

# Regulation – 2017

## DEPARTMENT OF CIVIL ENGINEERING

### PROGRAMME OUTCOMES (POs):

<b>PO 1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals to the solution of complex engineering problems in the major areas of Civil Engineering.
<b>PO 2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex problems of Civil Engineering reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences..
<b>PO 3</b>	<b>Design/development of solutions:</b> Design solutions for complex Civil engineering problems and design construction related components and processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
<b>PO 4</b>	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
<b>PO 5</b>	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
<b>PO 6</b>	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional Civil engineering practice.
<b>PO 7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO 8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

<b>PO 9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO 10</b>	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
<b>PO 11</b>	<b>Project management and finance:</b> Demonstrate the acquisition of the body of engineering knowledge and insight and management principles and apply them as member /leader in teams and multidisciplinary environments.
<b>PO 12</b>	<b>Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### PROGRAMME SPECIFIC OUTCOMES (PSOs):

<b>PSO 1</b>	Applying the mathematical and the problem solving knowledge to identify and provide solutions for solving complex Civil Engineering problems.
<b>PSO 2</b>	Apply the knowledge of Mechanics, Design of structures and Construction techniques to meet the various basic needs of the industry and the society.
<b>PSO 3</b>	Enable the students to use their technical expertise in latest technologies and apply their knowledge continuously in Civil Engineering to be excellent in their career.

# COURSE OUTCOMES

## **HS8151 COMMUNICATIVE ENGLISH**

After completion of the course, Students are able to,

1. Read articles of a general kind in magazines and newspapers.
2. Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.
3. Comprehend conversations and short talks delivered in English
4. Use electronic media.
5. Write short essays of a general kind and personal letters and emails in English.

## **MA8151 ENGINEERING MATHEMATICS – I**

After completion of the course, Students are able to,

1. Use both the limit definition and rules of differentiation to differentiate functions.
2. Apply differentiation to solve maxima and minima problems.
3. Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.
4. Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.
5. Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.

## **PH8151 ENGINEERING PHYSICS**

After completion of the course, Students are able to,

1. Gain knowledge on the basics of properties of matter and its applications,
2. Acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,
3. Adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers
4. Knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes,
5. Understand the basics of crystals, their structures and different crystal growth techniques

## **CY8151 ENGINEERING CHEMISTRY**

After completion of the course, Students are able to,

1. Gain knowledge on the engineering materials,
2. Gain knowledge on the fuels, energy sources and
3. Gain knowledge on the water treatment techniques
4. Understand the concept of engineering processes
5. Understand the applications for further learning.

## **GE8151 PROBLEM SOLVING AND PYTHON PROGRAMMING**

After completion of the course, Students are able to,

1. Develop algorithmic solutions to simple computational problems
2. Read, write, execute by hand simple Python programs.
3. Structure simple Python programs for solving problems.
4. Decompose a Python program into functions.
5. Represent compound data using Python lists, tuples, and dictionaries.

## **GE8152 ENGINEERING GRAPHICS**

After completion of the course, Students are able to,

1. Familiarize with the fundamentals and standards of Engineering graphics
2. Perform freehand sketching of basic geometrical constructions and multiple views of objects.
3. Project orthographic projections of lines and plane surfaces.
4. Draw projections and solids and development of surfaces.
5. Visualize and to project isometric and perspective sections of simple solids.

## **GE8161 PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY**

After completion of the course, Students are able to,

1. Write, test, and debug simple Python programs.
2. Implement Python programs with conditionals and loops.
3. Develop Python programs step-wise by defining functions and calling them.
4. Use Python lists, tuples, dictionaries for representing compound data.
5. Read and write data from/to files in Python.

## **BS8161 PHYSICS AND CHEMISTRY LABORATORY**

After completion of the course, Students are able to,

1. Apply principles of elasticity, engineering applications.
2. Optics engineering applications.
3. Thermal properties for engineering applications.
4. Understand the engineering properties of the various materials
5. Operate the different types conductivity meter to find the conductance of solution.

### **II Semester**

## **HS8251 TECHNICAL ENGLISH**

After completion of the course, Students are able to,

1. Express their opinions clearly, convincingly, initiate a discussion, negotiate, argue using appropriate communicative strategies.
2. Write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing.
3. Tell different genres of texts infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentation.
4. Understand different spoken excerpts critically and infer unspoken and implied meanings.
5. Express their language skills at academic as well as workplace.

## **MA8251 ENGINEERING MATHEMATICS – II**

After completion of the course, Students are able to,

1. Solve the problems related to vector calculus.
2. Analyze ordinary differential equations in model engineering problems.
3. Develop Laplace transform technique in linear ODE of second order with constant coefficients.
4. Analyze the fundamental analytic functions.
5. Explain the standard technique of complex variable theory.

## **PH8201 PHYSICS FOR CIVIL ENGINEERING**

After completion of the course, Students are able to,

1. Get Knowledge on the thermal performance of buildings,
2. Acquire knowledge on the acoustic properties of buildings.
3. Get knowledge on various lighting designs for buildings.

4. Gain knowledge on the properties and performance of engineering materials.
5. Understand the hazards of buildings.

### **BE8251 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

After completion of the course, Students are able to,

1. Understand the basic theorems used in Electrical circuits and the different components.
2. Gain knowledge on construction, working and characteristics of electrical machines.
3. Know the fundamentals characteristic of semiconductor and its applications.
4. Familiar with the principles of digital electronics.
5. Impart knowledge on basic principles of communication engineering.

### **GE8291 ENVIRONMENTAL SCIENCE AND ENGINEERING**

After completion of the course, Students are able to,

1. Acquired knowledge to solve environmental problems.
2. Understood relationship between biotic and abiotic components.
3. Knew the role of human beings in maintaining a clean environment and the values of biodiversity.
4. Able to understand topography and geographic distribution of organism.
5. Conscious about conserving the natural resources and creating pollution free environment.

### **GE8292 ENGINEERING MECHANICS**

After completion of the course, Students are able to,

1. Illustrate the vectorial and scalar representation of forces and moments.
2. Analyze the rigid body in equilibrium.
3. Evaluate the properties of surfaces and solids.
4. Calculate dynamic forces exerted in rigid body.
5. Determine the friction and the effects by the laws of friction.

### **GE8261 ENGINEERING PRACTICES LABORATORY**

After completion of the course, Students are able to,

1. Fabricate carpentry components and pipe connections including plumbing works.
2. Use welding equipments to join the structures.
3. Carry out the basic machining operations
4. Make the models using sheet metal works

5. Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundry and fittings.

### **CE8211 COMPUTER AIDED BUILDING DRAWING**

After completion of the course, Students are able to,

1. Understood principles of planning and orientation of buildings.
2. Draft the plan, elevation and sectional views of buildings.
3. Acquired the knowledge to draw the building plans as per the National Building Code norms.
4. Draft the plan, elevation and sectional views of industrial structures.
5. Draft the plan, elevation and sectional views of framed buildings using computer software.

### **III Semester**

### **MA8353 TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS**

After completion of the course, Students are able to,

1. Understand how to solve the given standard partial differential equations.
2. Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
3. Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
4. Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
5. Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

### **CE8301 STRENGTH OF MATERIALS I**

After completion of the course, Students are able to,

1. Understand the concepts of stress and strain, principal stresses and principal planes.
2. Determine Shear force and bending moment in beams and understand concept of theory of simple bending.
3. Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.
4. Apply basic equation of torsion in design of circular shafts and helical springs,
5. Analyze the pin jointed plane and space trusses.

## **CE8302 FLUID MECHANICS**

After completion of the course, Students are able to,

1. Get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.
2. Understand and solve the problems related to equation of motion.
3. Gain knowledge about dimensional and model analysis.
4. Learn types of flow and losses of flow in pipes.
5. Understand and solve the boundary layer problems.

## **CE8351 SURVEYING**

After completion of the course, Students are able to,

1. The use of various surveying instruments and mapping
2. Measuring Horizontal angle and vertical angle using different instruments
3. Methods of Levelling and setting Levels with different instruments
4. Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth
5. Concept and principle of modern surveying.

## **CE8391 CONSTRUCTION MATERIALS.**

After completion of the course, Students are able to,

1. Compare the properties of most common and advanced building materials.
2. understand the typical and potential applications of lime, cement and aggregates
3. know the production of concrete and also the method of placing and making of concrete elements
4. understand the applications of timbers and other materials
5. Understand the importance of modern material for construction.

## **CE8392 ENGINEERING GEOLOGY**

After completion of the course, Students are able to,

1. Understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.
2. Get basics knowledge on properties of minerals.
3. Gain knowledge about types of rocks, their distribution and uses.
4. Understand the methods of study on geological structure.
5. Understand the application of geological investigation in projects such as dams, tunnels, bridges, roads, airport and harbour.

### **CE8311 CONSTRUCTION MATERIALS LABORATORY**

After completion of the course, Students are able to,

1. Knowledge in the area of testing of construction materials
2. Knowledge in the area of testing of components of construction elements experimentally
3. Read the properties of any construction materials used in construction industry
4. Have idea on innovative materials which are used in the construction industries.
5. Get deep knowledge on components of concrete and its components.

### **CE8361 SURVEYING LABORATORY**

After completion of the course, Students are able to,

1. Get practical knowledge on handling basic survey instruments including Theodolite, Tacheometry,
2. Get practical knowledge on handling Total Station and GPS
3. have adequate knowledge to carryout Triangulation and Astronomical surveying
4. Get practical knowledge on general field marking for various engineering projects and Location of site.
5. Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth

### **HS8381 INTERPERSONAL SKILLS/LISTENING AND SPEAKING**

After completion of the course, Students are able to,

1. Listen and respond appropriately.
2. Participate in group discussions.
3. Make effective presentations.
4. Provide guidance and practice in basic general and classroom conversation and to engage in specific academic speaking activities.
5. Participate confidently and appropriately in conversations both formal and informal.

## *IV Semester*

### **MA8491 NUMERICAL METHODS**

After completion of the course, Students are able to,

1. Understand the basic concepts and techniques of solving algebraic and transcendental equations.
2. Appreciate the numerical techniques of interpolation and error approximations in various intervals in real life situations.
3. Apply the numerical techniques of differentiation and integration for engineering problems.
4. Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
5. Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

### **CE8401 CONSTRUCTION TECHNIQUES AND PRACTICES**

After completion of the course, Students are able to,

1. know the different construction techniques and structural systems
2. Understand various techniques and practices on masonry construction, flooring, and roofing.
3. Plan the requirements for substructure construction.
4. Know the methods and techniques involved in the construction of various types of super structures
5. Select, maintain and operate hand and power tools and equipment used in the building construction sites.

### **CE8402 STRENGTH OF MATERIALS II**

After completion of the course, Students are able to,

1. Determine the strain energy and compute the deflection of determinate beams, frames and trusses using energy principles
2. Analyze propped cantilever, fixed beams and continuous beams using theorem of three moment equation for external loadings and support settlements
3. find the load carrying capacity of columns and stresses induced in columns and cylinders
4. Determine principal stresses and planes for an element in three dimensional state of stress and study various theories of failure
5. Determine the stresses due to Unsymmetrical bending of beams, locate the shear center, and find the stresses in curved beams

## **CE8403 APPLIED HYDRAULIC ENGINEERING**

After completion of the course, Students are able to,

1. Apply their knowledge of fluid mechanics in addressing problems in open channels.
2. Able to identify a effective section for flow in different cross sections.
3. To solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
4. Understand the principles, working and application of turbines.
5. Understand the principles, working and application of pumps.

## **CE8404 CONCRETE TECHNOLOGY**

After completion of the course, Students are able to idea of,

1. various requirements of cement, aggregates and water for making concrete
2. the effect of admixtures on properties of concrete
3. the concept and procedure of mix design as per IS method
4. the properties of concrete at fresh and hardened state
5. the importance and application of special concretes.

## **CE8491 SOIL MECHANICS**

After completion of the course, Students are able to,

1. Classify the soil and assess the engineering properties, based on index properties.
2. Understand the stress concepts in soils
3. Understand and identify the settlement in soils.
4. Determine the shear strength of soil
5. Analyze both finite and infinite slopes

## **CE8481 STRENGTH OF MATERIALS LABORATORY**

After completion of the course, Students are able to,

1. Understand the fundamental concepts of stress and strain in mechanics of solids and structures.
2. Acquire sufficient knowledge in designing shafts to transmit required power
3. Acquire sufficient knowledge in springs for its maximum energy storage capacities.
4. Have knowledge about the mechanism of load transfer in beams, the induced stress resultants and deformations.
5. Get Knowledge in the area of testing of materials and components of structural elements experimentally.

## **CE8461 HYDRAULIC ENGINEERING LABORATORY**

After completion of the course, Students are able to,

1. Understand the flow measurement and the performance of the hydraulic machinery.
2. Learn the theorems of fluid mechanics.
3. Know the performance tests on various types of pumps.
4. Get knowledge about Impact of Jet on vanes and Classification of Turbines.
5. Get knowledge about Classification of pumps and Air vessels, indicator diagrams.

## **HS8461 ADVANCED READING AND WRITING**

After completion of the course, Students are able to,

1. Write different types of essays.
2. Write winning job applications.
3. Read and evaluate texts critically.
4. Display critical thinking in various professional contexts.
5. Enhance their writing skills with specific reference to technical writing.

### **V SEMESTER**

#### **CE8501 Design of Reinforced Cement Concrete Elements**

CO 1: Students will be able to understand the philosophies related to Design of RC Elements with emphasis of Limit State Method and to design the beams in both WSM and LSM.

CO 2: Students will be able to acquire the knowledge to design the structural elements for bond, anchorage, shear and torsion

CO 3: Students will be able to design the slabs and staircases.

CO 4: Students will be able to design the column and different end conditions

CO 5: Students will be able to design footing with different safe bearing conditions and types of loading conditions.

#### **CE8502 Structural Analysis I**

1. Analyze continuous beams, pin-jointed indeterminate plane frames and rigid plane frames by strain energy method
2. Analyze the continuous beams and rigid frames by slope deflection method.
3. Understand the concept of moment distribution and analysis of continuous beams and rigid frames with and without sway.

4. Analyze the indeterminate pin jointed plane frames continuous beams and rigid frames using matrix flexibility method.

5. Understand the concept of matrix stiffness method and analysis of continuous beams, pin jointed trusses and rigid plane frames.

#### **EN8491 Water Supply Engineering**

CO 1: Students will be familiar source and characteristics of water

CO 2: Students will be able to gain the knowledge about the transmission of the water to the treatment plant

CO 3: Students will be able to apply their knowledge an design of various functional unit in water treatment.

CO 4: Students will be able to understand of water quality criteria and standards and their relationship between public health.

CO 5: Students will be able to understand water distribution methods and requirements

#### **CE8591 Foundation Engineering**

CO1: Students will be able to get thorough knowledge to plan and execute a detail site Investigation programme.

CO2: Students will be able to understand the design of shallow foundation.

CO3: Students will be able to know the geotechnical design parameters and type of foundations.

CO4: Students will be able to acquire the knowledge on geotechnical design of different type of pile foundations.

CO5: Students will be able to understand the Retaining walls and their designs.

#### **GI 8014–GEOGRAPHIC INFORMATION SYSTEM**

CO 1:..Students will be able to have basic idea about the fundamentals of GIS.

CO 2:..Students will be able to understand the types of data models.

CO 3:..Students will be able to get knowledge about the data input and topology.

CO 4:..Students will be able to Gain knowledge on data quality and standards.

CO 5:..Students will be able to Understand data management functions and data output

#### **OAI551– ENVIRONMENT AND AGRICULTURE**

CO1: Students are able to understand the various concerns about environment

CO2: Students are able to acquire knowledge about environmental impacts

CO3: Students are able to understand the impacts of climate change on environment

CO4: Students are able to understand concepts such as GM crops, pollination, ecological farming, forest fragmentation and their relation to agriculture.

CO5: Students are able to acquire knowledge on mega farms, virtual water trade, and agricultural environmental policies

## **VI SEMESTER**

### **CE8601 Design of Steel Structural Elements**

CO 1: Students will understand the concepts of various design philosophies and design of members by allowable stress design

CO 2: Students will acquire the knowledge on design common bolted and welded connections for steel structures with reference to Indian Standard code of practice and design aids.

CO3: Students will acquire the knowledge on design of design of tension members and understand the effect of shear lag

CO4: Students will understand the design concept of axially loaded columns and column base connections of basic compression members which forms part of any structure system with reference to Indian Standard code of practice for steel structure and design aids.

CO5: Students will understand specific problems related to the design of laterally restrained and unrestrained steel beams as per IS code.

### **CE8602 Structural Analysis II**

Students will be able to

1. Draw influence lines for statically determinate structures and calculate critical stress resultants.
2. Understand Muller Breslau principle and draw the influence lines for statically indeterminate beams.
3. Analyze of three hinged, two hinged and fixed arches.
4. Analyze the suspension bridges with stiffening girders
5. Understand the concept of Plastic analysis and the method of analyzing beams and rigid frames.

### **CE8603 Irrigation Engineering**

Students will be able to

- Have knowledge and skills on crop water requirements.
- Understand the methods and management of irrigation.
- Gain knowledge on types of Impounding structures
- Understand methods of irrigation including canal irrigation.
- Get knowledge on water management on optimization of water use.

## **CE8604 Highway Engineering**

Students will be able to

- Get knowledge on planning and aligning of highway.
- Get knowledge on geometric design of highways.
- Understand the design flexible and rigid pavements.
- Gain knowledge on highway construction materials, properties, testing methods.
- Understand the concept of pavement management system, evaluation of distress and maintenance of pavements.

## **EN8592 Wastewater Engineering**

The students completing the course will have

1. An ability to estimate sewage generation and design sewer system including sewage pumping stations
2. required understanding on the characteristics and composition of sewage, self purification of streams
3. An ability to perform basic design of the unit operations and processes that are used in sewage treatment
4. Understand the standard methods for disposal of sewage.
5. Gain knowledge on sludge treatment and disposal.

## **CE8005- AIR POLLUTION AND CONTROL ENGINEERING**

**CO1:** Student's will able to understand the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management.

**CO2:** Student's will able to identify, formulate and solve air and noise pollution.

**CO 3:** Student's will able to design stacks and particulate air pollution control devices to meet applicable standards.

**CO 4:** Student's will able to select control equipment's.

**CO 5:** Student's will able to ensure quality, control and preventive measures.

### **VII SEMESTER**

## **CE8701 Estimation, Costing and Valuation Engineering**

CO 1: Students will be able to understand the necessity of estimation and get an idea to calculate the quantities of various items of work of residential buildings, bituminous and cement concrete roads, septic tank, soak pit and retaining walls.

CO 2: Students will be able to gain knowledge of rate analysis for all building works, canals and roads and also Cost estimate.

CO 3: Students will be able to understand the types of specifications, principles for report preparation and tender notices types.

CO 4: Students will be able to gain knowledge on types of contract.

CO 5: Students will be able to evaluate valuation for buildings and lands.

### **CE8702 Railways, Airports, Docks and Harbor Engineering.**

Students who successfully complete this course will be able to:

1. Understand the methods of route alignment and design elements in Railway Planning and Constructions.
2. Understand the Construction techniques and Maintenance of Track laying and Railway Stations.
3. Gain an insight on the planning and site selection of Airport Planning and design.
4. Analyze and design the elements for orientation of runways and passenger facility systems.
5. Understand the various features in Harbours and Ports, their construction, coastal protection works and coastal Regulations to be adopted.

### **CE8703 Structural Design and Drawing**

CO 1: Students will be able to design the cantilever and counterfort retaining walls.

CO 2: Students will be able to design the flat slabs and bridges.

CO 3: Students will be able to design the liquid storage structures.

CO 4: Students will be able to design the industrial structures.

CO 5: Students will be able to design the plate and gantry girders.

### **EN8591 –MUNICIPAL SOLID WASTE MANAGEMENT**

CO 1: Students will understand the nature and characteristics of municipal solid waste and regularity requirements regarding municipal solid waste management

CO 2: Students will be able to reduction, reuse and recycling of waste

CO 3: Students will be able to understand the collection of waste and transfer of waste.

CO 4: Students will be able to understand the waste processing, techniques and equipments and composting of waste.

CO 5: Students will be able to understand the disposal waste, design and operation of sanitary landfill.

### **OTT752 –TEXTILE EFFLUENT TREATMENTS**

CO 1: Students will be able to study about the pollution caused by textile processing.

CO 2: Students will be able to study the various primary waste water treatment techniques.

CO 3: Students will be able to study the various secondary waste water treatment techniques.

CO 4: Students will be able to study the various tertiary waste water treatment techniques.

CO 5: Students will be able to study about the control of textile processing in air pollution.

## **VIII SEMESTER**

### **GE8076 Professional Ethics in Engineering**

CO1: Understanding basic purpose of profession, professional ethics and various moral and social issues

CO2: Awareness of professional rights and responsibilities of a Engineer, safety and risk benefit analysis of a Engineer

CO3: Acquiring knowledge of various roles of Engineer In applying ethical principles at various professional levels

CO4: Professional Ethical values and contemporary issues.

CO5: Excelling in competitive and challenging environment to contribute to industrial growth.

### **CE8020 –MAINTENANCE, REPAIR AND REHABILITATION OF STRUCTURES**

**CO 1:** Students will be able to understand the importance and assessment method of distressed structures.

**CO 2:** Students will be able to understand the strength and durability properties, their effects due to climate and temperature.

**CO 3:** Students will be able to understand the recent development in concrete.

**CO 4:** Students will able to understand the techniques for repair and protection methods.

**CO 5:** Students will be able to understand the repair, rehabilitation and retrofitting of structures and demolition methods.