Bachelor of Technology -Civil Engineering

Program Outcomes (POs)

- PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- PO2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
- PO3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- PO4: 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.
- PO5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO10: 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.
- PO11: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO12: 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 (PSO)

- ✓ PSO1: Analyze, Design, Construct, Maintain and Operate infrastructural projects.
- ✓ PSO2: Assess the environmental impact of various projects and take required measures to curb environmental deterioration.
- ✓ PSO3: Able to use latest and relevant codes of practice, materials, techniques and software pertaining to various streams of Civil Engineering.

Course Outcomes (COs)

2017-2021 Batch

Semester	Course Code	Course Name	Course Outcomes (COs)
3	17CE31	FLUID MECHANICS	**CO1:** Describe the fundamental properties of fluid at rest and in motion and methods of pressure measurement **CO2:**Illustrate hydrostatic force on immersed surfaces, buoyancy and floatation **CO3:**Demonstrate the fluid flow problems using basic principles and theories of kinematics and dynamics **CO4:**Solve the problems in flow measurements and boundary layer theorem
3	17CE32	SURVEYING THEORY – I	**CO1:** To Explain the importance of surveying, types of compass, leveling instruments, Theodolite and maps **CO2:**To Describe chain surveying, compass surveying, leveling and contouring, Theodolite surveying **CO3:**To Solve Linear measurement using chain surveying, three point and two point problems using Plane table surveying , horizontal angles and Vertical angles by the methods of Reiteration and Repetition **CO4:**To Examine Errors in Compass surveying, adjustment of error by graphical method, Area and Volume by Simpson's rule and Trapezoidal rule, compensating and cumulative errors , elimination of errors in Theodolite surveying **CO5:**To Examine Traverse and Contour Map
3	17CE33	STRENGTH OF MATERIALS	**CO1:**Describe the concepts of stress, strain, Elastic constants, Hooke's law, Poisson's ratio, temperature stresses and composite sections **CO2:**Illustrate stresses such as bending stresses, shear stresses, torsional stresses and two dimensional stress system **CO3:** Examine and to draw bending moment and shear force diagrams and describe thin and thick cylinders.
Semester	**Course Code**	**Course Name**	**Course Outcomes (COs)**
3	17CE32L	SURVEYING PRACTICE –I	**CO1:**Use conventional surveying tools such as chain/tape, compass, plane table, level in the field of Civil

			Engineering applications such as structural plotting and highway profiling **CO2:**Choose the procedures involved in field work and to work as a surveying team **CO3:**Demonstrate a survey appropriately with the skill to understand the surroundings **CO4:**Choose accurate measurements, field booking, plotting and adjustment of errors can be understood
3	**17CE33L**	**BASIC MATERIALS TESTING LAB**	**CO1:**Examine tensile and compressive strength of a specimen for applying in a practical design based project work **CO2:** Describe hardness, impact strength, fatigue strength to analyze the application of a specific material for a given design requirements for different loading conditions of structures. **CO3:** Illustrate the capacity of a material to withstand torsional stresses for a safe and sustainable design of machine elements.
4	**17CE41**	**BUILDING CONSTRUCTION AND CONCRETE TECHNOLOGY**	**CO1:** Classify types of buildings and select materials of construction. **CO2:** Describe the components of a building like lintels, floors, roofs. and arches **CO3:** Summarize the functionality of doors, windows and stairs with respect to their types. **CO4:**Interpret different finishing materials and their uses **CO5:** Compare different scaffolding and shuttering material and their application.
4	**17CE42**	**SOILMECHANICS**	**CO1:** Assess the fundamentals of soil properties. **CO2:**Discuss the interaction between water and soil and its effects **CO3:**Describe the compaction and consolidation properties of soils **CO4:**Examine analysis to determine stress distribution and stability of slopes in soils
Semester	**Course Code**	**Course Name**	**Course Outcomes (COs)**
4	**17CE43**	**APPLIED HYDRAULICS ENGINEERING**	**CO1:**Discuss the basic principles of dimensional analysis, hydraulic similitude and concept of open channel flow **CO2:**Interpret the various factors governing the uniform and non-uniform

			flows and to design the most economic sections **CO3:**Illustrate the hydraulic jump and flow through pipes **CO4:**Test the concept of computational fluid mechanics and working principles of hydraulic machines
4	**17CE44**	**SURVEYING THEORY - II**	**CO1:** Describe the fundamental concepts Tacheometric Survey. **CO2:** Describe the basic concepts of Triangulation, Remote Sensing and GIS. **CO3:** Describe the concepts of EDM. **CO4:** Examine the various types of curves and to apply in highway design. **CO5:** Examine the angular measurements.
4	**17CE45**	**STRUCTURAL ANALYSIS - I**	**CO1:** Discuss the theorems in structural analysis; analyze columns by Euler's and Rankine's methods. **CO2:** Discuss the slope-deflection, moment area method, conjugate beam method and concept of virtual work **CO3:** Infer the indeterminate beams, Rolling loads and influence lines. **CO4:** Differentiate the different types of arches and suspension cables.
4	**17CE41L**	**CONSTRUCTION MATERIALS AND TESTING LAB**	**CO1:** Distinguish different tests to be conducted for various construction materials **CO2:** Design and casting different types of concrete mixes **CO3:** Summarize fresh and hardened concrete characteristics
4	**17CE44L**	**SURVEYING PRACTICE - II**	**CO1:** Use survey methods such as tacheometry, curve settings **CO2:** Use latest instruments like total station
Semester	**Course Code**	**Course Name**	**Course Outcomes (COs)**
5	**17CE51**	**GEOLOGY**	**CO1:** Describe importance of geology in civil engineering **CO2:** Identifying folds faults joints before construction of civil engineering structures like dams bridges home etc **CO3:** Choose right rocks and minerals for construction **CO4:** Select the suitable location of ground water presence by electrical resistivity methods
5	**17CE52**	**DESIGN OF RCC**	**CO1:** Discuss basic methods of

		STRUCTURES	design, limit state philosophy as in IS codes **CO2:** Classify singly and doubly reinforced rectangular and flanged beams, slab, column and footing **CO3:** Solve the design problems of singly and doubly reinforced rectangular and flanged beams, slab, column, isolated footing **CO4:** Examine one way slab, two way slab, continuous slab, bond, shear and torsion, braced and unbraced columns **CO5:** Sketch detailing of beam, slab, column and footing
5	**17CE53**	**HYDROLOGY**	**CO1:** Classify the various components of the hydrological cycle and quantify the water balance in a watershed **CO2:** Discuss the physical principles of all hydrological processes - evapotranspiration, precipitation, infiltration and runoff **CO3:** Estimate the values of hydrological processes and conduct hydrological analysis-river routing, rainfall-runoff, and statistical analysis of floods **CO4:** Compare steady state flow in confined and unconfined aquifers
5	**17CE54**	**STRUCTURAL ANALYSIS-II**	**CO1:** Examine indeterminate beams, frames with and without sway using slope defection and moment distribution method. **CO2:** Examine continuous beams with and without settlements, Analysis of frames with and without sway by Kani's method. **CO3:** Examine structures using Plastic analysis **CO4:** Apply concepts of Structural dynamics to Structures.
Semester	**Course Code**	**Course Name**	**Course Outcomes (COs)**
5	**17CE55**	**FOUNDATION ENGINEERING**	**CO1:** Describe the basic principles of soil mechanics and of the limitations of these theories. **CO2:** Identify basic foundation designs and retaining wall systems **CO3:** Interpret borehole log data to determine soil parameters and develop a geotechnical model. **CO4:** Identify a geotechnical report.
5	**17CE56**	**TRANSPORTATION ENGINEERING**	**CO1:** Explain the evolution of road construction methods and role of governmental agencies concerned with road development **CO2:** Describe the components of

			highway, properties of highway construction materials and construction practices of WBM, WMM, DBM, their maintenance and evaluation **CO3:** Solve problems related to sight distances, CBR, Modulus of sub-grade reaction **CO4:** Design Vertical, Horizontal, transition curves and surface drainage systems
5	**17CE57L**	**HYDRAULICS AND HYDRAULICS MACHINE LAB**	**CO1:** Understand the use of various flow measuring devices. **CO2:** Determine the performance characteristics and efficiency of various hydraulic machines under various conditions of working.
5	**17CE58L**	**COMPUTER AIDED BUILDING DRAWING**	**CO1:** Construct plan, elevation and sections of various types of buildings and Layouts using AutoCAD **CO2:** Formulate, imagine and creative skills in planning and detailing various types of buildings
6	**17CE61**	**WATER SUPPLY ENGINEERING**	**CO1:** Identify types of water demands and select a method of forecasting future population **CO2:** Describe the sources, collection and conveyance of water. **CO3:** Solve the functionality of various water treatment processes **CO4:** Interpret different types of distribution network and layouts.
Semester	**Course Code**	**Course Name**	**Course Outcomes (COs)**
6	**17CE62**	**DESIGN OF STEEL STRUCTURES**	**CO1:** Perform analysis and design of steel members and connections **CO2:** Differentiate and design steel structural connections **CO3:** Evaluate the steel structures using the moments resulted due to the load applies **CO4:** Create economical and stable steel structure using IS codal provisions
6	**17CE63**	**ESTIMATION AND COSTING**	**CO1:** Define different types of estimates **CO2:** Compute cost and quantity estimation of buildings and its components **CO3:** Estimate civil engineering structures like Culverts, manhole and septic tanks

			CO4: Examine and compare detailed construction specification and contracts **CO5:** Solve and compute the rate analysis for the different items of works in construction
6	**17CE64**	**IRRIGATION ENGINEERING**	**CO1:** Describe and apply concepts of irrigation to assess the water requirements of crops **CO2:** Compare the various systems and methods of irrigation and their respective usages. **CO3:** Assess the irrigation efficiencies, reservoir capacity and safe yield from a reservoir. **CO4:** Design irrigation canals and canal regulation works.
6	**17CE651**	**ALTERNATIVE BUILDING MATERIALS**	**CO1:** Interprete energy concepts, environmental concerns for building materials and green building ratings **CO2:** To Compare alternate masonry units and various types of waste materials used for building construction co3 discuss properties , applications of fiber reinforced concrete and ferro cement **CO3:** Assess cost effective design of buildings and describe different kinds of alternate roofing systems
Semester	**Course Code**	**Course Name**	**Course Outcomes (COs)**
6	**17CE652**	**AIR POLLUTION AND CONTROL**	**CO1:** Classify air pollution and identify its causes **CO2:** Employ the dispersion mechanisms of pollutants and its control **CO3:** Design air pollution control equipments **CO4:** Discuss biological air pollution and noise pollution
6	**17CE653**	**RAILWAY AND AIRPORT ENGINEERING**	**CO1:** Discuss the influence railway transportation in the society and the functions and requirements of various components of railways. **CO2:** Illustrate the alignment and geometric features of railways and to acquire the knowledge on maintenance of railways. **CO3:** Demonstrate the importance, functions and requirements of various components of airport **CO4:** Examine the alignment and geometric features of airport and to acquire the knowledge on

			maintenance of airport.
6	**17CE661**	**DESIGN AND DRAWING OF REINFORCED CEMENT CONCRETE**	**CO1:** Sketch working drawings of reinforced cement concrete structural components **CO2:** Design of reinforced cement concrete structural components for combined footing. **CO3:** Design of reinforced cement concrete structural components for Retaining walls **CO4:** Design of reinforced cement concrete structural components for Continuous beams **CO5:** Design of reinforced cement concrete structural components for Simple portal frames
6	**17CE662**	**DESIGN OF HYDRAULIC STRUCTURE**	**CO1:** Describe basic principles and factors affecting the selection of site for hydraulic structures. **CO2:** Illustrate the stability analysis and design of various types of dams and spillways. **CO3:** Design floor thickness of hydraulic structures using theories of seepage. **CO4:** Design components of diversion head-works and cross drainage works.
Semester	**Course Code**	**Course Name**	**Course Outcomes (COs)**
6	**17CE663**	**GROUND IMPROVEMENT TECHNIQUES**	**CO1:** Identify basic deficiencies of various soil deposits. **CO2:** Choose various methods and means of improve the soil stability. **CO3:** Decide the physical and chemical modification techniques to stabilize the soil properties.
6	**17CE67L**	**EXTENSIVE SURVEY PRACTICE**	**CO1:** Describe the applications of Surveying **CO2:** Use total Station and other Measuring Equipments **CO3:** Examine time management, communication and presentation Skills
6	**17CE68L**	**SOIL MECHANICS LAB**	**CO1:** Identify soils with reference to their characteristics **CO2:** Examine modes of soil behaviour and describe the behaviour and effect of water in soils **CO3:** Interpret different methods of improving soil stability including reference to compaction plant **CO4:** Illustrate a variety of laboratory tests on soils and calculate soil properties from test results
7	**17CE711**	**ADVANCED CONCRETE TECHNOLOGY**	**CO1:** Describe the behaviour of fresh and hardened concrete. **CO2:** Discuss about admixtures, their

			mechanism in fresh and hardened concrete. **CO3:** Examine factors affecting the durability of concrete and non destructive methods of testing. **CO4:** Appraise the recent developments in concrete technology **CO5:** Design the concrete mix and grade as per codes using IS,ACI/BS methods
7	**17CE712**	**APPLIED REMOTE SENSING AND GIS**	**CO1:** Illustrate the principles of remote sensing and aerial photogrammetry **CO2:** Simplify the process of satellite image data acquisition and their characteristics **CO3:** Interprete and select the digital image processing techniques **CO4:** Employ knowledge of RS applications and fundamental concepts of GIS and IRNSS in civil and environmental engineering
Semester	**Course Code**	**Course Name**	**Course Outcomes (COs)**
7	**17CE713**	**URBAN TRANSPORT PLANNING**	**CO1:** Outline the basics of required for urban transport planning and urban structure **CO2:** Demonstrate the process of data collection about travel behavior and analyze the data for use in transport planning. **CO3:** Create and calibrate models for trip distribution and traffic assignment **CO4:** Illustrate the steps that are necessary to complete a long-term transportation plan
7	**17CE721**	**PRE-STRESSED CONCRETE STRUCTURES**	**CO1:** Discuss the behavior of materials, strength concept and load balancing concept. **CO2:** Differentiate the Losses of pre-stress and Crack Width. **CO3:** Discuss the structural Members using Pre-tensioning and Post-tensioning concepts.
7	**17CE722**	**WASTE WATER ENGINEERING**	**CO1:** Describe basic concepts of sewage Generation, its Effects and various components required for collection and transportation **CO2:** Identify the various wastewater parameters and to the treatment required. **CO3:** Solve the required treatment units for wastewater treatment **CO4:** Illustrate the safe disposal

			methods of effluents
7	**17CE723**	**ROCK MECHANICS**	**CO1:** Describe the importance of rock mechanics and distribution of rocks **CO2:** Examine different rock mass and differentiate according to its engineering properties **CO3:** Recognize the Engineering properties, laboratory and field tests on rock and rock mass **CO4:** Explain the different modes of rock mass failure and its impacts **CO5:** Formulate and design for strengthening of rock mass
Semester	**Course Code**	**Course Name**	**Course Outcomes (COs)**
7	**17CE731**	**DESIGN AND DRAWING OF STEEL STRUCTURES**	**CO1:** Sketch working drawings for Bolted beam to beam and column connections **CO2:** Sketch working drawings for column connections and column base connections **CO3:** Recognize the Engineering properties, laboratory and field tests on rock and rock mass **CO4:** Explain the different modes of rock mass failure and its impacts **CO5:** Formulate and design for strengthening of rock mass
7	**17CE732**	**SOLID WASTE MANAGEMENT**	**CO1:** Identify and discuss the public health, regulatory, planning, technical, and economic principles that influence the solid waste management system, **CO2:** Describe appropriate methods to minimize the impact to public and occupational health from solid waste related activities **CO3:** Differentiate the importance of the components of an integrated solid waste handling system – including source reduction, recycling and reuse, composting, or land-filling and combustion
7	**17CE733**	**PAVEMENT DESIGN**	**CO1:** Identify and categorize the factors affecting design and performance of pavements **CO2:** Design flexible and rigid pavements in different design methods **CO3:** Examine the pavement failures and do maintenance accordingly **CO4:** Estimate the cost of road projects
7	**17CE741**	**CONSTRUCTION PLANNING AND**	**CO1:** Describe steps involved in

		MANAGEMENT	planning and scheduling construction projects **CO2:** Use project time through CPM and PERT, control the cost of the project by creating cash flows and budgeting **CO3:** Schedule management of manpower, machinery and materials **CO4:** Use principles of Quality Control and ISO – 9000
Semester	**Course Code**	**Course Name**	**Course Outcomes (COs)**
7	**17CE742**	**GROUND WATER HYDROLOGY**	**CO1:** Describe the fundamental of groundwater and groundwater flow. **CO2:** Examine steady and unsteady groundwater flow. **CO3:** Identify sources and causes of groundwater pollution and examine the groundwater recharge methods. **CO4:** Assess the groundwater quality and Basin Yield.
7	**17CEOE711**	**GREEN TECHNOLOGY**	**CO1:** Describe the Concept of Green Technology, carbon emission and rain water harvesting. **CO2:** Illustrate the simulate sustainable and renewable green technology systems. **CO3:** Criticize the concepts of Cradle to cradle philosophy.
7	**17CEOE712**	**HAZARDOUS WASTE MANAGEMENT**	**CO1:** Explain the fundamental principles of existing and emerging technologies for the treatment of waste and recovery of value from waste **CO2:** Choose facilities for the storage, transport, processing and disposal of hazardous waste **CO3:** Distinguish hazardous waste, Biomedical waste, E-waste and to provide scientific management system **CO4:** Decide the hazardous waste, Biomedical waste, E-waste and plastic waste as per the rules laid by Ministry of Environment and Forest
7	**17CEOE721**	**ECOLOGY AND ENVIRONMENTAL ENGINEERING**	**CO1:** Explain the fundamental principles of existing and emerging technologies for the treatment of waste and recovery of value from waste **CO2:** Choose facilities for the storage,

			transport, processing and disposal of hazardous waste **CO3:** Distinguish hazardous waste, Biomedical waste, E-waste and to provide scientific management system
Semester	**Course Code**	**Course Name**	**Course Outcomes (COs)**
7	**17CE743**	**TRAFFIC ENGINEERING**	**CO1:** Describe different traffic characteristics, types of traffic studies **CO2:** Identify different traffic management used in enforcement and education. **CO3:** Choose different types of traffic surveys for different projects and can employ accident analysis and methods. **CO4:** Examine road accident causes and its effects and also environmental hazards due to traffic **CO5:** Assess traffic signal timings and design of street lighting
7	**17CEOE722**	**AIR POLLUTION AND CONTROL**	**CO1:** Classify air pollution and identify its causes **CO2:** Employ the dispersion mechanisms of pollutants and its control **CO3:** Design air pollution control equipments **CO4:** Discuss biological air pollution and noise pollution
7	**17CE77**	**PROJECT WORK PHASE-1**	**CO1:** Identify the civil engineering research gap concepts **CO2:** Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach **CO3:** Develop improve and refine technical aspects for the chosen projects **CO4:** Demonstrate their work as an individual or in a team in development of technical projects **CO5:** Report and communicate effectively the project related activities and findings **CO6:** Exhibit and publish the implemented work in reputed journals
8	**17CEOE811**	**ENVIRONMENTAL IMPACT ASSESSMENT**	**CO1:** Summarize the EIA concepts and importance of balance between environment and project development **CO2:** Employ relevant EIA technique methods in case studies. **CO3:** Assess and predict the impacts of development projects **CO4:** Write the complete EIA report for

			development projects **CO5:** Outline the environmental policies and laws
Semester	**Course Code**	**Course Name**	**Course Outcomes (COs)**
8	**17CEOE812**	**SMART MATERIALS AND SYSTEMS**	**CO1:** Describe the automation in building systems. **CO2:** Demonstrate the self-diagnosis concept in actuation systems. **CO3:** Demonstrate various actuator techniques.
8	**17CEOE821**	**DISASTER MITIGATION AND MANAGEMENT**	**CO1:** Discuss fundamental concepts relevant to natural disasters, their significance and types. **CO2:** Examine the factors that cause the disaster and disaster management cycle. **CO3:** Illustrate the approaches of Disaster Risk Reduction (DRR) and inter-relation between disaster and development. **CO4:** Memorise the regulations, application of science and technology in disaster management.
8	**17CEOE822**	**APPLIED REMOTE SENSING AND GIS**	**CO1:** To illustrate the principles of remote sensing and aerial photogrammetry **CO2:** To simplify the process of satellite image data acquisition and their characteristics **CO3:** Interprete and select the digital image processing techniques **CO4:** Employ knowledge of RS applications and fundamental concepts of GIS and IRNSS in civil and environmental engineering
8	**17CE83P**	**PROJECT WORK PHASE-II**	**CO1:** Select and initiate technical project **CO2:** Conduct the project planning activities that accurately forecast project costs, timelines, and Quality and Implement processes for successful communication and management **CO3:** Demonstrate effective project execution and control techniques that result in successful project **CO4:** Conduct project closure activities and obtain formal project acceptance **CO5:** Demonstrate a strong working knowledge of ethics and professional responsibility **CO6:** Exhibit and publish the implemented work in reputed journals