

Course Outcomes		
Third Semester		
course code	course name	course outcomes
CE-C301	Applied Mathematics III	Solve the Ordinary and Partial Differential Equations using Laplace Transformation.
		Solve Ordinary and Partial Differential Equations using Fourier series.
		Solve initial and boundary value problems involving ordinary differential equations Fit the curve using concept of correlation and regression.
		Apply bilinear transformations and conformal mappings
		Identify the applicability of theorems and evaluate the contour integrals.
CE-C 302	Surveying I	Measure vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basic surveying problems.
		Perform various practical and hence projects using different surveying instruments.
		Apply geometric principles for computing data and drawing plans and sections
		Analyze the obtained spatial data and compute areas and volumes and represent 3D data on plane surfaces (2D) as contours
CE-C 303	Strength of Materials	Understand the concepts of shear force, bending moment, axial force for statically determinate beams and compound beams having internal hinges; and subsequently, its application to draw the shear force, bending moment and axial force diagrams.
		Analyze the flexural members for its structural behavior under the effect of flexure (bending), shear and torsion either independently or in combination thereof.
		Study the behavior of the structural member under the action of axial load, bending and twisting moment.
		Study the deformation behavior of axially loaded columns having different end conditions and further, evaluate the strength of such columns.
		The successful completion of the course will equip the students for undertaking the courses dealing with the analysis and design of determinate and indeterminate structures.
CE-C 304	Engineering Geology	Understand the significance of geological studies for safe, stable and economic design of any civil engineering structure.
		Demonstrate the knowledge of geology to explain major geological processes such as formation of mountain, ocean and the occurrence and distribution of earthquakes and volcanoes.
		Explain various geological structures like folds, faults, joints, unconformity, their origin and distribution which are very essential in the design and construction of dams, tunnels and any other major civil engineering project.
		Understand methods of surface and subsurface investigation, advantages and disadvantages caused due to geological conditions during the construction of dam and tunnel.
		Understand the causes and prevention of natural hazard like earthquake, landslide, volcano etc. will help student to meet the specific needs with suitable considerations for public health and safety.
		Prepare effective reports mentioning advantages and disadvantages caused due to geological condition and can evaluate any site for civil engineering project.
CE-C 305	Fluid Mechanics I	Define various properties of fluids, state and explain different types of laws and principles of fluid mechanics.
		Interpret different forms of pressure measurement and Calculate Hydrostatic Force and its Location for a given geometry and orientation of plane surface.
		Compute force of buoyancy on a partially or fully submerged body and analyse the stability of a floating body.
		Distinguish velocity potential function and stream function and solve for velocity and acceleration of a fluid at a given location in a fluid flow.
		Derive Euler's Equation of motion and Deduce Bernoulli's equation
		Measure velocity and rate of flow using various devices.
Fourth semester		
CE-C 401	Applied Mathematics IV	Solve the system of linear equations using matrix algebra with its specific rules. Illustrate basics of vector calculus.
		Apply the concept of probability distribution and sampling theory to engineering problems
		Apply principles of vector calculus to the analysis of engineering problems.
		Identify, formulate and solve engineering problems.

		Illustrate basic theory of correlations and regression.	
CE-C 402	Surveying II	Operate Total Station & GPS for desired accuracy in surveying and establish survey control of determined accuracy using Total Station, GPS, GIS and remote sensing. Set out various types of curves by linear and angular methods Compute setting out data from survey and design information. Generate and manipulate field survey data and incorporate design data using specialised software's. Appreciate the role of various governmental authorities in maintaining cadastral survey records.	
CE-C 403	Structural Analysis I	Understand the behavior of various statically determinate structures including compound structures having an internal hinge for various loadings. Analyze these structures to find out the internal forces such as axial force, shear force, bending moment, twisting moments, etc. Evaluate the displacements / deflections in beams and frames under the action of loads. They will be able to obtain the response of the beams under the action of moving loads. Analyze the structures such as arches and suspension bridges and study the behavior of eccentrically loaded columns. Analyze the section with respect to unsymmetrical bending and shear center. <i>Demonstrate the ability to extend the knowledge gained in this subject in the subjects Structural Analysis-II and elective subjects such as Advanced Structural Analysis and Advanced Structural Mechanics in the higher years of their UG programme where they will be dealing with the indeterminate structures. The knowledge gained in this subject shall also be useful for application in the structural design in later years.</i>	
CE-C 404	Building Design and Drawing	Students will be able to list down the types of structures and its various components (for eg. doors, windows, staircase, foundations etc.) Students will be able to explain various concepts pertaining to building design and drawing (for eg. principles of planning, architectural planning, green buildings etc.) Students will be able to apply principles of planning, architectural planning and building bye laws while designing and preparing building drawings. Students will be able to calculate and analyze various technical details of a building (for eg. carpet area, FSI etc.) from its drawings. Students will be able to design various components of buildings (for eg. staircases etc.) as well as buildings as a whole, given the requirements of the building owner and local D.C. laws. Students will be able to prepare drawings (for eg. plans, elevation, perspective views etc.) of the designed components of buildings as well as buildings as a whole.	
CE-C 405	Building Materials and Construction Technology	Identify and list the various building materials, their properties and symbols. Identify the properties of ingredients of concrete, interpret and design concrete mix for various grades Explain and interpret manufacturing process of basic construction materials and understand various masonry construction and finishes Perform tests on various materials.	
CE-C 406	Fluid Mechanics II	Interpret different pipe fittings and evaluate the fluid velocity considering major and minor losses. Solve pipe network problems by Hardy cross method. Distinguish the types of compressible flow and understand concept of boundary layer theory. Evaluate pressure drop in pipe flow using Hagen-Poiseuille's equation for laminar flow in a pipe. Establish Prandtl's mixing theory and solve turbulent flow problems.	
Fifth semester			
CEC501	Structural Analysis-II	Understand the behavior of various statically indeterminate structures subjected to static loads and variation in temperature. Analyze the structures using displacement parameters to find out the internal forces such as axial force, shear force, bending moment, twisting moments, etc. for beams, 2D portal frames with various loads and boundary conditions, which becomes the basis for structural design.	

		<p>Contrast between the concept of force and displacement methods of analysis of indeterminate structures. Also, the elastic curve in beams and frames under the action of loads.</p> <p>Understand the concept of plastic hinge, plastic moment carrying capacity, shape factor and collapse load for single and multiple span beams.</p> <p>Find out the approximate dimensions of beams and columns using the approximate method for giving the input in design software. The knowledge gained in this subject shall also be useful for application in the structural design in later years and also useful in the civil engineering field for the analysis purpose.</p> <p>Demonstrate the ability to extend the knowledge gained in this subject for their higher years UG Programme subjects such as Advanced Structural Analysis and Advanced Structural Mechanics in which they will be dealing with the indeterminate structures.</p>	
CEC502	Geotechnical Engineering-I	<p>Understand the soil types, index and engineering properties and relationship between various unit weights & other parameters.</p> <p>Classify the soil with a view towards assessing the suitability of a given soil for use; either to use it to support a structure (e.g. embankment) or to construct a structure therein (e.g. foundation)</p> <p>Understand the use of geosynthetics in soil to improve soil properties.</p> <p>Evaluate the compaction characteristics in laboratory & field and hence interpret the results with compaction specifications.</p> <p>Interpret soil boring data for foundation design.</p> <p>Conduct laboratory experiments to collect, analyze, interpret and present the data</p>	
CEC503	Applied Hydraulics	<p>Apply the concepts of fluid dynamics to solve pipe bend and sprinkler problems.</p> <p>Analyze dimensional problems and explain model laws.</p> <p>Explain the working and functions of Francis, Kaplan and Pelton wheel turbines.</p> <p>Explain the basic concepts of open channel hydraulics and measure discharge through open channels.</p> <p>Identify the occurrence of hydraulic jump and its parameters</p> <p>Explain uniform flow, non-uniform flow and establish mathematical relationships.</p>	
CEC504	Environmental Engineering-I	<p>Understand the water supply system, its components and water demand by various consumers.</p> <p>Understand and analyze the quality of water and will be able to conduct the quality control test on samples.</p> <p>Understand the different processes in the water treatment facility.</p> <p>Design the different units of treatment for water treatment plants.</p> <p>Understand the components of building water supply system, storage and rain water harvesting.</p> <p>Understand the problems of air and noise pollution. Besides, they will be prepared to contribute practical solutions to environmental problems in our society.</p>	
CEC505	Transportation Engineering-I	<p>To get an insight of the development in all the fields of highway engineering and familiarized with different surveys required to be carried out for the implementation of the highway project; to understand the phase of engineering which deals with the planning and geometrics design of streets, highways and abutting land in the context of safe and convenient traffic operations thereon.</p> <p>To know the required properties of the different materials to be used in the construction of highways and other allied structures, to understand characterization of the materials and to evaluate their suitability; understand the principle of soil stabilization, utilization of geosynthetics in the construction of highway and allied structures</p> <p>To understand the classification of different types of pavements, factors to be considered in the design of pavements, approaches for designing the different types of pavements and can the flexible and rigid pavements be using IRC Specifications.</p> <p>To get an insight into the methods of construction of different types of pavements; along with the importance of highway drainage and various methods of providing the drainage; also, to understand the elements of bridge engineering.</p> <p>To illustrate different distresses in the pavements, evaluate the pavements in terms of its functional and structural adequacy and arrive upon the rehabilitation measures.</p>	

		To explain methods to strengthen the distressed pavements, low volume and low-cost road and also to understand the significance of the drainage in the field of highway engineering including different methods of providing the drainage in the highways.	
CE-DLO 5063	Department Level Optional Course-I: Building Services & Repairs	Understand the importance & installation of utility services.	
		Understand the drawbacks of all the service lines are not installed properly or if materials used are faulty.	
		Choose appropriate systems & integrate the same into the building construction projects.	
		Assess the structural health of the buildings & infrastructural works and also Inspect & evaluate the damaged structures.	
		Implement the techniques for repairing the concrete structures and also decide whether or not the structure should be dismantled, if it is deteriorated beyond repair.	
		Employ the methods of steel protection in the field.	
		Understand the damage caused by fire & exercise due care for fire safety	
Sixth Semester			
CEC601	Geotechnical Engineering-II	Students will be able to calculate the shear strength parameters for the soil.	
		Students will be able to calculate the factors of safety of different types of slopes under various soil conditions, analyze the stability of slopes, calculate lateral earth pressures and analyse the stability of retaining walls.	
		Students will be able to calculate bearing capacity of shallow foundations using theoretical and field methods, calculate load bearing capacity of individual as well as group of pile foundations and their settlement using theoretical and field methods	
		Students will be able to explain conduits and calculate the load carried by the struts of a braced cut under various soil conditions	
		Students will be able to explain ground improvement techniques.	
CEC602	Design and Drawing of Steel Structures	Explain the Limit State Design philosophy as applied to steel structures.	
		Predict the behavior and design members subjected to axial compression, tension and their connection.	
		Predict the behavior and design members subjected to bending, shear and their connection	
		Calculate loading for a truss and design the complete truss.	
		Demonstrate ability to follow IS codes, design tables and aids in analysis and design steel structures	
		Analyze and design the commercial steel structures and prepare drawing with complete detailing.	
CEC603	Transportation Engineering-I	Understand the various systems of railway, airport, water transportation and the components of p-way and its construction, yards, modernization of railway track.	
		Apply the concept of geometric design of railway track and railway traffic control.	
		Understand airport planning, obstructions and orientation of runway.	
		Apply the concept of geometric design of runway, taxiway, etc. and the knowledge of various signaling system for air traffic control.	
		Understand the system of water transportation, types of breakwater, harbours and port facilities equipment	
		Understand the basic idea about the bridge engineering.	
CE-C604	Environmental Engineering – I	Explain wastewater collection systems in buildings and municipal areas and to determine the quantity of wastewater and storm water production. Also, gain the knowledge of the construction of new sewer line and importance of sewer appurtenances.	
		Explain and analyze the characteristics of wastewater and design the primary treatment for wastewater	
		Explain on-site treatment methods and solve Analyze and design wastewater treatment systems (ASP, Aerated lagoon and Oxidation ponds).	
		Identify and apply proper treatment for reclamation and reuse of wastewater and disposal.	
		To provide knowledge of solid waste collection system, characteristics of solid waste and to identify hazardous waste. Study related to plastic waste management will be studied.	
CEC605	Water Resources Engineering	Classify various types of irrigation projects	
		Explain different irrigation methods and effective use of water resources.	

		Calculate the crop water requirements and irrigation requirement.
		Derive hydrographs and calculate runoff of a catchment area.
		Explain the steady state and unsteady state conditions of any aquifer and design water wells.
		Estimate the capacity of a reservoir for different purposes.
CE-DLO6061	Department Level Optional Course-II-Advanced Construction Equipment	<ul style="list-style-type: none"> • Understand the use/applications of various conventional construction equipment and select the best out of them for a particular site requirement. • Know modern methods/equipment used for underground as well as underwater tunnelling. • Compare conventional and modern methods of formwork on the basis of productivity, reuse value, ease of erection and dismantling, flexibility offered and overall cost. • Understand the techniques involved and the equipment required thereof for construction of various transporting facilities. • Gain knowledge about the setting up of different kinds of the power generating structures. • Select proper equipment for construction of transporting facilities based on requirements.
Seventh Semester		
CE-C 701	Quantity Survey, Estimation & Valuation	<ul style="list-style-type: none"> · Apply the measurement systems to various civil engineering items of work. · Draft the specifications for various items of work & determine unit rates of items of works · Estimate approximate cost of the structures by using various methods & prepare detailed estimates of various civil engineering structures by referring drawings. · Assess the quantities of earthwork & construct mass haul diagrams. · Draft tender notice & demonstrate the significance of the tender as well as contract process. · Determine the present fair value of any constructed building at stated time.
CE-C 702	Theory of Reinforced Concrete Structures	<ul style="list-style-type: none"> · Understand the pros and cons of the WSM and LSM. · Understand the various clauses specified in IS: 456-2000 for designing structural members with the safety and economy. · Carry out analysis and design of various elements of the reinforced concrete structures such as beam, slab, column, footings using the concept of Limit state method. · Understand and the use of readymade design curves from Special publications of Bureau of Indian standards.
CE-C 703	Water Resources Engineering II	<ul style="list-style-type: none"> · Design the section of gravity dams, earth and rockfill dams, arch dams and buttress dams. · Design spillways and energy dissipaters. · Apply silt theories to design irrigation canals. · Explain various types of canals and its maintenance. · Explain different cross drainage works of a canal system
CE-DLO 7042	Department Level Elective: Solid Waste Management	<ul style="list-style-type: none"> · Explain generation, storage, collection, transfer and transport, processing, recovery and disposal in the management of solid waste. · Understand the characteristics of different types of solid waste and the factors affecting variation. · Identify the methods of collection, storage and transportation of solid waste. · Suggest suitable technical solutions for processing of wastes. · Ability to plan waste minimization and disposal of municipal solid waste. · Ensure the safe handling and treatment of Hazardous, Electronic and Biomedical waste.
CE-C ILOC7017	Disaster Management and Mitigation Measures	<ul style="list-style-type: none"> · Get to know natural as well as manmade disaster and their extent and possible effects on the economy · Plan of national importance structures based upon the previous history. · Get acquainted with government policies, acts and various organizational structure associated with an emergency. · Get to know the simple do's and don'ts in such extreme events and act accordingly.
Eighth semester		

CE-C 801	Design and Drawing of Reinforced Concrete Structures	Design independently RCC structure by applying IS code provisions.
		· Design staircase, water tank and retaining wall.
		· Explain principles of PSC and calculate losses.
		· Draw and explain the structural detailing.
CE-C 802	Construction Management	Explain response of structure during an earthquake and calculate design forces.
		· Understand & apply the knowledge of management functions like planning, scheduling, executing & controlling the construction projects.
		· Prepare feasible project schedule by using various scheduling techniques.
		· Gain knowledge of managing various resources & recommend best method of allocating the resources to the project.
		· develop optimum relationship between time & cost for construction project
		· Implement quality & safety measures on construction sites during execution of civil engineering projects.
CE-C DLO8032	Department Level Elective: Industrial Waste Treatment	· Understand the importance of labour legislation
		· Understand the characteristics of industrial wastewater.
		· Identify sampling method and analyze industrial waste.
		· Design facilities for the processing and reclamation of industrial waste water.
		· Explain on-site treatment methods and solve Analyze and design wastewater treatment systems. (floatation, vacuum filtration, centrifugation, filter press and membrane filters)
		· Detailed on-site manufacturing processes and treatments of industrial waste water.
CE-C ILOC8021	Institute Level Elective: Project Management	· Analyze proposed development project plans for possible environmental effects and to
		· Apply selection criteria and select an appropriate project from different options.
		· Write work break down structure for a project and develop a schedule based on it.
		· Identify opportunities and threats to the project and decide an approach to deal with them strategically.
		· Use Earned value technique and determine & predict status of the project.
CE-C ILOC8028	Institute level Elective : Environmental Management	· Capture lessons learned during project phases and document them for future reference
		· Understand the concept of environmental management
		· Understand ecosystem and interdependence, food chain etc.
		· Understand and interpret environment related legislations