## Course Outcomes

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|---|---|---|---|
| **Semester No:** | **3** | | |
| **Course Title:** | **BUILDING PLANNING AND ARCHITECTURE** | **Course Code:** | **CE21017** |

**Course Outcome Statement**

1. Identify building components and apply regulations in site planning.
2. Utilize environmental design principles in architectural planning.
3. Implement functional planning and integrate basic building services.
4. Describe architectural history and the architect's professional role.
5. Create architectural compositions and produce technical drawings.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **3** | | |
| **Course Title:** | **BUILDING PLANNING AND ARCHITECTURE LABORATORY** | **Course Code:** | **CE21401** |

**Course Outcome Statement**

1. Interpret and apply architectural drawing conventions, including sign conventions, symbols, and standard representations of building elements.
2. Create accurate architectural drawings for various residential structures, including doors, windows, staircases, and different house types.
3. Utilize AutoCAD software to produce professional-quality plans, elevations, and sections for institutional and commercial buildings, as well as perspective views.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **3** | | |
| **Course Title:** | **GEODESY** | **Course Code:** | **CE21012** |

**Course Outcome Statement**

1. Determine the horizontal and vertical angle with theodolite
2. Calculate horizontal distance using different method of tachometry.
3. Apply the concept of trigonometry levelling for the determination of RL of an object when base of object is accessible and inaccessible.
4. Analyze the different elements of curves in setting out the curve.
5. Discuss the fundamental concept of Aerial Surveying.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **3** | | |
| **Course Title:** | **GEODESY LABORATORY** | **Course Code:** | **CE21402** |

**Course Outcome Statement**

1. Demonstrate proficiency in using theodolites for accurate angle measurements in surveying.
2. Apply various methods of traverse calculations to determine geographic positions.
3. Perform height measurements of accessible and inaccessible objects using trigonometric leveling techniques.
4. Utilize tacheometric principles for distance and elevation measurements in surveying applications.
5. Develop skills in setting out circular curves for infrastructure projects using surveying instruments.

**COURSE OUTCOME STATEMENTS**
**2024-25**

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **3** | | |
| **Course Title:** | **STRENGTH OF MATERIALS** | **Course Code:** | **CE21013** |

**Course Outcome Statement**

1. Analyze the elastic behavior of bodies and mechanical properties of materials and analyze the stress-strain characteristics on any plane and also determine principal planes, principal stresses and location of planes carrying maximum shear stresses.
2. Evaluate the distribution of internal forces (shear force, bending moment and axial force at any section) in determinate beam and frames.
3. Analyze and design the beams of various cross-sections including composite sections based on the theory of bending.
4. Calculate deflections and slopes in beams using different methods,
5. Evaluate the effects of shear and torsional stresses on beam and shafts, and analyze their behavior under combined bending and torsion.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **3** | | |
| **Course Title:** | **STRENGTH OF MATERIALS LABORATORY** | **Course Code:** | **CE21403** |

**Course Outcome Statement**

1. Apply the knowledge of material testing techniques to evaluate mechanical properties and shall be able to justify the application of material.
2. Demonstrate the ability to analyze and verify fundamental laws of mechanics.
3. Ascertain the compound stresses on any oblique plane and shall be able to draw SFD BMD using graphical approach.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **3** | | |
| **Course Title:** | **ENGINEERING MATERIAL** | **Course Code:** | **CE21015** |

**Course Outcome Statement**

1. Demonstrate the composition, manufacturing and properties of brick, lime and clay products.
2. Describe and explain the type's uses and properties of glasses, timber and plastics in buildings.
3. Discuss and explain the properties of decorative materials such as rubber, organic coating, and laminates water proofing etc.
4. Classify the properties of fresh and hardened concrete. Design and recommend the proportion of concrete mix using the specification of ingredients.
5. Discuss Alternate & Innovative Construction Material for Housing and classify the properties of heat insulating materials and behavior of various materials under compression, tension, bending, fatigue, creep and hardness under different loading.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **3** | | |
| **Course Title:** | **ENGINEERING MATERIAL LABORATORY** | **Course Code:** | **CE21404** |

**Course Outcome Statement**

1. Analyze cement properties through standardized tests.
2. Evaluate aggregate characteristics and behavior.
3. Assess concrete workability and strength parameters.
4. Examine various construction materials properties.
5. Apply concrete mix design principles and methods.

**COURSE OUTCOME STATEMENTS**
**2024-25**

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **4** | | |
| **Course Title:** | **CONSTRUCTION TECHNOLOGY-I** | **Course Code:** | **CE21512** |

**Course Outcome Statement**

1. Describe the various available conventional and new construction materials and techniques.
2. Explain the suitability of materials required for various structural elements.
3. Describe the suitability different construction techniques.
4. Apply the suitability of locally available material in building constructions.
5. Explain the application of globally available equipment's in construction technology.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **4** | | |
| **Course Title:** | **CONSTRUCTION TECHNOLOGY-I LABORATORY** | **Course Code:** | **CE21801** |

**Course Outcome Statement**

1. Analyze and apply fundamental concepts in building construction, including foundations, masonry techniques, and structural elements.
2. Evaluate and compare different types of construction materials and methods used in flooring, roofing, and staircase design.
3. Develop practical skills in interpreting and creating technical drawings related to various building components and systems.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **4** | | |
| **Course Title:** | **TRANSPORTATION ENGINEERING** | **Course Code:** | **CE21514** |

**Course Outcome Statement**

1. Apply the principles of highway classification, historical development, and survey techniques for effective road planning and development.
2. Design the geometric elements of roads, including cross sections, sight distances, and alignments.
3. Analyze traffic studies and design traffic control measures, including signals, markings, and intersection types.
4. Explain the components and design principles of railway systems, including permanent way, points, and crossings.
5. Design and plan dock and harbor facilities, including protective coastal works and port structures.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **4** | | |
| **Course Title:** | **TRANSPORTATION ENGINEERING LAB** | **Course Code:** | **CE21802** |

**Course Outcome Statement**

1. Assess and analyze the performance and level of service of existing road infrastructure.
2. Design and develop intersection solutions for urban traffic management.
3. Apply geometric design principles to the layout of highways and railways.
4. Conduct traffic volume and capacity studies to improve road safety and efficiency.
5. Design harbor layouts and protective coastal structures considering environmental and operational factors.

## Course Outcomes

| | | | |
|---|---|---|---|
| Semester No: | 4 | | |
| Course Title: | ENGINEERING GEOLOGY | Course Code: | CE21518 |

**Course Outcome Statement**

1. Comprehend fundamental geological concepts and their relevance to civil engineering.
2. Analyze rock properties and structural geology for engineering applications.
3. Evaluate geological hazards, particularly landslides and earthquakes.
4. Apply geological investigation techniques for various civil engineering projects.
5. Utilize remote sensing, GPS, and GIS technologies in civil engineering and resource mapping.

## Course Outcomes

| | | | |
|---|---|---|---|
| Semester No: | 4 | | |
| Course Title: | ENGINEERING GEOLOGY LABORATORY | Course Code: | CE21803 |

**Course Outcome Statement**

1. Analyze geological structures including folds, faults, and unconformities.
2. Interpret geological features relevant to civil engineering projects.
3. Develop skills in geological map reading and cross-section drawing.

## Course Outcomes

| | | | |
|---|---|---|---|
| Semester No: | 4 | | |
| Course Title: | STRUCTURAL MECHANICS | Course Code: | CE21554 |

**Course Outcome Statement**

1. Determine the deflection of determinate structures using energy methods.
2. Analyze axially loaded and eccentric columns and calculate buckling loads.
3. Analyze curved flexural members, springs, shells and pressure vessels.
4. Compute stresses in beams subjected to unsymmetrical bending.
5. Analyze and interpret response of single degree of freedom systems subjected to harmonic loading.

## Course Outcomes

| | | | |
|---|---|---|---|
| Semester No: | 4 | | |
| Course Title: | STRUCTURAL MECHANICS LABORATORY | Course Code: | CE21804 |

**Course Outcome Statement**

1. Develop a thorough understanding of the behavior of various structural elements (beams, trusses, and columns) under different loading conditions.
2. Apply theoretical principles such as strain energy methods, Euler's theory, and Castigliano's theorem to analyze and predict structural responses.
3. Enhance analytical and computational skills by verifying experimental results through analytical methods and developing computer programs for structural analysis. 4. Develop proficiency in conducting experiments related to deflection, bending, shear force, and moment of inertia and verify results with theoretical calculations.
5. Gain hands-on experience in using experimental and computational tools to analyze structural elements, enhancing the ability to apply these techniques in real-world engineering problems.

**COURSE OUTCOME STATEMENTS**
**2024-25**

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **5** | | |
| **Course Title:** | **ENVIRONMENTAL ENGINEERING** | **Course Code:** | **CE31006** |

**Course Outcome Statement**

1. Determine types of sources, intake works and common impurities in water, population forecasting methods and examination of physicochemical and bacteriological quality of water.
2. Describe pipes used in water supply scheme-types of joints, valves, fittings etc. including corrosion in pipes.
3. Analyze water distribution network and aspects of leak detection.
4. Determine and analyze quality of wastewater/sewage and significance of various Parameter related to same.
5. Classify types of sewerage system and analyze hydraulic design of sewers.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **5** | | |
| **Course Title:** | **ENVIRONMENTAL ENGINEERING LABORATORY** | **Course Code:** | **CE31006** |

**Course Outcome Statement**

1. Analyze physical and chemical quality parameters of water and wastewater samples according to Indian standards, and determine their suitability for drinking and required treatment levels.
2. Quantify bacterial content in water and wastewater samples, and understand bacteriological media used for culturing microorganisms.
3. Demonstrate knowledge of Indian standards related to drinking water, effluents, and river water quality

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **5** | | |
| **Course Title:** | **DESIGN OF RCC STRUCTURES** | **Course Code:** | **CE31003** |

**Course Outcome Statement**

1. Analyze and design RC beams using Working Stress and Limit State Methods.
2. Design slabs, staircases, and reinforcement for shear, bond, and torsion.
3. Design short and long columns under axial and eccentric loading.
4. Design various types of footings based on structural requirements.
5. Design cantilever and counterfort retaining walls.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **5** | | |
| **Course Title:** | **DESIGN OF RCC STRUCTURES LABORATORY** | **Course Code:** | **CE31003** |

**Course Outcome Statement**

1. Design and detail various Elements of R. C. C. Structure.
2. Design and detail a Small R. C. C. building

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **5** | | |
| **Course Title:** | **STRUCTURAL ANALYSIS I** | **Course Code:** | **CE31007** |

**Course Outcome Statement**

**1. Compute deformations using different methods to analyze indeterminate structures with various loads and supports. Differentiate between determinacy/indeterminacy and Stability/Instability.**
**2. Analyze the two-degree indeterminate problems using the concept of strain energy.**
**3. Analyze fixed and continuous beams with varying cross-sections and support settlements.**
**4. Illustrate the influence lines and rolling loads for beams, trusses, and bridges.**
**5. Analyze arches, cables and suspension bridges with influence lines.**

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **5** | | |
| **Course Title:** | **WATER RESOURCES ENGINEERING** | **Course Code:** | **CE31010** |

**Course Outcome Statement**

**1. Apply the concepts of soil water plant relationship to generate the crop water requirements**
**2. Design irrigation canals and canal network.**
**3. Classify the different types of irrigation structures along with their components, functions and types.**
**4. Analyse various components of the hydrological cycle, concepts of runoff and floods etc., estimate runoff by different methods.**
**5. Analyse hydrologic flood routing models. Compute yield from surface and subsurface basin.**
**The assessment of available water is also described with detailed concept of hydrologic analysis including precipitation analysis, rainfall Runoff process, and design flood estimation along with hydrograph analysis. Further introduction to various hydraulic structures is given along with detailed design concepts of earthed channels.**

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **5** | | |
| **Course Title:** | **WATER RESOURCES ENGINEERING LABORATORY** | **Course Code:** | **CE31010** |

**Course Outcome Statement**

**1. Demonstrate the use and function of various hydrometeorological instruments for monitoring components of the hydrologic cycle.**
**2. Conduct experiments to quantify evaporation, infiltration, and erosion using standard laboratory equipment.**
**3. Simulate rainfall and evaluate its effects on intensity, uniformity, and erosion processes.**
**4. Analyze open channel flow behavior and hydraulic phenomena through flume-based experiments.**
**5. Apply experimental techniques like electrical analogy and flow measurement tools to assess flow patterns and hydraulic structure performance.**

**COURSE OUTCOME STATEMENTS**
**2024-25**

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **5** | | |
| **Course Title:** | **ADVANCE HIGHWAY AND AIRPORT ENGINEERING** | **Course Code:** | **CE31201** |

**Course Outcome Statement**

1. Identify and evaluate the properties of highway materials relevant to pavement performance and construction.
2. Solve design problems related to flexible and rigid pavements using standard methods and guidelines.
3. Analyze key factors influencing pavement design and compare different design methodologies.
4. Interpret aircraft characteristics and integrate them into airport planning, highway construction procedures, and maintenance practices.
5. Develop airport layout plans and perform structural design of airport pavements based on technical criteria.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **5** | | |
| **Course Title:** | **ADVANCE HIGHWAY AND AIRPORT ENGINEERING LABORATORY** | **Course Code:** | **CE31201** |

**Course Outcome Statement**

1. Master the evaluation of physical properties of aggregates.
2. Analyze the mechanical properties and durability of aggregates.
3. Understand the rheological properties and behavior of bituminous materials.
4. Develop expertise in designing bituminous concrete mixes and road drainage systems.
5. Evaluate pavement performance and design rehabilitation strategies

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **6** | | |
| **Course Title:** | **DESIGN OF STEEL STRUCTURES** | **Course Code:** | **CE31502** |

**Course Outcome Statement**

1. Illustrate and design various types of structural steel connections including riveted, bolted, and welded joints with consideration of failure modes and joint efficiency.
2. Analyze and design tension and compression members, including truss components, under axial and combined loading conditions with appropriate load considerations.
3. Design flexural steel members considering lateral and web buckling, and apply plastic analysis methods to beams and frames using collapse mechanisms.
4. Design steel columns and their foundations, incorporating lacing, battens, and various base types while considering slenderness effects.
5. Develop built-up girders including plate girders with appropriate stiffeners and evaluate their structural performance and detailing requirements.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **6** | | |
| **Course Title:** | **DESIGN OF STEEL STRUCTURES LABORATORY** | **Course Code:** | **CE31502** |

**Course Outcome Statement**

1. Design and detail various Elements of Steel Structure.
2. Design and detail a Small steel building

**COURSE OUTCOME STATEMENTS**
**2024-25**

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **6** | | |
| **Course Title:** | **STRUCTURAL ANALYSIS-II** | **Course Code:** | **CE 31505** |

**Course Outcome Statement**

1. Identify suitable method to solve indeterminate structures.
2. Calculate the forces in member by the displacement and force methods.
3. Describe the structural behavior based on the results of analysis.
4. Determine the bending moment diagram and shear force diagram of determinate and indeterminate structures.
5. Assess the formation of plastic hinges in the structure.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **6** | | |
| **Course Title:** | **CONSTRUCTION TECHNOLOGY-II** | **Course Code:** | **CE31506** |

**Course Outcome Statement**

1. Analyse the different types of estimates, units of measurements in infrastructure projects.
2. Calculate the quantity of different items of work for different specifications as per SOR.
3. Assess the valuation of the property by various methods.
4. Prepare the tender document and explain different departmental procedures.
5. Apply the CPM and PERT technique to optimize construction project.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **6** | | |
| **Course Title:** | **CONSTRUCTION TECHNOLOGY-II LABORATORY** | **Course Code:** | **CE31506** |

**Course Outcome Statement**

1. Calculate the quantity of different items of work for different specifications as per SOR.
2. Prepare the tender document and explain different departmental procedures.
3. Apply the CPM and PERT techniques to optimize construction projects.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **6** | | |
| **Course Title:** | **GEOTECHNICAL ENGINEERING – I** | **Course Code:** | **CE31507** |

**Course Outcome Statement**

1. Describe and explain the soil formation and soil structure.
2. Classify the soils and identify the soil engineering properties
3. Solve any practice problems related to soil stresses estimation, permeability, seepage including flow net diagram
4. Evaluate any practical problems related to consolidation like consolidation settlement, time rate of settlement
5. Analyse the stress distribution & shear failure by various methods.

**COURSE OUTCOME STATEMENTS**
**2024-25**

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **6** | | |
| **Course Title:** | **GEOTECHNICAL ENGINEERING – I LABORATORY** | **Course Code:** | **CE31507** |

**Course Outcome Statement**

1. Conduct laboratory tests to determine basic soil properties and classify soils based on standard procedures.
2. Perform field density tests and analyze soil compaction characteristics for geotechnical applications

## Course Outcomes

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|---|---|---|---|
| **Semester No:** | **6** | | |
| **Course Title:** | **WATER AND WASTEWATER TREATMENT TECHNOLOGIES** | **Course Code:** | **CE31703** |

**Course Outcome Statement**

1. Explain impact of raw water quality on health and its mitigation, design of sedimentation tank, its types and factors affecting settling.
2. Analyze coagulants, factors affecting coagulation, jar test. design of Clariflocculator, Filtration unit, its types and multimedia filters.
3. Apply methods of disinfection, usage of free chlorine and combined chlorine, mechanism of chlorination with their advantage and disadvantage.
4. Design preliminary, primary and secondary treatment units of conventional sewage treatment plant.
5. Design biological treatment units viz. Activated sludge plant, SBR and methods of sludge treatment and disposal.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **6** | | |
| **Course Title:** | **WATER AND WASTEWATER TREATMENT TECHNOLOGIES LABORATORY** | **Course Code:** | **CE31703** |

**Course Outcome Statement**

1. Apply analytical techniques to measure specific contaminants and quality parameters in water and wastewater samples, including arsenic, fluoride, and nitrogen compounds.
2. Conduct jar tests to determine optimal coagulant dosages and analyze sludge characteristics for water and wastewater treatment applications.
3. Evaluate solid waste properties and utilize Indian and international standards for water quality assessment and management.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **7** | | |
| **Course Title:** | **DESIGN OF ADVANCED RCC STRUCTURES** | **Course Code:** | **CE41001** |

**Course Outcome Statement**

1. Design tanks resting on the ground and underground, including circular and rectangular tanks, using IS 3370 and other methods.
2. Design overhead tanks and their structural components, considering the effects of continuity.
3. Design silos, bunkers, and chimneys in reinforced concrete and steel.
4. Analyze and design flat slabs using direct and equivalent frame methods.
5. Design grid slabs using approximate and exact methods.

## Course Outcomes

| Semester No: | 7 | | |
|---|---|---|---|
| Course Title: | DESIGN OF HYDRAULIC STRUCTURES | Course Code: | CE41006 |

**Course Outcome Statement**

1. Analyze different types of hydraulic structures based on materials and the functions of each with the given site conditions.
2. Apply the theories of stability analysis of dam structures to ensure a safe and serviceable design for execution
3. Apply the theories of design of structures on pervious foundations and design the structures for safety and serviceability
4. Develop design aspects of canal regulation structures suitable for different conditions of materials, site conditions and hydraulic aspects of flow
5. Produce detailed drawings in executable form of the designed structures.

## Course Outcomes

| Semester No: | 7 | | |
|---|---|---|---|
| Course Title: | GEOTECHNICAL ENGINEERING – II | Course Code: | CE41007 |

**Course Outcome Statement**

1. Analyse earth retaining structures in various types of soil medium.
2. Estimate appropriate soil strength parameters with respect to the drainage conditions
3. Analyze the bearing capacity of soil by IS code methods.
4. Evaluate solutions for shallow and deep foundations for various structures.
5. Discuss the importance of soil investigation for any civil engineering construction.

## Course Outcomes

| Semester No: | ELECTIVE III | | |
|---|---|---|---|
| Course Title: | ADVANCED ANALYSIS OF STRUCTURES | Course Code: | CE41281 |

**Course Outcome Statement**

1. Apply matrix flexibility method to analyze structural systems.
2. Analyze structures using flexibility method, considering various factors.
3. Implement matrix stiffness method for structural evaluation.
4. Apply stiffness method to complex structural problems.
5. Utilize tension coefficient method and introduce finite element method.

## Course Outcomes

| Semester No: | ELECTIVE III | | |
|---|---|---|---|
| Course Title: | ADVANCED GEOLOGY & ROCK MECHANICS | Course Code: | CE41283 |

**Course Outcome Statement**

1. Apply subsurface exploratory methods and geophysical techniques.
2. Analyze rock properties' influence on groundwater and conduct surveys.
3. Evaluate rocks as construction materials for various civil engineering applications.
4. Classify tunnels, assess stability factors, and investigate landslide prevention.
5. Analyze rock mechanical properties and perform relevant laboratory tests.

**COURSE OUTCOME STATEMENTS**
**2024-25**

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **ELECTIVE III** | | |
| **Course Title:** | **TRANSPORTATION PLANNING** | **Course Code:** | **CE41285** |

**Course Outcome Statement**

1. Demonstrate knowledge of transportation planning and its processes.
2. Analyze travel demand and trip generation-distribution patterns.
3. Evaluate modal choices for urban transportation systems.
4. Apply trip assignment techniques for various routes within a zone.
5. Implement economic principles in transportation facility design and management.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **ELECTIVE III** | | |
| **Course Title:** | **PLANNING AND MANAGEMENT OF WATER RESOURCES** | **Course Code:** | |

**Course Outcome Statement**

1. To explain the complex interaction and integration of different components of water resources systems related to natural processes, economics, and environmental values.
2. To identify and assess risks and estimate reliability of predictions.
3. To apply modelling techniques and simulation or optimization for the outcomes.
4. To develop the ability to create, defining and select best solution from a suitable set of efficient alternatives solutions to water resources related engineering problems.
5. To evaluate economic consideration for water resources systems.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **ELECTIVE IV** | | |
| **Course Title:** | **BRIDGE ENGINEERING** | **Course Code:** | **CE41312** |

**Course Outcome Statement**

1. Apply IRC specifications for bridge planning, analysis, and design, including site selection and investigation.
2. Compare highway and railway bridges across various construction materials.
3. Design concrete and composite bridges, selecting appropriate bearings and expansion joints.
4. Analyze and design bridge substructures including piers, abutments, and foundations.
5. Evaluate bridge construction techniques, maintenance, and design steel bridges for railway loads.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **ELECTIVE IV** | | |
| **Course Title:** | **ADVANCE CONSTRUCTION PLANNING AND MANAGEMENT** | **Course Code:** | |

**Course Outcome Statement**

1. Discuss and explain the planning and management principles in construction projects.
2. Demonstrate the techniques of resource management for optimizing the time & cost of project.
3. Develop the contract documentation and explain different acts related to contracts and arbitration.
4. Generate the estimation for different construction projects and evaluate budget for various construction projects.
5. Develop the organization’s working procedures and group decision making ability.

**COURSE OUTCOME STATEMENTS**
**2024-25**

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **ELECTIVE IV** | | |
| **Course Title:** | **PRESTRESSED CONCRETE DESIGN** | **Course Code:** | **CE41313** |

**Course Outcome Statement**

1. Explain key principles and concepts of prestressing.
2. Compare pre-tensioning and post-tensioning methods, considering prestress losses.
3. Design prestressed members for flexural strength.
4. Analyze prestressed members for shear, torsion, deflection, and crack width.
5. Apply prestressed concrete concepts to analyze and design various structural elements.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **ELECTIVE IV** | | |
| **Course Title:** | **SYSTEM APPLICATION TO WATER RESOURCES CREDITS** | **Course Code:** | |

**Course Outcome Statement**

1. Identify components of water resources planning and systems.
2. Analyze reservoir sizing, planning, operation, and water management techniques.
3. Apply deterministic optimization methods to water resource problems.
4. Utilize stochastic optimization techniques in water resource management.
5. Solve reservoir optimization and flood control problems using dynamic programming.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **ELECTIVE IV** | | |
| **Course Title:** | **TRAFFIC ENGINEERING** | **Course Code:** | **CE41311** |

**Course Outcome Statement**

1. Analyze driver characteristics and conduct traffic studies.
2. Apply traffic flow relationships to heterogeneous and homogeneous flows.
3. Evaluate highway capacity, LOS, and design traffic control systems.
4. Implement traffic safety measures and mitigate accident-prone areas.
5. Develop traffic management strategies and propose roadway improvements.

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **ELECTIVE IV** | | |
| **Course Title:** | **ADVANCED FLUID MECHANICS** | **Course Code:** | |

**Course Outcome Statement**

1. Analyze boundary layer behavior, flow separation, and drag forces in various fluid flow scenarios.
2. Apply gradually varied flow concepts and compute water surface profiles in open channels.
3. Evaluate unsteady flow phenomena and perform hydraulic routing and discharge measurements.
4. Analyze the principles of jet impingement and assess the performance of various hydraulic turbines.
5. Evaluate the working principles and performance characteristics of centrifugal and reciprocating pumps.

**COURSE OUTCOME STATEMENTS**
**2024-25**

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **ELECTIVE IV** | | |
| **Course Title:** | **INDUSTRIAL WASTEWATER MANAGEMENT** | **Course Code:** | **CE41315** |

**Course Outcome Statement**

**1. Determine the characteristics, sources and terms related to industrial wastewater treatment and have a better understanding of the effects and disposal of industrial waste on sewers.**
**2. Perform auditing with case examples and discuss waste minimization methods and guidelines for environmental management system.**
**3. Test various characteristics of industrial wastewater via. different instruments, software's and their applications.**
**4. Characterize different types of industrial waste and determine the appropriate treatment methods for them.**
**5. Explain various aspects of common effluent treatment plant, their treatment and disposal.**

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **ELECTIVE V** | | |
| **Course Title:** | **ADVANCED TRANSPORTATION ENGINEERING** | **Course Code:** | **CE41674 (CE41684)** |

**Course Outcome Statement**

**1. Evaluate the economic aspects of highway projects, including cost components and parameters.**
**2. Develop and apply transportation demand models to predict and analyze travel behavior and demand.**
**3. Analyze traffic and transportation problems in urban areas, and classify various transportation modes and their characteristics.**
**4. Analyze various urban public transportation systems, including BRTS, bus lanes, and rail systems, in the context of their advantages and limitations.**
**5. Select the different construction equipment for pavement construction, considering factors like selection, cost, and output.**

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **ELECTIVE V** | | |
| **Course Title:** | **DESIGN OF R.C.C. & PRESTRESSED BRIDGE** | **Course Code:** | **CE 41678 (CE41608)** |

**Course Outcome Statement**

**1. Identify standard specifications of road bridges, define various specifications of IRC for planning, analysis & design of bridges in general design consideration.**
**2. Define various Types of Bridges, Design of Solid slab and girder Slab Bridges & design of girders and slabs as per Courbon's Theory and Pigeaud Theory.**
**3. Analyze and design of balanced cantilever bridges, design of cantilever section, suspended span and articulations.**
**4. Analyze and design of bridge piers, abutments & bearings, define introduction of continuous and arch bridges.**
**5. Analyse and design of prestressed concrete bridges, and define pre & post tensioning, cable zone equation, initial & final stress condition, shear.**

**COURSE OUTCOME STATEMENTS**
**2024-25**

## Course Outcomes

| | | | |
|---|---|---|---|
| **Semester No:** | **ELECTIVE V** | | |
| **Course Title:** | **AIR QUALITY MANAGEMENT** | **Course Code:** | |

**Course Outcome Statement**

1. To analyze various perspectives of air pollution, sources, classification.
2. To understand the effects, air quality monitoring and indices, control technologies.
3. To develop the concept of carbon credit and its applications, and to measure the effects of Photochemical Smog.
4. To understand the meteorological terms related to the environment/atmosphere.
5. To identify and understand the control devices for air pollution control and monitoring.

## Course Outcomes

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|---|---|---|---|
| **Semester No:** | **ELECTIVE V** | | |
| **Course Title:** | **ADVANCED HYDROLOGIC ANALYSIS** | **Course Code:** | **CE41677 (CE41604)** |

**Course Outcome Statement**

1. Summarize the hydrological modelling process especially in the context of design flood estimation.
2. Apply the flood flow modelling equations in longer river channels.
3. Evaluate the rainfall runoff modelling to predict the flows in various conditions of climatic factors and land cover land use.
4. Understand the basic concepts of watershed modelling philosophy.
5. Analyse the ground water processes and its flow phenomena.

## Course Outcomes

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|---|---|---|---|
| **Semester No:** | **ELECTIVE VI** | | |
| **Course Title:** | **ADVANCED FLUID MECHANICS** | **Course Code:** | **CE 41774** |

**Course Outcome Statement**

1. Analyze boundary layer behavior, flow separation, and drag forces in various fluid flow scenarios.
2. Apply gradually varied flow concepts and compute water surface profiles in open channels.
3. Evaluate unsteady flow phenomena and perform hydraulic routing and discharge measurements.
4. Analyze the principles of jet impingement and assess the performance of various hydraulic turbines.
5. Evaluate the working principles and performance characteristics of centrifugal and reciprocating pumps.

## Course Outcomes

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|---|---|---|---|
| **Semester No:** | **ELECTIVE VI** | | |
| **Course Title:** | **STRUCTURAL DYNAMICS** | **Course Code:** | |

**Course Outcome Statement**

1. Calculate natural frequencies and draw mode shapes for harmonic vibration
2. Analyze the response of SDOF systems for general and random vibrations
3. Formulate and solve dynamic response problems for SDOF systems
4. Identify, formulate, and solve dynamic response problems for MDOF systems
5. Analyze continuous systems subjected to different types of dynamic loads

## Course Outcomes

| Semester No: | ELECTIVE VI | | |
|---|---|---|---|
| Course Title: | FINITE ELEMENT METHOD | Course Code: | CE41775 |

**Course Outcome Statement**

1. Calculate natural frequencies and draw mode shapes for harmonic vibration
2. Analyze the response of SDOF systems for general and random vibrations
3. Formulate and solve dynamic response problems for SDOF systems
4. Identify, formulate, and solve dynamic response problems for MDOF systems
5. Analyze continuous systems subjected to different types of dynamic loads

## Course Outcomes

| Semester No: | ELECTIVE VI | | |
|---|---|---|---|
| Course Title: | MUNICIPAL SOLID WASTE MANAGEMENT | Course Code: | CE41711 |

**Course Outcome Statement**

1. To determine the sources, composition, characteristics and learning of all terms related to general solid waste management including explanation of hierarchical structure in solid waste management and requirement for integrated solution.
2. To examine technical aspects of solid waste segregation, collection and transportation along with route optimization for a solid waste collection and transport system.
3. To analyze and design compost and incineration facilities.
4. To plan and design municipal sanitary landfills along with management of Leachate and landfill gas.
5. To identify appropriate technologies for recycle, recovery and reuse of municipal solid waste. Case studies and Solid waste legislation.