

Semester	Course Code	Course Name	Course Outcome
III	BT 301	M-III	<p>CO1: Students will be able to define effective mathematical tools to numerically solve algebraic and transcendental equations. Also explain various interpolation methods by using finite difference operators.</p> <p>CO2: Students will be able to examine differentiation and integration by interpolation methods. Also discuss various numerical techniques to solve simultaneous linear algebraic equations.</p> <p>CO3: Students will be able to implement various mathematical tools to solve ordinary and partial differential equations.</p> <p>CO4: Student will be able to identify importance of Laplace transform, Fourier transform and inverse Laplace transform.</p> <p>CO5: Student will be able to analyze the concept of probability and probability distribution.</p>
III	CE 302	Construction Material	<p>CO1: To understand about classification, properties of various materials like Stones, Brick, Mortar and Concrete.</p> <p>CO2: To understand about classification, properties of various materials like Timber, Glass, Steel and Aluminium.</p> <p>CO3: To learn about Flooring, Roofing, Plumbing and Sanitary Material.</p> <p>CO4: To study about Paints, Enamels and Varnishes.</p> <p>CO5: To study about Miscellaneous Construction Materials.</p>
III	CE 303	Surveying	<p>CO1: The Fundamentals of Surveying class provides basic knowledge about principles of surveying for location, design and construction of engineering projects</p> <p>CO2: Students will gain knowledge handling the equipment Theodolite to find out the horizontal and vertical angles and to find out the elevation of the required points by indirect measurement.</p> <p>CO3: To make students aware to prepare contoured maps or plans requiring both the horizontal as well as vertical control, preparation of topographic maps which require both elevations and horizontal distances.</p> <p>CO4: Student will learn about the Curves and its types and how the setting out of curve implemented in a Highway Site..</p> <p>CO5: Study about Hydrographic Survey and Aerial Survey and prepare maps for coastal Area and military Area.</p>

III	CE 304	Building Planning and Architecture	<p>CO1: Students will be able to understand the various elements of buildings, various types of footing, open foundation, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.</p> <p>CO2: Students will be able to understand the different types of buildings, Provisions of National Building Codes and Rules, Building bye-laws, open area, Setbacks etc.</p> <p>CO3: Students will be able to understand the Building Services like water supply, sewerage and drainage systems, sanitary fittings and fixtures, plumbing systems, internal & external drainage systems, principles of electrification of buildings etc.</p> <p>CO4: Students will be able to understand the factors influencing architectural development, characteristics features, historic examples, Principles of architectural composition etc.</p> <p>CO5: Students will be able to understand the factors influencing Perspective Drawing and Town Planning, structure plan, detailed town planning scheme and action plan, town planning legislation and municipal acts, panning of control development schemes, urban financing etc.</p>
III	CE 305	Strength of Material	<p>CO1: Student will be able to understand the basic concept of strength of material and various properties of material & The action of forces and effects on structural and machine elements such as circular bars, angle iron, and beams etc.</p> <p>CO2: Student will be able to understand the basic concept of Bending. So we can conclude that the subject of strength of materials is basically study of The behavior of materials under different types of load and moment.</p> <p>CO3: Student will be able to understand the basic concept of Deflection and shear stress & To familiarize the student with the various stresses that may act on a material such as compressive stress, tensile stress, tangential stress, etc and the response of a material to each of these types.</p> <p>CO4: Student will be able to understand the basic concept of column and strut, type of column & uses of column & strut.</p> <p>CO5: Student will be able to understand the basic concept of Torsion of hollow cylinder , solid body & tube.</p>
III	CE 306	SH & ACEP Lab	<p>CO1: Student will Study of ancient monuments e.g. Forts, Bridges, Buildings and various other civil engineering related structures.</p> <p>CO2: The student will be able to understand Environmental practices adopted in construction of historical structure during ancient/medieval period.</p>

			<p>CO3: The student will be able to understand about construction techniques and materials used in historical structures</p> <p>CO4: The student study about Various planning aspects adopted in historical structures.</p> <p>CO5: The student will visit of various historical structures and museums to understand history of civil engineering practices.</p>
III	BT 107	Internship Evaluation I	<p>CO1: The student will be able to understand the basic concepts of Field Work.</p> <p>CO2: The student will be able to understand the real world experience.</p> <p>CO3: The student will be able to understand the field learning on site.</p> <p>CO4: The student will be able to understand the hand-on experience in the field.</p> <p>CO5: The student will be able to improve their knowledge of the field.</p>
IV	ES 401	EEES	<p>CO1: After studying the content scholar will be able to compare and differentiate about available energy systems, Energy sources and possible future options based on demand and supply.</p> <p>CO2: After studying the content, students will be able to identify the various segments of environment and ecosystem, which will help them to be a better engineer and serve the society in a positive manner.</p> <p>CO3: After studying the content students will be able to compare and value the Bio-geography of India, Biodiversity of the country, Threats to biodiversity and its conservation.</p> <p>CO4: After studying the content scholar will be able to identify and examine the sources of pollution, types, solution for the issue and impact on the society.</p> <p>CO5: After studying the content students will be able to identify and construct solutions for the issues related to society like energy, climate change and water availability, its harvesting, Issues involved in enforcement of environmental legislation, and public awareness.</p>
IV	CE 402	Construction technology	<p>CO1: The student will understand that how the foundation distribute the weight of the structure over large area so as to avoid over loading of the soil beneath.</p> <p>CO2: The student will understand The Formwork Safety Course for Supervisor at providing individuals with the knowledge and skill required to supervise the construction, erection, and alteration or dismantling and inspection of formwork structures at any worksites.</p> <p>CO3: The student will learn the construction of the masonry wall and partitions provided in a residential or commercial buildings.</p>

CO4: The student are able to understand the concepts of roof and floor construction and its elements that provide in the various types of buildings.

CO5: The student will able to Analyze the earthquake resistant structure and find the factors that affecting the stability of building due to earthquake and wind load.

IV CE 403 Structural Analysis I

CO1: Students will Understand the Principles of virtual work and strain energy method it is useful for finding the deflection and also learn about maxwell's reciprocal theorem

CO2: Students will Understand the continuous beams by theorem of three moments and solve different cases of effect of sinking and rotation of supports by Moment distribution method

CO3: After completion of unit students will able to Analysis of beams and frames by slope Deflection method, Column Analogy method.

CO4: After completion of unit students will able to know about Three and Two hinged arches of different shapes.

CO5: After completion of unit students will able to know about Maximum SF and BM curves for various types of Rolling Loads.

IV CE 404 Transportation Engg I

CO1: After completion of unit student will able to describe mode of transportation specially railway and its function, they also can explain the various parts like railway car, rail, hauling capacity, traction, tractive resistance, ballast etc.

CO2: After completion of unit student will able to solve problem related to geometric design, super elevation, cant and cant deficiency etc. They also explain and describe various parts of geometric design like signal, interlocking, different yards.

CO3: After completion of unit student will able so understand about the bridge component, forces and load, alignment and many terms related to bridge stability and construction.

CO4: After completion of unit student will able to understand about the foundation used in the bridge and the related terms. They will also able to describe or discuss cofferdam and retrofitting of the bridge foundation.

CO5: After completion of unit student will able to understand about the tunnel and the terms related to tunnel engineering

IV CE 405 Engineering Geology and Remote Sensing

CO1: Student will able to identify various fetures developed by natural agencies as well as the natural disasters ouccring in nature.

CO2: Student will be able to understand various mineral used in civil engineering and their occurrence.

CO3: Student will be able to identify various features developed by natural agencies of rocks type as well as the natural disasters occurring in nature.

CO4: Student will be able to understand various rock structure and their occurrence.

CO5: Students will attain a foundational knowledge and comprehension of the physical, computational, and perceptual basis for remote sensing and concept of remote sensing, process of remotely sensed data and its advantages.

IV	CE 406	Software Lab	<p>CO1: Understand the need for software tools in analysis and design of Civil Engineering Systems.</p> <p>CO2: Identify the available open source software tools used for specific problems in Civil Engineering.</p> <p>CO3: Use the latest software tools for Modeling, Analysis and Design of Civil Engineering Systems Mapping.</p> <p>CO4: Student will be able to put forward ideas and understandings to others with effective communication processes.</p> <p>CO5: The course will enable the students to an idea of how structures are built and projects are developed on the field.</p>
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V	CE501	Fluid Mechanics I	<p>CO1: Student will be able to describe or explain various physical and chemical properties of fluid.</p> <p>CO2: Student will be able to define the various types of flow and their significance.</p> <p>CO3: Student will be able to define the different types of energy equation and its uses in water engineering they can also solve the various problem on that.</p> <p>CO4: Student will be able to explain the laminar flow and its properties they also can solve the problem related to it.</p> <p>CO5: Student will be able to define the different types of pipe flow problems and losses, they will also be able to understand the different function of dimensional analysis</p>
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V	CE502	Transportation Engg II	<p>CO1: Student will be able to understand about highways planning, Road classification, Patterns of road and geometric design elements etc.</p> <p>CO2: Students will be able to understand the Design of flexible pavements, design of mixes and stability, WBM, WMM, BM, IBM, surface dressing, interfacial treatment-seal coat, tack coat, prime coat, wearing coats, grouted macadam etc.</p>
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CO3: Students will able to understand the Principles of stabilization, mechanical stabilization, requirements, advantages, disadvantages and uses, Channelised and unchannelised intersections etc.

CO4: Students will able to understand the Airport site selection. air craft characteristic and their effects on runway alignments, windrose diagrams, basic runway length and corrections, classification of airports etc.

CO5: Students will able to understand the Zoning regulations, approach area, approach surface-imaginary, conical, and horizontal. Rotating beacon etc.

V	CE503	Structural Analysis II	<p>CO1: Student will able to Know Moment distribution method in analysis of frames with sway, analysis of box frames, analysis of portals with inclined members alongwith analysis of beams and frames by Kani's method</p> <p>CO2: Student will be able to define Plastic analysis of beams and frames.</p> <p>CO3: Student will be able to Analyse of tall frames for wind and earthquake loads, codal provisions for lateral loads and know about Approximate analysis of multistory frames for vertical and lateral loads.</p> <p>CO4: Student will be able to explain Matrix method of structural analysis in which they able to solve continous beam by force method and displacement method.</p> <p>CO5: Student will be able to define Influence lines for intermediate structuresand define Muller Breslau principle, Analysis of Beam-Columns.</p>
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V	CE504	Remote Sensing and GIS	<p>CO1: Students will attain a foundational knowledge and comprehension of the physical, computational, and perceptual basis for remote sensing and concept of remote sensing, process of remotely sensed data and It's advantages.</p> <p>CO2: Sudents can understand the basic difference between various kinds of satellites and sensors and perform image enhancement on remotely sensed imagery.</p> <p>CO3: Understand the basic concept of GIS and its applications, know different types of data representation in GIS.</p> <p>CO4: The students will be able to differentiate raster and vector data modes and also appreciate the role of these models in visualizing and graphical outputs through GIS.</p> <p>CO5: The student will able to apply Compute knowledge of Remote sensing and GIS in defferent civil engineering applications.</p>
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V	CE505	Material Testing Lab	<p>CO1: The student will be able to understand the basic concepts of materials and perform various tests on materials.</p> <p>CO2: The student will be able to understand the basic concepts of cement, including initial and final setting time of cement, consistency of cement, and compressive strength of cement.</p> <p>CO3: The student will be able to determine the fineness modulus of fine aggregate and coarse aggregate.</p> <p>CO4: The student will be able to determine the flexural strength and workability of concrete.</p> <p>CO5: The student will be able to understand the concrete mix design by the IS code method.</p>
V	CE506	QSC Lab	<p>CO1: The student will be able to understand the basic concepts of Estimates.</p> <p>CO2: The student will be able to determine the detailed estimate for services of plumbing and water supply or Electrification work.</p> <p>CO3: The student will be able to determine the detailed estimate for earth work for the road construction or arched culvert.</p> <p>CO4: The student will be able to understand the basic concepts of rate analysis of materials.</p> <p>CO5: The student will be able to determine the DPR of civil engineering projects.</p>
V	CE507	Field Visit	<p>CO1: The student will be able to understand the basic concepts of Field Work.</p> <p>CO2: The student will be able to understand the real world experience.</p> <p>CO3: The student will be able to understand the field learning on site.</p> <p>CO4: The student will be able to understand the hand-on experience in the field.</p> <p>CO5: The student will be able to improve their knowledge of the field.</p>
V	CE508	Internship Evaluation I	<p>CO1: Get exposed to the Civil Engineering Works in the industry and learn the practical aspects of the same.</p> <p>CO2: Understand and correlate the academic and industry based on understanding achieved during the exposure in the industry</p> <p>CO3: The student will be able to write the detailed report on understanding achieved related to project planning, design, construction, and management.</p> <p>CO4: Understand the legal aspects in construction projects through the understanding of various laws pertaining to civil engineering and architectural planning & sanctioning, labor & organizational welfare measure, provisions of arbitration and litigations.</p>

			<p>CO5: Implement the quality control aspects in planning & management, modern trends project management, application of information system in management of construction projects, safety provisions and equipments.</p>
VI	CE 601	Structural Design and Drawing (RCC I)	<p>CO1: After completion of unit students will able to analyse and design singly Reinforced beam according to IS 456-2000 specification.</p> <p>CO2: After completion of unit students will able to design and analyse Doubly Reinforced beam and according to IS 456-2000 specification.</p> <p>CO3: After completion of unit students will able to Design of Slab including one way and two way slab according to IS 456-2000 specification.</p> <p>CO4: After completion of unit students will able to know about Columns and footing according to IS 456-2000 specification.</p> <p>CO5: After completion of unit students will able to know about Staircases according to IS 456-2000 specification.</p>
VI	CE 602	Environment Engg I	<p>CO1: Students will be able to understand about water source, quality, demand and fluctuations in demand.</p> <p>CO2: Students will be able to understand about impurities, physical, chemical and bacteriological parameters of water, intake structure, operation of pumps and pumping stations.</p> <p>CO3: Students will be able to understand about the method and process of water treatment.</p> <p>CO4: Students will be able to understand the different sewerage scheme, collection and coalescence of sewage, design and types of sewers and sewers.</p> <p>CO5: Students will be able to understand the characteristics of waste water, oxygen demand, equipment involved in analysis, natural methods of waste water disposal, self-purifying capacity of the stream.</p>
VI	CE 603	Water resources Engg	<p>CO1: Student will be able to understand the soil crop water relationship and also understand different irrigation methods</p> <p>CO2: Student will be able to understand the confined & unconfined aquifers and also understand ground water recharge methods and waterlogging effects.</p> <p>CO3: Student will be able to understand rainfall data, its measurement & estimation of missing rainfall. Student will also be able to understand unit hydrograph analysis.</p> <p>CO4: Student will be able to understand canal & its structural design and also understand different hydraulic structures like dams, spillways & weirs.</p>

			CO5: Student will be able to understand different types of floods, their estimation and flood control measures.
VI	CE 604	Fluid Mechanics II	CO1: Student will be able to describe or explain turbulent & laminar flow. CO2: Student will be able to understand about the open channel flow or uniform flow in open channel. CO3: Student will be able to understand about the open channel flow or Non uniform flow in open channel. CO4: Student will be able to explain Drag force on any body and their application. CO5: Student will be able to explain different type turbine, pump.
VI	CE 605	Advanced Surveying Lab	CO1: Make use of knowledge regarding various survey instruments in measuring the distances and angles and also to compute levels of different works CO2: Apply the knowledge in preparing various types of maps. CO3: Use the knowledge to estimate the quantity (areas and volumes) of the Civil Engineering work. CO4: Carry out detailed survey of an area using appropriate technique and draw topological features on the sheet. CO5: Understand and make use of various photography surveys in drawing appropriate conclusion.
VI	CE 606	NDT Lab	CO1: The student shall be able to select an appropriate NDT technique as per requirement. CO2: Students will understand the terminology and basic concepts of materials and structure failure mode, and failure mechanisms. CO3: Students will be able to apply appreciate NDT methods for Materials and Structural health monitoring and sensing. CO4: After study students understand and apply the knowledge to field inspection or monitoring of civil materials and structures. CO5: Student will be able to understand fundamental materials mechanical properties and linear fracture mechanics of materials, testing procedures of commonly used civil materials and structures.
VI	CE 608	Minor Project	CO1: Work in a team to select a problem for project work.. CO2: Review and evaluate the available literature on the chosen problem in various fields of Civil engg. CO3: Students will be able to formulate the methodology to solve the identified problems. CO4: After study students understand and apply the principles, tools and techniques to solve the problem in civil engg.

CO5: Student will able to Prepare and present project report.

CO1: After completion of this unit, student will be able to know various index properties of soil and also the soil classification.

CO2: After completion of this unit, student will come to know about the permeability, factors affecting it and also the effective stress principle.

VII

CE701

Geotechnical Engg

CO3: At the end of this unit, student will come to know about Boussinesqs & Westergaard's stress principles on different areas and also they come to know about different compaction methods.

CO4: At the end of this unit, student will come to know about consolidation concept from terzaghi analysis and also they find out coefficient of consolidation from different methods.

CO5: After completion of this unit, student will be able to know about various shear strength properties and parameters by using laboratory methods. Students will also come to know about soil stabilization.

CO1: After completion of unit students will able to Design of Multistory Buildings - Sway and non-sway buildings, shear walls and other bracing elements.

CO2: After completion of unit students will able to know about Earth Retaining Structures that is Cantilever and counter fort type retaining walls and Design of it.

VII

CE702

Advanced Structural Design (RCC II)

CO3: After completion of unit students will able to Design of Water tank and also able to discuss many function of the water tank.

CO4: After completion of unit students will able to know about bunker and silo they also can design both of them.

CO5: In this chapter student will able to understand minor and meyor things about the bridge and the prestressing.

CO1: To Aware about the problems associated with Municipal solid waste(MSW) and their effective management.

VII

CE703

Integrated Waste Management

CO2: To understand the components of Integrated solid waste management system.

CO3: To learn about recycling, reuse and reduce, recover of solid wastes and Transfer station.

CO4: To examine the operation of a resource recovery facility, waste-to-energy strategies.

CO5: To study the design and operation of a municipal solid waste composting and land-filling.

VII	CE704	Pre-stressed Concrete	<p>CO1: The student will understand about Fabrication, casting and testing of simply supported prestressed concrete beam/slab for strength and deflection behaviour.</p> <p>CO2: The student will understand about Fabrication, casting and testing of beam/slab with different layout of cables for strength and deflection behaviour.</p> <p>CO3: The student will study about Fabrication, casting and testing of various prestressed structures as per contents IS Code provisions.</p> <p>CO4: The student will understand how prestressed reinforcement work in different structures.</p> <p>CO5: The student will learn to understand the design basis of prestressed concrete, precast concrete elements and foundations</p>
VII	CE705	IOT Lab	<p>CO1: The students will be able to have understanding of Arduino/Raspberry Pi</p> <p>CO2: The students will be able to Apply the skills learned by designing, building, and testing a microcontroller-based embedded system</p> <p>CO3: The students will be able to Publishing/Subscribing to connect, collect data, monitor and manage assets</p> <p>CO4: The students will be able to Remotely monitor data and control devices</p> <p>CO5: The students will be able to Perform experiments and mini projects on IoT</p>
VII	CE706	Project I	<p>CO1: The student will be able to demonstrate the knowledge, skills and attitudes of a professional engineer</p> <p>CO2: The student will be able to undertake problem identification, formulation and solution.</p> <p>CO3: The student will be able to Demonstrate a sound technical knowledge of their field.</p> <p>CO4: The student will be able to demonstrate teamwork skills</p> <p>CO5: Students are able to see themselves as individuals with various skills and abilities, some more developed than others, and understand that they can make choices about how they wish to move forward.</p>
VII	CE607	Internship Evaluation II	<p>CO1: Get exposed to the Civil Engineering Works in the industry and learn the practical aspects of the same.</p> <p>CO2: Understand and correlate the academic and industry based on understanding achieved during the exposure in the industry</p> <p>CO3: The student will able to write the detailed report on understanding achieved related to project planning, design, construction, and management.</p>

			<p>CO4: Understand the legal aspects in construction projects through the understanding of various laws pertaining to civil engineering and architectural planning & sanctioning, labor & organizational welfare measure, provisions of arbitration and litigations.</p> <p>CO5: Implement the quality control aspects in planning & management, modern trends project management, application of information system in management of construction projects, safety provisions and equipments.</p>
VIII	CE801	Structural Design and Drawing II (Steel I)	<p>CO1: Student will able to describe or explain various types of joint and connections.</p> <p>CO2: Student will be able to design the tension member and compression member.</p> <p>CO3: Student will be able to define the different types of beam and able to design of beam (like simply support beam, continuous beam, cantilever beam).</p> <p>CO4: Student will be able to explain and design lacing and bracing system.</p> <p>CO5: Student will be able to explain different type of bracing system.</p>
VIII	CE802	Foundation Engg	<p>CO1: The student will able to understand the behaviour criteria of collapsible soil and implemented the different methods to increase the strength of collapsible soil and understand the selection of different types of footing on collapsible soil.</p> <p>CO2: The Student will able to understand the design criteria of shallow foundation and different types theories of failure of Shallow Foundation and understand the effect of ground water table on footing.</p> <p>CO3: The Student will able to understand the design criteria of Deep foundation, the different methods of pile driving and understand the pile group efficiency.</p> <p>CO4: The Student will able to understand different methods of improving soil condition by Geosynthetic material and understand the construction of Under-reamed piles.</p> <p>CO5: The Student will able to understand the different types of earth pressure theory and evaluate the earth pressure in at rest, active and passive state and design the retaining wall.</p>
VIII	CE803	Integrated Water Management	<p>CO1: To study the paradigm shift in water management with global and national perspectives of water crisis. It also aims to understand the concepts of 'blue water', 'green water' and 'virtual water' and their roles in water management.</p> <p>CO2: To study the sustainable water resources management and to plan and develop framework for future.</p>

CO3: To study the modern principles of water management and planning.
 CO4: To develop surface and subsurface water systems along with water balance equation.
 CO5: To study the conventional and non-conventional techniques for water security.

VIII CE804 Earthquake Resistant Structure Lab

CO1: The student will be able to understand the earthquake resistance structures
 CO2: The student will be able to understand the design of steel buildings
 CO3: The student will be able to understand the seismic protection of structures
 CO4: The student will be able to identify design forces and moments in the members.
 CO5: Students are able to consider ductility in earthquake resistant design of RCC building

VIII CE805 Project II

CO1: The student will be able to demonstrate the knowledge, skills and attitudes of a professional engineer
 CO2: The student will be able to undertake problem identification, formulation and solution.
 CO3: The student will be able to demonstrate a sound technical knowledge of their field.
 CO4: The student will be able to demonstrate teamwork skills
 CO5: Students are able to see themselves as individuals with various skills and abilities, some more developed than others, and understand that they can make choices about how they wish to move forward.