrete.F.K. Kong, R.H. Evans, Van Nostrand Reimhold U.K., Latest Edition
- Prestressed Concrete Design, T.Y. Lin, Mc Graw Hill Company, Latest Edition

Approval:

Board of Studies: 33

Board of Faculty: 23

Academic Council:

Resolution No. 33.3

Resolution No. 23.09

Resolution No.

Dated: 30-11-2021

Dated: 09-12-2021

Dated:

Title of Subject : **Steel Structures (Th)**
Code : CE316
Discipline : Civil Engineering (6th Semester)
Effective : 19-Batch and onwards
Pre-requisite : Strength of Materials-II **Co-requisite: -----**
Assessment : Theory: 20% Sessional, 80% Written Semester Examination
 (20% Mid, 60% Final)
Credit Hours : 03 + 00 **Marks : 100 + 00**
Minimum Contact Hours: 45 + 00

Course Learning Outcomes (CLOs):

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

CLO	Description	Taxonomy Level	PLO
1	DISCUSS the basic concepts related to design of steel structures along with design loads.	C2	1
2	<i>ANALYZE and design main structural members and connections of steel structures.</i>	<i>C4</i>	3

Course outline:

- **Design Methods and Specifications**

Properties of Steel, Variation of stress-strain diagram with different percentage of carbon, Advantages and disadvantages of steel structures, Various steel sections used in the design of steel structure, Use of steel table, Introduction to AISC steel construction manual, Basic concepts and specification related to Allowable Stress Design (ASD) and Load and Resistance Factor Design (LRFD) methods.

- **Design Loads and Analysis**

Different loads considered in the design such as dead load, live load, wind load, earth quake load and traffic load on bridges, Load calculation and analysis of main structural members.

- **Design of Structural Members**

Euler's column theory, slenderness ratio, effective length, buckling of columns, Design of column using different steel sections, Design of hot rolled I- beam, floor beams and girders, purlins, beam with additional flange plates, Web buckling and web crippling in steel beams, Design of plate girder, stiffeners and steel truss, Types and strength of steel connections, Significance of steel connection design, Fabrication and erection methods involved in the construction of steel structures.

Recommended Books:

- Structural Steel Design, Jack C. McCormac, Stephen F. Csernak, Prentice Hall, Latest Edition
- Steel Structures: Design and Behavior, Charles G. Salmon, John E. Johnson, Faris A. Malhas, Prentice Hall, Latest Edition
- Design of Steel Structures, Gaylord, E.H. and C. N. Gaylord, McGraw-Hill Companies; Latest Edition

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Title of Subject	:	<u>Quantity Surveying and Estimation (Th)</u>	
Code	:	CE341	
Discipline	:	Civil Engineering (6 th Semester)	
Effective	:	18-Batch and onwards	
Pre-requisite	:	---	Co-requisite: ---
Assessment	:	Theory: 20% Sessional, 80% Written Semester Examination (20% Mid,60% Final)	
Credit Hours	:	03 + 00	Marks : 100 + 00
Minimum Contact Hours:		45 + 00	

Course Learning Outcomes (CLOs):

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

CLO	Description	Taxonomy Level	PLO
1	SOLVE the numerical related to quantities of various civil engineering works.	C3	2
2	ANALYZE cost of construction project and discuss contract award procedure	C4	4

Course outline:

- **Introduction**

Estimate and its' types, Scope of civil engineering works and its' impact on cost estimate, Role of quantity surveyor at different organizational levels, Main requirements for preparing an estimate, Factors to be considered while preparing a detailed estimate, Importance of preliminary estimate in administrative approval of public sector projects, Preliminary estimate of various buildings, Significance of cost estimation in construction industry.

- **Quantity Calculation in Various Civil Engineering Works**

Load Bearing Structures: Calculation of quantities for different items of work using spate wall and centre line method, R.C.C Structures: Quantity calculation related to column, beam, slab, staircase and retaining wall, Road works: Lead and Lift, Earthwork calculation in road works using different methods, Calculation of quantities related to bridges, steel truss, sewerage and water supply works.

- **Rate Analysis and Bill of Quantities**

Task or Out-turn work, Importance of rate analysis in construction industry, Significance of productivity calculation in rate analysis, Factors influencing rate analysis, Specification for various items in construction, General practice in government departments for schedule of rates, Rate Analysis of different construction works: Earthwork in excavation, lean concrete in foundation, brickwork, plastering and R.C.C work, Bill of Quantities (B.O.Q) for construction project, Maintaining measurement book.

- **Tendering and Award of Works**

Introduction to types of contracts, Preparation of civil engineering contracts and tender documents, Evaluation of bids, Security deposit and earnest money, General procedure for award of works in public sector departments, Valuation of buildings and its' purpose.

Recommended Books:

- Estimating and Costing in Civil Engineering, S. Dutta, Latest Edition, S. Dutta & Company, Lucknow, Latest Edition
- Estimating, Costing and Accounts, DD Kohli, S. Chand & Company (Pvt) Ltd, Latest Edition
- Fundamentals of construction. Estimating & Cost Accounting, Keith Collier, McGraw Hill Book Company, Latest Edition

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