



Lokmanya Tilak Jankalyan Shikshan Sanstha's

## **PRIYADARSHINI COLLEGE OF ENGINEERING**

**(An Autonomous Institute, Accredited By NAAC 'A+' Grade )**

(Recognised by A.I.C.T.E., New Delhi & Govt. of Maharashtra, Affiliated to R.T.M.Nagpur University)

Near CRPF Campus, Hingna Road, Nagpur-440 019, Maharashtra (India)

Phone : 07104 – 236381, 237307, Fax : 07104 – 237681,

email : principal.pce.ngp@gmail.com, www.pcenagpur.edu.in



## ***DEPARTMENT OF CIVIL ENGINEERING***

### **COURSE OUTCOME**

#### **3<sup>rd</sup> Semester (Autonomous)**

**Course Title: Environmental Engineering**

**Course Code: 24UCV301T**

After the completion of course students would be able to:

1. **Illustrate** qualitative and quantitative aspects of water for domestic, public and industrial demands.
2. **Apply, analyze and design** the water treatment unit operation and unit process.
3. **Examine** the characteristics of waste water, necessary treatment and types of treatment processes
4. **Analyze and design** the waste water treatment process units
5. **Explain and Apply** the rural sanitation and municipal waste management systems.
6. **Explain** the significance of Air pollution , noise pollution, Clean Development Mechanism, Geo environment, environmental Resource management, climate change and other sustainable resource management system

**Course Title: Geotechnical Engineering**

**Course Code: 24UCV302T**

After the completion of course students would be able to:

1. **Establish** volume weight relationship of the soil
2. **Explain** the index properties of soil.
3. **Evaluate** the permeability and seepage of the soil.
4. **Compute** the stress distribution in soil mass
5. Estimate the consolidation and compaction of the soil.
6. **Determine** the shear strength of the soil.



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### Course Title: General Mathematical Techniques

Course Code: 24UBS303T

After the completion of course students would be able to:

1. **Evaluate** the eigen values, eigen vectors and canonical forms of matrix to solve various engineering problems.
2. **Analyze** the functions of complex variable.
3. **Examine** the random variables with respect to probability function, distribution function
4. **Evaluate** various algebraic, transcendental and differential equations by numerical techniques.

### Course Title: Strength Of Materials

Course Code: 24UCV304T

After the completion of course students would be able to:

1. **Explain** the behaviour of materials under different stress and strain conditions.
2. **Evaluate** and draw shear force diagram and bending moment diagram and their relation.
3. **Formulate** the bending and shear stresses equations and able to draw bending and shear stress diagrams.
4. **Formulate** slope and Deflection equations for beams subjected to various loads by Macauley's method also Analyze and Evaluate the torsion in circular section.

### Course Title: Building Materials and Elements

Course Code: 24UOE321T

After the completion of course students would be able to:

1. **Distinguish** different types of building materials and its uses.
2. **Describe** different types of concrete and their properties
3. **Recognize** necessity of different building components
4. **Know** the different types of plastering, pointing there terminologies
5. **Classify** the various types of form work, scaffolding, distempering
6. **Recognize** the different techniques use in dampproofing.



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### **Course Title: Solid Waste Management**

**Course Code: 24UOE322T**

After the completion of course students would be able to:

1. **Illustrate** concept of minimization & separation of waste as per their characterization
2. **Understand** and apply the knowledge Elements and of collection of Solid waste
3. **Develop & design** optimum route of transportation of solid waste
4. **Establish** Zero waste concept at source
5. **Identify** the reusable material after separation for sustainable development
6. **Analysis and Design** treatment of municipal solid waste and landfill

### **Course Title: Green Building**

**Course Code: 24UOE323T**

After the completion of course students would be able to:

1. **Demonstrate** green concept skills and apply tools of Green building assessment.
2. **Select appropriate** green building material and technique.
3. **Design** sustainable and energy efficient civil engineering project.
4. **Carry out** Green Building rating using IGBC guidelines.
5. **Use** alternate source of energy and effective use water
6. **Apply** effective environmental friendly building technology

### **Course Title: Mini Project**

**Course Code: 24UCV307P**

After the completion of course students would be able to:

1. **Identify** the engineering related problems in the community.
2. **Analyze** and design different solutions to resolve the problems of community/ on field .
3. **Apply** economical solution to those problems in the field.



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**Course Title: Digital Economy and Management**

**Course Code: 24UBS306T**

After the completion of course students would be able to:

1. **Develop** knowledge of economic theories and share market.
2. **Identify** key trends in Digital economy.
3. **Acquire** knowledge of business strategies.
4. **Analyze** the problems of Small Scale Industries.

**Course Title: Universal Human Values**

**Course Code: 24UBS307T**

After the completion of course students would be able to:

1. **Analyze** the essentials of value education and self exploration.
2. **Evaluate** coexistence of the self with the body.
3. **Develop** sustained happiness through identifying the essentials of human values .
4. **Identify** the importance of harmony in family, society and universal order.



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### 4<sup>TH</sup> Semester (Autonomous)

**Course Title: STRUCTURAL ANALYSIS**

**Course Code: 24UCV401T**

After the completion of course students would be able to:

1. **Analyse** determinate and indeterminate structures.
2. **Perform** analysis of beams and frames using Slope Deflection Method
3. **Perform analysis** of beams and frames using Moment Distribution Method.
4. **Analyse** structural members for rolling loads by Influence Line Diagram.
5. **Perform analysis** of frames using Strain Energy Method.
6. **Analyze** indeterminate structures specifically fixed beams, frames, and arches.

**Course Title: SURVEYING & GEOMATICS**

**Course Code: 24UCV402T**

After the completion of course students would be able to:

1. **Measure** length and bearing of lines using various instruments and calculate area of given field.
2. **Carry out** levelling and contouring.
3. **Operate** the theodolite for measurement of angles and distances.
4. **Design** and setting out of various types of curves.
5. **Determine** correct location of triangulation stations.
6. **use** modern surveying equipmen

**Course Title: Building Design & Drawing with CAD**

**Course Code: 24UCV403P**

After the completion of course students would be able to:

1. **List** down the types of structures and its various components
2. **Explain** various concepts pertaining to building design and drawing
3. **Apply** principles of planning, architectural planning and building bye laws while designing and preparing building drawings.
4. **Calculate** and analyze various technical details of a building



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### **Course Title: Rural Sanitation**

**Course Code: 24UOE435T**

After the completion of course students would be able to:

1. **Recognize** the need for rural sanitation
2. **Identify** the importance of Public health and Hygiene
3. **Develop** rural sanitation system by various of low cost methods
4. **Provide** suitable disposal methods for effluent in rural area.

### **Course Title: E-Waste management**

**Course Code: 24UOE436T**

After the completion of course students would be able to:

1. **Interpret** the hazardous e-waste and explain its management.
2. **Explain** various chemical, physico-chemical and biological treatments for hazardous waste
3. **Design** the landfill for the hazardous waste.
4. **Apply** the fundamentals and management of E-Waste with respect to resource recovery and control measures for reduction of E-waste at source

### **Course Title: Remote Sensing, GIS & GPS**

**Course Code: 24UOE437T**

After the completion of course students would be able to:

1. **Identify** the concepts of Photogrametry and compute the heights of objects
2. **Comprehend** the energy interactions with earth surface features
3. **Describe** the basic concept of GIS and its applications
4. **Illustrate** different types of GPS receivers

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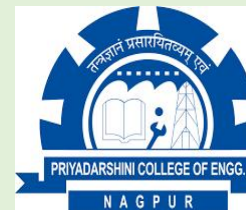
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### **Course Title: Environmental Engineering**

**Course Code: 24UOE438T**

After the completion of course students would be able to:

1. **Illustrate & Analyze** the components of biosphere and impact of human activity on environment.
2. **Recognize & Analyze** the causes and sources of pollutants, and their impact on global environment.
3. **Develop** ethics and scientific awareness about waste generation and treatment.
4. **Develop** the system for solid wastes management and noise pollution and control.

### **Course Title: Professional Communication**

**Course Code: 24UBS407T**

After the completion of course students would be able to:

1. **Construct** correct sentences for spoken and written English.
2. **Develop** writing and speaking skills.
3. **Demonstrate** writing skills at work place .
4. **Prepare** themselves for job placement.

### **Course Title: Entrepreneurship Development and Startup**

**Course Code: 24UBS408T**

After the completion of course students would be able to:

1. **Construct** correct sentences for spoken and written English.
2. **Develop** writing and speaking skills.
3. **Demonstrate** writing skills at work place .
4. **Prepare** themselves for job placement.

### **Course Title: Professional Ethics for Engineers**

**Course Code: 24UBS409T**

After the completion of course students would be able to:

1. **Acquire** basics of entrepreneurship development
2. **Identify** various types of startups.
3. **Analyze** the concept of ideation
4. **Develop** knowledge of start-up funding.



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### 5<sup>th</sup> Semester (Autonomous)

**Course Title: Reinforced Cement Concrete Designs**

**Course Code: 25UCV501T**

After the completion of course students would be able to:

1. **Analyze** beam by working stress method.
2. **Apply** the fundamental concepts of limit state method on limit state of serviceability.
3. **Analyze and design** of column.
4. **Design** of slab.
5. **Evaluate** the fundamental concepts of limit state of collapse in compression and design of footing.
6. **Explain** the Pre-stressed concrete and its different method.

**Course Title: Fluid Mechanics**

**Course Code: 25UCV502T**

After the completion of course students would be able to:

1. **Illustrate** and assess the importance and practical significance of various fluid properties.
2. **Interpret** the fluid pressure measurement.
3. **Estimate** various forces acting on various submerged surfaces.
4. **Illustrate and estimate** the various forces acting on partially and fully submerged bodies.
5. **Interpret** the importance of various parameters on the fluid motion.
6. **Recognize** the various flow measuring devices with their practical applications.



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### Course Title: Concrete Technology & Materials Testing

Course Code: 25UCV503T

After the completion of course students would be able to:

1. **Explain** the properties and significance of the constituent materials of concrete.
2. **Determine** the properties of fresh and hardened concrete by standard testing procedures for identifying their performance.
3. **Design** the higher grade concrete by BIS mix design procedure.
4. **Apply** the use of special concrete materials, in constructions for satisfying the future needs of industry & infrastructure of country.
5. **Relate** to a variety of established material testing procedures/techniques and the relevant codes of practice.
6. **Evaluate** and write a technical laboratory report.

### Course Title: Foundation Engineering

Course Code: 25UCV504T

After the completion of course students would be able to:

1. **Use** the knowledge of different soil exploration techniques to ascertain the properties of soil
2. **Analyse** the stability of slopes
3. **Design** of retaining structures
4. **Practice** Ground Improvement Techniques
5. **Design** the shallow foundation
6. **Design** the deep foundation

### Course Title: Prestressed Concrete

Course Code: 25UCV521T

After the completion of course students would be able to:

1. **Interpret** the behaviour of pre-stressed concrete.
2. **Analyze and Design** of the pre-stressed concrete rectangular beam.
3. **Demonstrate** the Shear and Torsional resistance of the pre-stressed concrete members
4. **Analyze and Design** of pre-stress composite concrete.
5. **Get fundamental** knowledge of pre-stressing to continuous beams.
6. **Design** of pre-stressed concrete poles.



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### Course Title: Ground Improvement Techniques

Course Code: 25UCV522T

After the completion of course students would be able to:

1. **Identify** the type of problems in problematic soils and to suggest different ground improvement techniques to solve these problems.
2. **Explain** the importance and suitability of shallow and deep compaction techniques like use of different rollers, dynamic tamping, explosion etc.
3. **Design** of drainage and dewatering systems for various civil engineering problems.
4. **Apply** the admixtures like cement and lime for treating expansive soil.
5. **Demonstrate** the design and construction techniques of those in-situ soil improvement techniques.
6. **Select** suitable grouting techniques and grout materials used frequently for underground and foundation constructions.

### Course Title: Geo-environmental Engineering

Course Code: 25UCV523T

After the completion of course students would be able to:

1. **Describe** the importance to Geo-Environmental Engineering.
2. **Explain** the Soil-Water-Contaminant Interaction.
3. **Specify** the Waste containment practices.
4. **Explain** Waste stabilization and mechanism of stabilization.
5. **Demonstrate** the ability to apply site remediation techniques of contaminated sites.
6. **Evaluate** the influence of contaminants on water and get introduced to geotechnical centrifuge modeling

### Course Title: Advanced Building Materials

Course Code: 25UCV524T

After the completion of course students would be able to:

1. **Demonstrate** the structural, physical and long term performance of building materials used in construction.
2. **Interpret** special mortars and admixtures used in Civil engineering applications.
3. **Achieve** the knowledge the properties of Ceramic materials and applications in construction projects.
4. **Discover** the role and applications of polymers in building and construction projects
5. **Identify** suitable materials for different construction purposes and understand their characteristics.
6. **Apply** the concept of green building and sustainable materials.



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### Course Title: Ground Water Hydrology

Course Code: 25UCV525T

After the completion of course students would be able to:

1. **Explain** the basic concept of hydrology and various processes.
2. **Compute** various components of the hydrological processes.
3. **Explain** well hydraulics
4. **Compute** ground water flow rate
5. **Calculate** geo-hydrological parameters.
6. **Illustrate** various methods of groundwater recharge.

### Course Title: Advanced Surveying

Course Code: 25UCV526T

After the completion of course students would be able to:

1. **Develop** expertise in Remote Sensing and familiarize with its key terms.
2. **Utilize** drone and LiDAR technology to enhance surveying accuracy and efficiency
3. **Develop** apply concept of image interpretation.
4. **Apply** knowledge of GIS.
5. **Obtain** concept of photogrammetry surveying and its application.
6. **Apply** GPS & DGPS technology for surveying

### Course Title: Air Pollution

Course Code: 25UOE531T

After the completion of course students would be able to:

1. **Identify** different aspects of air pollutants, its sources and effects on man & materials
2. **Use** Indian and CPCB standards of air pollutants and air sampling
3. **Explain** the sampling of air pollutants in ambient air
4. **Describe** the methods and types of equipment for controlling the air pollutants



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### Course Title: Climate change and Mitigation

Course Code: 25UOE532T

After the completion of course students would be able to:

1. **Recognize** the problem of economics of energy – environmental interaction with respect to global climate change
2. **Analyse** the Green house effect
3. **Analyse** the impact of climate change
4. **Describe** the clean technology and mitigation strategies for global climate change.

### Course Title: Disaster Management

Course Code: 25UOE533T

After the completion of course students would be able to:

1. **Identify and classify** different types of disasters (natural and man-made). and understand the disaster management cycle and its phases: mitigation, preparedness, response, and recovery.
2. **Evaluate** the role of government, NGOs, and international organizations in disaster management and assess the importance of disaster risk reduction (DRR) strategies.
3. **Apply** key disaster management principles in simulated or real-world scenarios.
4. **Demonstrate** knowledge of disaster management policies and frameworks in India and globally.



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### 6<sup>th</sup> Semester (Autonomous)

**Course Title: Estimating & Costing**

**Course Code: 25UCV601T**

After the completion of course students would be able to:

1. **Prepare** the preliminary estimate for administrative approval & technical sanction for a Civil engineering project.
2. **Estimate** the bill of quantities using different techniques of preliminary & detailed estimation of buildings & roads.
3. **Develop** the tender documents, fill the contracts and make use of knowledge of different contract submission & opening in awarding the work to the contractor. Use the concept of SD, EMD, MAS, Running Bill, Final Bill during the entire project.
4. **Develop** the specification of the works to be undertaken,
5. **Analyze** the technique of Rate analysis in estimating the exact cost of material & manpower and hence the entire project.
6. **Estimate** the extract value of the asset (movable & immovable) using different Valuation techniques

**Course Title: Transportation Engineering**

**Course Code: 25UCV602T**

After the completion of course students would be able to:

1. **Define and describe** different objectives and requirements of Highway Development and Planning, Alignments.
2. **Design** various Geometric Features of Highways & Pavement Design
3. **Analyze, apply and evaluate** the parameters of Traffic Engineering.
4. **Explain and describe** various terms in railway engineering and aircraft engineering.

**Course Title: Hydraulics and Water Resources Engineering**

**Course Code: 25UCV603T**

After the completion of course students would be able to:

1. **Apply** the concepts related to boundary layer theory and determination of drag and lift forces.
2. **Utilize** the knowledge of theories and equations of pipe flow in analyzing and designing the pipe network systems and its components including water hammer pressures.
3. **Employ** the concepts of uniform and critical flow through open and apply basics related to Turbines & Pumps in Water Resources planning.
4. **Use** of knowledge of basics of hydrology in calculating infiltration, evaporation, total runoff.
5. **Describe** different systems and methods of irrigation and estimate the quantity of water required by crops and estimate the quantity of water required by crops.
6. **Design and analyse** dams, illustrate types of Spillways and canal.



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### Course Title:Advanced Structural Analysis (Elective-II)

Course Code: 25UCV6XXT

After the completion of course students would be able to:

- 1.**Illustrate** the structural behavior of bars and trusses and analyze it by using flexibility method of analysis.
- 2.**Interpret** the structural behavior of beams and plane frames and analyze it by using flexibility method of analysis.
3. **Analyze** bars, springs and truss by member approach of stiffness matrix method.
- 4.**Analyze** beams by member approach of stiffness matrix method and to develop transformation matrix and global/structure stiffness matrix for plane frame and thereby analyze it by member approach of stiffness matrix method.
- 5.**Develop** transformation matrix and global/structure stiffness matrix for grid and
6. **Develop** the member stiffness matrix of space truss and space frame and develop

### Course Title:Geosynthetics Engineering (Elective- II)

Course Code: 25UCV6XXT

After the completion of course students would be able to:

- 1.**Identify** and classify different types of geosynthetics.
- 2.**Determine** the relevant properties of geosynthetics for specific applications.
- 3.**Explore** the different functions of Geosynthetics.
- 4.**Illustrate** the applications of geosynthetics in Civil engineering field.
5. **Study** and identify about various reinforced soil structures and understand reinforced soil embankments.
6. **Interpret** the environmental impact and sustainable use of geosynthetics.

### Course Title:Climate change and Mitigation (Elective-II)

Course Code: 25UCV6XXT

After the completion of course students would be able to:

- 1.**Illustrate** the Climate system, its changes and causes
2. **Analysis** Green house gases and its chemistry, sources, effects .
3. **Analyze** impact of climate change
- 4.**Illustrate** the clean technology and mitigation of climate change.
- 5.**Explore** rules and protocols on global trading related to global warming
6. **Interpret** the modeling on climate change.



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### Course Title:Flood Control & Drainage (Elective-II)

Course Code: 25UCV6XXT

After the completion of course students would be able to:

1. **Explain** the process of precipitation and describe various techniques used to measure it.
2. **Discuss** the concept of runoff and compare different techniques used to determine it.
3. **Identify** different types of hydrologic extremes and analyze their causes and impacts related to floods.
4. **Apply** hydrological methods to estimate design floods and demonstrate flood routing techniques.
5. **Evaluate** different flood control strategies and design appropriate flood mitigation structures or systems.
6. **Explain** the functions of drainage systems and justify their importance in urban and rural planning.

### Course Title:Railway Engineering (Elective-II)

Course Code: 25UCV6XXT

After the completion of course students would be able to:

1. **Apply** expertise in building a new railway track
2. **Design** railway track.
3. **Utilize** knowledge in the construction and maintenance of railway track.
4. **Describe** modernization, rehabilitation and renewal of track.
5. **Describe** various signaling & control system.
6. **Enhance** awareness of railway safety and contemporary developments in rail transport.

### Course Title: Structural Audit (Elective- III)

Course Code:25UCV6XXT

After the completion of course students would be able to:

1. **Apply** the concept of Structural Audit
2. **Describe** the concept of Structural Health Monitoring
3. **Get** fundamental knowledge of conduction of Structural Audits
- 4.**Analyze** structural defects and deterioration patterns based on data from audits and monitoring.
- 5.**Assess** the structural stability and safety of buildings based on audit findings and recommend remedial measures.
- 6.**Prepare** a comprehensive Structural Audit Report including findings, conclusions, and suggestions for structural repair and maintenance.



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### Course Title: Advanced Soil Engineering(Elective-III)

Course Code:25UCV6XXT

After the completion of course students would be able to:

1. **Analyze** the properties and behavior of soils under various stress and loading conditions.
2. **Evaluate** advanced soil testing techniques for soil characterization.
3. **Apply** soil mechanics principles to solve complex geotechnical engineering problems.
4. **Understand** the concepts of soil-structure interaction and the behavior of foundations.
5. **Assess** the influence of various environmental factors on soil behavior (e.g., expansive soils, soft soils).
6. **Design** and apply methods for improving soil conditions for construction projects.

### Course Title:Sustainable Resource Management (Elective III)

Course Code:25UCV6XXT

After the completion of course students would be able to:

1. **Identify and explain** various natural resources, their objectives, demand patterns, and associated social dimensions contributing to sustainability.
2. **Analyze** the characteristics, uses, impacts, and management strategies of land, soil, and water resources, including methods for their renewal and sustainable use.
3. **Differentiate** between conventional and non-renewable energy resources and **evaluate** their environmental implications and potential for sustainable development.
4. **Examine** the availability, distribution, and ecological impact of forest and mineral resources, and propose responsible extraction and management practices.
5. **Assess** the principles and practices of natural resource conservation systems and formulate sustainable strategies for effective conservation and management.
6. **Develop** strategies to optimize resource usage and reduce construction waste.

### Course Title: Precast and Modular Construction Practices (Elective-III) Course Code:25UCV6XXT

After the completion of course students would be able to:

1. **Describe** the principles of prefabrication and identify materials required for Precast Technology.
2. **Explain** the process of manufacturing finished precast concrete products.
3. **Apply** knowledge to differentiate between pre-tensioned and post-tensioned systems in terms of structural behavior.
4. **Analyze** structural differences and performance aspects of pre-tensioned and post-tensioned members.
5. **Evaluate** different equipment and technologies used in precast construction practices.
6. **Design** a basic precast concrete production setup incorporating prefabrication principles and suitable materials.



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### Course Title: Hydropower Engineering (Elective-III) Course Code:25UCV6XXT

After the completion of course students would be able to:

1. **Identify** various sources of water power and estimate their potential for hydroelectric generation.
2. **Explain** the concepts and design criteria for power canals and identify their components.
3. **Apply** design principles to develop layouts for power canals and assess their suitability.
4. **Interpret** the working principles and design aspects of various components of hydroelectric power units.
5. **Estimate and analyze** the performance parameters of hydro power plants including powerhouse design.
6. **Evaluate** electrical aspects related to hydroelectric power generation and integration with the grid.

### Course Title: Bridge and Tunnelling Engineering (Elective-III) Course Code:25UCV6XXT

After the completion of course students would be able to:

1. **Identify and classify** different types of bridges and their structural components.
2. **Explain** the types of loads and stresses acting on bridges.
3. **Analyze** the hydro-logic parameters essential for bridge design and construction.
4. **Identify** various types of tunnels and their functional components.
5. **Compare** different methods of tunneling based on site conditions and purpose.
6. **Evaluate** the suitability of tunneling methods and bridge design based on structural and environmental considerations.

### Course Title: Software Applications in Civil Engineering Course Code:25UCV604P

After the completion of course students would be able to:

1. **Gain** confidence in using STAAD.Pro for creating structural models and conducting analyses.
2. **Analyze** the response of structures under different loading conditions, ensuring the design is safe and efficient.
3. **Design** structural components (such as beams and columns) that meet the required safety and code compliance.
4. **Read and interpret** the analysis results, including deflections, stresses, and forces, and apply them in real-world projects.



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### 7<sup>th</sup> Semester (RTMNU CBCS)

**Course Title: Design of Steel Structure**

**Course Code: BTCVE701T**

After the completion of course students would be able to:

- 1. Analyze** the structural properties to evaluate the strength of a design and apply design philosophy principles accordingly
- 2. Design** structural members under axial loading using various techniques.
- 3. Design** structural components of buildings under bending loads by applying relevant analytical techniques
- 4. Design** structural members under complex loading conditions by applying relevant engineering principles and analyzing their behavior.
- 5. Design** various types of column bases ie slab bases, gusseted bases, and moment-resistant bases, applying relevant structural principles and codes

**Course Title: Sustainable Resource Management (Elective IV)**

**Course Code: BTCVE702T**

After the completion of course students would be able to:

- 1. Identify and explain** various natural resources, their objectives, demand patterns, and associated social dimensions contributing to sustainability.
- 2. Analyze** the characteristics, uses, impacts, and management strategies of land, soil, and water resources, including methods for their renewal and sustainable use.
- 3. Differentiate** between conventional and non-renewable energy resources and **evaluate** their environmental implications and potential for sustainable development.
- 4. Examine** the availability, distribution, and ecological impact of forest and mineral resources, and propose responsible extraction and management practices.
- 5. Assess** the principles and practices of natural resource conservation systems and formulate sustainable strategies for effective conservation and management.



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**Course Title: Building Construction Practices (Elective – IV)**

**Course Code: BTCVE702T**

After the completion of course students would be able to:

1. **Illustrate** classification of Building as per NBC and building component & its function
2. **Describe** different types of foundations & related activities as per requirement
3. **Explain** the construction of sub structure as per conditions & requirement
4. **Explain** the construction of super structure as per conditions & requirement
5. **Discuss** building maintenance work as per conditions & requirement

**Course Title: Air Pollution & Solid Waste Management (Elective-V)**

**Course Code: BTCVE703T**

After the completion of course students would be able to:

1. **Explain** different aspects of air pollutants, its sources and effects on man & materials and Meteorological parameters
2. **Describe** various methods of air sampling & design equipment's for air pollution to reduce its impact on environment
3. **Identify** problems arriving in handling large amount of solid waste generated
4. **Explain** the problems arriving in collection, transportation and processing of solid waste & to propose safe and efficient methods for solid waste collection and disposal.
5. **Discuss** and compare the emerging technologies used for air pollution control.



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**Course Title:Water & Wastewater Treatment (Elective-VI)      Course Code: BTCVE704T**

After the completion of course students would be able to:

- 1.**Explain** the processes and **design** the components of water treatment systems involving aeration, coagulation-flocculation, and sedimentation.
- 2.**Describe and design** the treatment units for water filtration and disinfection to ensure potable water quality.
- 3.**Identify** various sources of wastewater, **analyze** their characteristics, and explain suitable disposal methods.
- 4.**Design and analyze** preliminary and primary wastewater treatment systems considering flow and pollutant loads.
- 5.**Explain** the principles of secondary wastewater treatment and design appropriate biological treatment systems such as activated sludge process, trickling filters, etc.

**Course Title:Forensic In Civil Engineering (Elective-VI)      Course Code: BTCVE704T**

After the completion of course students would be able to:

- 1.**Describe** various testing methods of Failed Structures.
- 2.**Summarize** the aspects of failures connected with various structural systems and materials.
- 3.**Apply** the strategic measures against failures.
- 4.**Discuss** the legal and technical report of the failure in lucid manner.
- 5.**Summarize** knowledge about structural failures



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### Course Title: Pavement Analysis & Design (Elective-VI) Course Code: BTCVE704T

After the completion of course students would be able to:

1. **Analyze** the stresses and strains in a flexible pavement using multi-layered elastic theory.
2. **Design** a flexible pavement using IRC, Asphalt Institute, and AASHTO methods.
3. **Analyze** stresses and strains in a rigid pavement using Westergaard's theory
4. **Design** a rigid pavement using IRC, and AASHTO methods.
5. **Comprehend** the concept of strengthening of existing pavements and pavement management system

### Course Title: Irrigation Management (Elective-VI) Course Code: BTCVE704T

After the completion of course students would be able to:

1. **Discussion** of various principles of irrigation management.
2. **Study** of various methods of canal section design and approaches of optimal canal design
3. **Estimation** of seepage losses through a canal system and criteria to minimise it
4. **Involvement** of various stake holders of irrigation system and efficient functioning for the better efficiency of the system
5. **Knowing** various policies and attempt made by state and central Government for the proper functioning of irrigation system



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### Course Title: Civil Engineering Testing, Materials & Evaluation (OE-II) Course Code: BTCVE705T

After the completion of course students would be able to:

1. **Evaluate** the role of materials in Civil Engineering.
2. **Know** the mechanical behaviour and properties of steel and concrete by standard testing procedures for identifying their performance.
3. **Explain** special materials, composite materials and use of new techniques in constructions for satisfying the future needs of industry.
4. **Exposure** to a variety of established material testing procedures/techniques and the relevant codes of practice.
5. **Evaluate** and write a technical laboratory report.

### Course Title: Project Work Phase-I Course Code: BTCVE706P

After the completion of course students would be able to:

1. **Identify** and formulate a relevant Civil Engineering problem through literature survey.
2. **Apply** engineering fundamentals and principles to define project objectives and scope.
3. **Develop** a feasible project plan including time schedules, resources, and preliminary design methodology.
4. **Demonstrate** the ability to work in a team, distribute tasks, and maintain project documentation..
5. **Use modern tools** and techniques to support project execution and result presentation.



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### **8<sup>th</sup> Semester (RTMNU CBCS)**

**Course Title: Construction Method and Equipment Management      Course Code: BTCVE 801T**

After the completion of course students would be able to:

- 1.Utilize** the knowledge about construction industry and construction projects.
- 2.Classify** the knowledge of project organization.
- 3.Organize** the construction planning methods.
- 4.Distinguish** about construction labour and equipment management.
- 5.Evaluating** the knowledge about construction materials management.

**Course Title: Digital Land Surveying & Mapping      Course Code: BTCVE 802T**

After the completion of course students would be able to:

- 1.Explain** the principles and applications of digital land surveying.
- 2.Explain** the process of collecting and recording GPS data for surveying
- 3.Explain** how DGPS improves positioning accuracy compared to GPS.
- 4.Operate** a total station to measure distances, angles, and coordinates.
- 5.Apply** mapping software to analyze and interpret geospatial data



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### Course Title: Disaster Management

Course Code: BTCVE 803T

After the completion of course students would be able to:

1. **Analyze and evaluate** public health aspects of disaster management at both local and global levels, and apply integrated knowledge to manage such events effectively, even under conditions of limited information.
2. **Describe, analyze, and evaluate** the environmental, social, cultural, economic, legal, and organizational factors that influence vulnerabilities and capacities in disaster situations.
3. **Apply** theoretical knowledge and practical skills in disaster risk reduction, response, and recovery processes, and explain their interrelations with particular focus on public health dimensions.
4. **Collect, analyze,** and communicate risk-related information, relief needs, and past disaster lessons to develop and present mitigation strategies with well-structured arguments and evidence-based conclusions.
5. **Design** and conduct research on emergencies and disaster events, evaluate scientific approaches and their limitations, and demonstrate responsibility for the ethical and societal implications of disaster science applications.

### Course Title: Project Work Phase-II

Course Code: BTCVE 804P

After the completion of course students would be able to:

1. **Demonstrate** a sound technical knowledge of their selected project topic.
2. **Identify** and analyse real world problem, formulation and solution.
3. **Design** engineering solutions to complex problems and apply the modern techniques for utilizing a systems approach.
4. **Communicate** effectively to discuss and solve engineering problems including ability to work in team.
5. **Apply**, implement and share their project outcomes with outside world