

# DEPARTMENT OF CIVIL ENGINEERING

## Course outcomes

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### 3<sup>rd</sup> Semester

#### BTCE-301- 18 Surveying & Geometrics

The course will enable the students to:

1. Understand the concept, various methods and techniques of surveying
2. Compute angles, distances and levels for given area
3. Apply the concept of tachometry survey in difficult and hilly terrain.
4. Select appropriate instruments for data collection and survey purpose
5. Analyze and retrieve the information from remotely sensed data and interpret the data for survey.
6. Understand the concepts related to GIS and GPS and analyze the geographical data.

#### BTCE-302- 18 Solid Mechanics

After studying the course the students of Civil Engineering will be competent:-

1. Understand the concept of static equilibrium, deformations, and material constitutive behavior.
2. Describe the concepts of stress, strain and elastic behavior of materials including Hooke's law relationships to analyze structural members subjected to tension, compression and torsion.
3. Apply the concept of Mohr's circle in the stress/strain calculations.
4. Develop SFD and BMD for different type of beams subjected to different types of loads
5. Plot elastic curves for beams undergoing displacements under different loadings
6. Understand the behavior of columns and struts under axial loading.

#### BTCE-303- 18 Fluid Mechanics

After studying the course the students of Civil Engineering will be competent:-

1. To apply the knowledge of the basic principles of fluid mechanics for analysis and design of type of flow regime in a given engineering system, to construct an appropriate (fixed, deforming, or moving) control volume for a given engineering system and apply the principles of conservation of mass, momentum, and energy to the control volume.
2. Ability to calculate the hydrostatic forces and moments on planar and curved submerged and floating surfaces to analyze fluid flow problems with the application of the momentum and energy equations and ability to present data or governing equations in non-dimensional form, design experiments, and perform model studies and to decide when appropriate to use ideal flow concepts and the Bernoulli equation.
3. Ability to solve for internal flow in pipes and channels through simple solutions of the Navier-Stokes equations, Moody chart and head-loss equations and ability to solve for external flow, Formulate expressions using dimensionless approach and able to determine design parameters by creating replica of prototype at appropriate scale.
4. Calculate the most efficient flow channel sections analyze fluid flow problems, particularly for the case of open channel flow with the application of the momentum, energy equations for

rapidly varied flow systems. Establish Hagen Poiseuille's equation, shear stress distribution equation, velocity distribution for turbulent flow in smooth and rough pipes for laminar flow through pipe and parallel plates, energy and specific energy's equation, velocity distribution equations and momentum and specific force equation in open channel flow etc and Utilize these equations to calculate Pressure drop for given length of pipe, categories major (frictional) and minor head losses, leakage through crack etc

- 5., Design and addressing problems in open channel (lined/ unlined) of different shapes and size optimally as per site condition. relate basic equations of fluid flow in the case of open channel flow and to solve problems related to determination of location and types of hydraulic jump to develop an understanding of how fluid mechanics applies to mechanical, biological and environmental systems.

### **BTAM-301- 18 Mathematics-III (Transform & Discrete Mathematics)**

1. Understand the basic results on vector function, their properties and fields so as to apply them for solving problems of engineering.
2. Find length, area and volume using integral calculus that is an important application in engineering.
3. Solve some real problems in engineering using Gauss Divergence and Stokes' theorem
4. To formulate Laplace transform of functions and its applications to solve differential equations that form real life problems in engineering.
5. To formulate Fourier series, its properties and its applications to solve problems in engineering.

### **BTEC- 305- 18 Basic Electronics & applications in Civil Engineering**

After undergoing this course students will be able to

1. Understand construction of diodes and their rectifier applications.
2. Appreciate the construction and working bipolar junction transistors and MOSFETs.
3. Design Op-Amp IC based fundamental applications.
4. Comprehend working of basic elements of digital electronics and circuits.

### **HSMC-132- 18 Civil Engineering- Introduction, Societal & Global Impact**

After studying the course the students of Civil Engineering will be competent:-

1. Introduction to what constitutes Civil Engineering
2. Understanding the vast interfaces this field has with the society at large
3. Providing inspiration for doing creative and innovative work for the benefit of the society
4. Need to think innovatively to ensure Sustainability
5. Highlighting the depth of engagement possible within civil engineering and exploration of various possibilities of a career in this field

### **BTCE-306- 18 Surveying & Geomatics Lab**

After completing the course the students must demonstrate the knowledge and ability to:

1. Assess horizontal & vertical angles by Theodolite.
2. Survey the area using different methods of plane tabling and compass survey and to adjust the compass traverse graphically.

3. Compute the reduce levels using various methods of leveling.
4. Predict the location of any point horizontally and vertically using Tachometry.
5. Setting out curves in the field.
6. Use electronic survey instruments.

### **BTCE-307- 18 Fluid Mechanics Lab**

After studying the course the students of Civil Engineering will be competent:-

- 1 Select appropriate pressure measuring device under different condition of flow.
- 2 Determine the stability of a floating body.
- 3 Understand and apply Bernoulli's theorem practically.
- 4 Find discharge of fluid through pipe, orifices and in open channel.
- 5 Estimate the major and minor losses in pipe.
- 6 Estimate the various elements and energy losses in hydraulic jump.

### **BTCE-308- 18 Solid Mechanics Lab**

After studying the course the students of Civil Engineering will be competent:-

1. Understand the importance of physical properties of steel.
2. Identify and comprehend code provisions for testing different properties of steel.
3. Develop stress-strain curve for axial compression, axial tension and shear.
4. Assess hardness and impact strength of steel.
5. Assess flexural strength of a given material.
6. Evaluate fatigue and impact strength of steel.

## **4<sup>th</sup> Semester**

### **BTCE-401- 18 Concrete Technology**

After studying this course, students shall be able to:

1. Understand the relevance of different properties of constituent materials on properties of concrete.
2. Understand the behavior and durability aspects of concrete under different loading and exposure conditions.
3. Understand the issues involved in production and use of concrete.
4. Design of concrete mixes as per BIS specifications.
5. Understand various testing methods for concrete and their applicability.
6. Knowledge of special type of non-conventional concretes.

### **BTCE-402- 18 Materials, Testing & Evaluation**

After studying this course, students shall be able to:

1. Appraisal about the role of materials in civil engineering
2. Introduce common measurement instruments, equipments and devices to capture the material response under loading
3. Exposure to a variety of established material testing procedures/techniques and the relevant codes of practice
4. Ability to write a technical laboratory report.

### **BTCE-403- 18 Hydrology & Water Resources Engineering**

At the end of the course, students must be in a position to:

- 1 Understand the interaction among various processes in the hydrologic cycle.
- 2 Calculate the average annual rainfall of any area using the rain gauge data and inter-relations of various parameters as infiltration, evapotranspiration etc
- 3 Understand the various component of hydro graphs and able to estimate the run off.
- 4 Find the water requirement for different crops and able to proposed appropriate method of applying water.
- 5 Understand the distribution system of canal and various components of irrigation system.
- 6 Classify dams and spillways, their problems and able to determine forces exerted by fluid on dams.

### **BTCE-404- 18 Transportation Engineering**

After completing this course the student must demonstrate the knowledge and ability to:

1. Appreciate the importance of different modes of transportation and characterize the road transportation.
2. Alignment and geometry of pavement as per Indian Standards according to topography.
3. Assess the properties of highway materials in laboratory
4. Understand the importance of railway infrastructure planning and design.
5. Identify the functions of different component of railway track.
6. Outline the importance of Airport Infrastructure

### **BTCE-405- 18 Disaster Preparedness & Planning**

After completing this course the student must demonstrate the knowledge and ability to:

1. Identify various types of disasters, their causes, effects & mitigation measures.
2. Demonstrate the understanding of various phases of disaster management cycle and create vulnerability and risk maps.
3. Understand the use of emergency management system to tackle the problems.
4. Discuss the role of media, various agencies and organizations for effective disaster management.
5. Design early warning system and understand the utilization of advanced technologies in disaster management.
6. Compare different models for disaster management and plan & design of infrastructure for effective disaster management.

### **EVS-101-18 Environmental Science**

After studying this course, students shall be able to:

1. Students will enable to understand environmental problems at local and national level through literature and general awareness.
2. The students will gain practical knowledge by visiting wildlife areas, environmental institutes and various personalities who have done practical work on various environmental Issues.
3. The students will apply interdisciplinary approach to understand key environmental issues and critically analyze them to explore the possibilities to mitigate these problems.
4. Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

### **BTCE-406- 18 Concrete Testing Lab**

After studying this course, students shall be able to:

1. Evaluate properties of building materials, such as cement and aggregates.
2. Conduct experiments and check the acceptance criteria (if any).
3. Design concrete mixes as per BIS provisions.
4. Analyze the properties of concrete in fresh and hardened state.
5. Create a well organized document and present the results appropriately.
6. Understand and apply non destructive testing (NDT) for evaluating concrete quality.

### **BTCE-407- 18 Transportation Lab**

After studying this course, students shall be able to:

1. Characterize the pavement materials as per the Indian Standard guidelines.
2. Evaluate the strength of subgrade soil by CBR test.
3. Conduct experiments to evaluate aggregate properties.
4. Determine properties of bitumen material and mixes
5. Evaluate the pavement condition by rough meter and Benkelman beam test.
6. Create a well organized report and present the results appropriately

## **5<sup>th</sup> Semester**

### **BTCE-501-18 Engineering Geology**

The course will enable the students understand:

1. The basic concepts of geological processes and their importance in civil Engineering
2. Identification of rocks and minerals and their characteristics
3. Significance of geological structures and processes in civil engineering projects
4. Site characterization and geologic considerations in construction

### **BTCE-502-18 Elements of Earthquake Engineering**

The course will enable the students to:

1. Appreciate the role of earthquake forces in structural design of building.
2. Apply various codal provisions related to seismic design of buildings.
3. Acquire new basic knowledge in earthquake engineering

### **BTCE-503-18 Construction Engineering & Management**

The course will enable the students to:

1. An idea of how structures are built and projects are developed on the field
2. An understanding of modern construction practices
3. A good idea of basic construction dynamics- various stakeholders, project objectives,
4. processes, resources required and project economics
4. A basic ability to plan, control and monitor construction projects with respect to time and cost
5. An idea of how to optimize construction projects based on costs
6. An idea how construction projects are administered with respect to contract structures and issues.
7. An ability to put forward ideas and understandings to others with effective communication

Processes

### **BTCE-504-18 Environmental Engineering**

The course will enable the students to:

1. Understand the impact of humans on environment and environment on humans
2. Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.
3. Be able to plan strategies to control, reduce and monitor pollution.
4. Be able to select the most appropriate technique for the treatment of water, wastewater, solid waste and contaminated air.
5. Be conversant with basic environmental legislation.

### **BTCE-505-18 Structural Engineering**

The course will enable the students to:

1. The students will be able to apply their knowledge of structural mechanics in addressing design problems of structural engineering
2. They will possess the skills to analyze and design concrete and steel structures
3. They will have knowledge of structural engineering

### **BTCE-506-18 Geotechnical Engineering**

After studying this course, students shall be able to:

1. Comprehend the various geotechnical field challenges and understand their fundamental, index and engineering properties and then use (apply) the soil as an engineering material.
2. Investigate and write the laboratory reports for soil design properties and parameters by apply the concept of permeability, total and effective stress approaches in soil strength determination
3. Apply the various specifications of compaction of soils in the construction of highways and earthen dams.
4. Able to apply the knowledge of consolidation, soil deformation parameters, and calculate settlement magnitude and rate of settlement.
5. Design the embankment slopes and check the stability of finite slopes.

### **BTCE-507-18 Geotechnical Lab**

After studying this course, students shall be able to:

1. Investigate and write the laboratory reports on physical properties of soils such as specific gravity, field density, and water content etc.
2. Investigate and write the laboratory reports on design properties and soil parameters by apply the concept of grain size analysis, consistency limits, permeability and compaction tests

### **BTCE-508-18 Environmental Engineering Lab**

After studying this course, students shall be able to:

1. The student will be able to apply knowledge of environmental engineering disciplines like water, wastewater, air and groundwater pollution, environmental chemistry, microbiology, solid waste management, industrial wastewater treatment and environmental impact assessment to real life problems
2. The student will be able to understand and analyze the environment related problems and to successfully define the solution methodology related to these problems
3. The student will be able to perform analysis and design as per the standard provisions so as to protect the environment
4. The student will be able to demonstrate ability to communicate effectively to the society
5. The student will be able to adopt new technology by properly understanding the pros and cons to implement the same successfully
6. The student will be able to function effectively as leader by encouraging the team work so as to make him problem solver

### **BTCE-509-18 Structural Lab**

After the completion of Lab, Student will be able to:

- 1) Understand to calculate the deflection and flexural rigidity of Simply supported beam
- 2) Understand to determine the deflection of Fixed beam
- 3) Learn to draw the influence line diagram for reactions.
- 4) Understand to determine the deflection of the overhang beams.
- 5) Acquire the knowledge to draw the Structural drawings of RC Elements such as Beam, Slab and Structural Drawings of Steel Elements such as Connections, Tension Members, Compression Members, Beams.

## **6<sup>th</sup> Semester**

### **BTCE-601-18 Engineering Economics, Estimation & Costing**

On completion of the course, the students will:

1. Have an idea of basic principles and elements of economics in general.
2. Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.
3. Be able to understand the technical specifications for various works to be performed for a project and how they impact the cost of a structure.
4. Be able to quantify the worth of a structure by evaluating quantities of constituents, derive their cost rates and build up the overall cost of the structure.
5. Be able to understand how competitive bidding works and how to submit a competitive bid proposal.

### **PECE-602A-18 Foundation Engineering**

On completion of this course, the students will be able to

- 1 - Understand the methods of surface and subsoil exploration and to prepare investigation report.
- 2 - Estimate the stresses in soils and bearing capacity of soil for shallow foundation.
- 3 - Design various types of shallow foundation and to estimate settlement.
- 4 - Apply the concepts of deep foundation and solve problems related with pile foundation.

### **PECE-603E-18 Prestressed Concrete**

On completion of this course the student will be able to:

1. Recognize the materials for prestressed concrete and its properties, advantages and applications in contrast to normally reinforced concrete.
2. Comprehend the concept of pre-tensioning and post-tensioning of prestressed concrete, types of prestressed members, prestressing systems and its components.
3. Analyse the prestress, its losses, and determine the strength of a prestressed concrete sections using Indian Standards (IS) guidelines under flexure, shear and torsion.
4. Evaluate the strength and serviceability requirements of different prestressed concrete members i.e. beams, slab and anchor blocks.
5. Design the sections and the reinforcement for prestressed concrete beams, prestressed slabs and anchorage zones as per the IS specifications.

### **PECE-604F-18 Construction Engineering Materials**

On completion of this course the student will be able

1. To provides a broad understanding of the composition, microstructure, and engineering behavior of various materials used in civil engineering applications.
2. To introduces various modifications possibilities in construction materials.
3. To Understand and Explain Special Concrete.



## **7<sup>th</sup> Semester**

### **PECE -701A-18 Pavement and geometric design of Highways**

On the completion of this course the student will be able to

1. Understand patterns of Traffic and its behavior.
2. Develop an understanding for various sight distances and its affects
3. Analyze and design Horizontal and vertical curves
4. Design the cross-sectional elements for different types of highways.
5. Develop and appreciate the concept of intersections

### **PECE-702B-18 Rural water Supply and onsite Sanitation Systems**

On the completion of this course the students will be able to

1. Understand various issues and parameters involved in Rural Water Supply.
2. Analyse proper Rural Water Supply System and various Techniques involved for the same.
3. Have a proper knowledge about Operation and Maintenance of Rural Water Supply and NRDWP
4. Design Low Cost Water Treatment.
5. Ecological sanitation approach – Grey water and storm water management
6. Compact and simple wastewater treatment systems in rural areas-catch basins-constructed wetlands- roughing filters- stabilization ponds - septic tanks – anaerobic baffled reactors-soak pits
7. Disposal of Solid Wastes- Composting- land filling- incineration
8. Other specific issues and problems encountered in rural sanitation.

### **PECE-703C-18 Design of Hydraulic Structures**

On the completion of this course the students will be able to

1. Design the concrete gravity and earthen dams
2. Understand the various components of canal diversion head works, their functions and design Considerations
3. Apply the seepage theories to calculate the uplift pressures at various points under the Hydraulic structures of complex bed configuration
4. Understand and design the lined and unlined canals and canal falls
5. Design the cross – drainage works that is aqueducts, siphon aqueducts and super passages

### **HSMC -255 Professional Practice, Law & Ethics**

On the completion of this course the students will be able to

1. To understand the types of roles they are expected to play in the society as practitioners of the civil engineering profession
2. To develop some ideas of the legal and practical aspects of their profession
3. Basic concepts in professional practice, business management, public policy, leadership and professional licensure are introduced
4. The professional relations, civic responsibilities and ethical obligations for engineering practice Contract management, various legal aspects related to engineering
5. Elementary knowledge of laws that would be of utility in their profession, including several new areas of law such as IPR, ADR

## **OECE-701-18 Metro Systems and Engineering**

1. Understand the different Metro systems
2. To develop some ideas regarding construction of Metro stations
3. Understand the different environmental and social safeguards during construction of Metro routes, safety systems
4. Understand the different Track systems, Signalling Systems and Electric systems
5. Understand the maintenance works of Metro
6. Understand the basic planning, financials, survey and investigation works for new metro routes