

DEPARTMENT OF CIVIL ENGINEERING

SEMESTER III

SL NO	COURSE CODE	COURSE NAME	CO No	CO DESCRIPTION
1	MAT201	PARTIAL DIFFERENTIAL EQUATION AND COMPLEX ANALYSIS	1	Understand the concept and the solution of partial differential equation
			2	Analyse and solve one dimensional wave equation and heat equation
			3	Understand complex functions, its continuity differentiability with the use of Cauchy Riemann equations
			4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function
			5	Understand the series expansion of complex function about a singularity and Apply residue theorem to compute several kinds of real integrals
2	CET201	MECHANICS OF SOLIDS	1	Recall the fundamental terms and theorems associated with mechanics of linear elastic deformable bodies
			2	Explain the behaviour and response of various structural elements under various loading conditions
			3	Apply the principles of solid mechanics to calculate internal stresses/strains, stress resultants and strain energies in structural elements subjected to axial/transverse loads and bending/twisting moments
			4	Choose appropriate principles or formulas to find the elastic constants of materials making use of the information available
			5	Perform stress transformations, identify principal planes / stresses and maximum shear stress at a point in a structural member
			6	Analyse the given structural member to calculate the safe load or proportion the cross section to carry the load safely
3	CET203	FLUID MECHANICS AND HYDRAULICS	1	Recall the relevant principles of hydrostatics and hydraulics of pipes and open channels
			2	Identify or describe the type, characteristics or properties of fluid flow
			3	Estimate the fluid pressure, perform the stability check of bodies under hydrostatic condition
			4	Compute discharge through pipes or estimate the forces on pipe bends by applying hydraulic principles of continuity, energy and/or momentum
			5	Analyse or compute the flow through open channels, perform the design of prismatic channels

4	CET205	SURVEYING & GEOMATICS	1	Apply surveying techniques and principles of levelling for the preparation of contour maps, computation of area-volume and sketching a mass diagram
			2	Apply the principles of surveying for triangulation
			3	Apply different methods of traverse surveying and traverse balancing
			4	Identify the possible errors in surveying and apply the corrections in field measurements
			5	Apply the basic knowledge of setting out of different types of curves
			6	Employ surveying techniques using advanced surveying equipments
5	MCN201	SUSTAINABLE ENGINEERING	1	Understand the relevance and the concept of sustainability and the global initiatives in this direction
			2	Explain the different types of environmental pollution problems and their sustainable solutions
			3	Discuss the environmental regulations and standards
			4	Outline the concepts related to conventional and non-conventional energy
			5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles
6	HUT200	PROFESSIONAL ETHICS	1	Understand the core values that shape the ethical behaviour of a professional
			2	Adopt a good character and follow an ethical life
			3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics
			4	Solve moral and ethical problems through exploration and assessment by established experiments
			5	Apply the knowledge of human values and social values to contemporary ethical values and global issues

7	CEL201	CIVIL ENGINEERING PLANNING & DRAFTING LAB	1	Illustrate the ability to organise civil engineering drawings systematically and professionally
			2	Prepare building drawings as per the specified guidelines
			3	Assess a complete building drawing to include all necessary information
			4	Create a digital form of the building plan using any drafting software
8	CEL203	SURVEY LAB	1	Use conventional surveying tools such as chain/tape and compass for plotting and area determination
			2	Apply levelling principles in field
			3	Solve triangulation problems using theodolite
			4	Employ total station for field surveying
			5	Demonstrate the use of distomat and handheld GPS
SEMESTER IV				
1	MAT202	PROBABILITY, STATISTICS AND NUMERICAL METHODS	1	Understand the concept, properties and important models of discrete random variables and,using them, analyse suitable random phenomena
			2	Understand the concept, properties and important models of continuous random variables and,using them, analyse suitable random phenomena
			3	Perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population
			4	Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques
			5	Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations
2	CET202	ENGINEERING GEOLOGY	1	Recall the fundamental concepts of surface processes, subsurface processes, minerals, rocks, groundwater and geological factors in civil engineering construction
			2	Identify and describe the surface processes, subsurface processes, earth materials, groundwater and geological factors in civil engineering constructions
			3	Apply the basic concepts of surface and subsurface processes, minerals, rocks, groundwater and geological characteristics in civil engineering constructions
			4	Analyze and classify geological processes, earth materials and groundwater
			5	Evaluation of geological factors in civil engineering constructions

3	CET204	GEOTECHNICAL ENGINEERING - I	1	Explain the fundamental concepts of basic and engineering properties of soil
			2	Describe the laboratory testing methods for determining soil parameters
			3	Solve the basic properties of soil by applying functional relationships
			4	Calculate the engineering properties of soil by applying the laboratory test results and the fundamental concepts of soil mechanics
			5	Analyze the soil properties to identify and classify the soil
4	CET206	TRANSPORTATION ENGINEERING	1	Apply the basic principles of Highway planning and design highway geometric elements
			2	Apply standard code specifications in judging the quality of highway materials; designing of flexible pavements
			3	Explain phenomena in road traffic by collection, analysis and interpretation of traffic data through surveys; creative design of traffic control facilities
			4	Understand about railway systems, tunnel, harbour and docks
			5	Express basics of airport engineering and design airport elements
5	EST200	DESIGN AND ENGINEERING	1	Explain the different concepts and principles involved in design engineering
			2	Apply design thinking while learning and practicing engineering
			3	Develop innovative, reliable, sustainable, and economically viable designs incorporating knowledge in engineering
6	MCN202	CONSTITUTION OF INDIA	1	Explain the background of the present constitution of India and features
			2	Utilize the fundamental rights and duties
			3	Understand the working of the union executive, parliament and judiciary
			4	Understand the working of the state executive, legislature and judiciary
			5	Utilize the special provisions and statutory institutions
			6	Show national and patriotic spirit as responsible citizens of the country

7	CEL202	MATERIAL TESTING LAB - I	1	The understand the behaviour of engineering materials under various forms and stages of loading
			2	Characterize the elastic properties of various materials
			3	Evaluate the strength and stiffness properties of engineering materials under various loading conditions
8	CEL204	FLUID MECHANICS LAB	1	Apply fundamental knowledge of Fluid Mechanics to corresponding experiments
			2	Apply theoretical concepts in Fluid Mechanics to respective experiments
			3	Analyse experimental data and interpret the results
			4	Document the experimentation in prescribed manner

SEMESTER V

1	CET301	STRUCTURAL ANALYSIS I	1	Apply the principles of solid mechanics to analyse trusses
			2	Apply various methods to determine deflections in statically determinate structures.
			3	Identify the problems with static indeterminacy and tackling such problems by means of the method of consistent deformations and energy principles
			4	Apply specific methods such as slope deflection and moment distribution methods of structural analysis for typical structures with different characteristics
			5	Apply suitable methods of analysis for various types of structures including cables, suspension bridges and arches
			6	Analyse the effects of moving loads on structures using influence lines.
2	CET303	DESIGN OF CONCRETE STRUCTURES	1	Recall the fundamental concepts of limit state design and code provisions for the design of concrete members under bending, shear, compression and torsion
			2	Analyse reinforced concrete sections to determine the ultimate capacity in bending, shear and compression
			3	Design and detail beams, slab, stairs and footings using IS code provisions
			4	Design and detail columns using IS code and SP 16 design charts
			5	Explain the criteria for earthquake-resistant design of structures and ductile detailing of concrete structures subjected to seismic forces.

3	CET305	GEOTECHNICAL ENGINEERING - II	1	Understand soil exploration methods
			2	Explain the basic concepts, theories and methods of analysis in foundation engineering
			3	Calculate bearing capacity, pile capacity, foundation settlement and earth pressure
			4	Analyze shallow and deep foundations
			5	Solve the field problems related to geotechnical engineering
4	CET307	HYDROLOGY & WATER RESOURCES ENGINEERING	1	Describe and estimate the different components of the hydrologic cycle by processing hydrometeorological data
			2	Determine the crop water requirements for the design of irrigation canals by recollecting the principles of irrigation engineering
			3	Perform the estimation of streamflow and/or describe the river behavior and control structures
			4	Describe and apply the principles of reservoir engineering to estimate the capacity of reservoirs and their useful life
			5	Demonstrate the principles of groundwater engineering and apply them to computing the yield of aquifers and wells
5	CST309	CONSTRUCTION TECHNOLOGY AND MANAGEMENT	1	Describe the properties of materials used in construction
			2	Explain the properties of concrete and its determination
			3	Describe the various elements of building construction
			4	Explain the technologies for construction
			5	Describe the procedure for planning and executing public works
			6	Apply scheduling techniques in project planning and control
6	MCN301	DISASTER MANAGEMENT	1	Define and use various terminologies in use in disaster management parlance and organise each of these terms in relation to the disaster management cycle
			2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment
			3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk
			4	Explain the core elements and phases of Disaster Risk Management and develop possible measures to reduce disaster risks across sector and community
			5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions
			6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level

7	CEL331	MATERIAL TESTING LAB I	1	To describe the basic properties of various construction materials
			2	Characterize the physical and mechanical properties of various construction materials
			3	Interpret the quality of various construction materials as per IS Codal provisions
8	CSL333	GEOTECHNICAL ENGINEERING LAB	1	Identify and classify soil based on standard geotechnical experimental methods
			2	Perform and analyze permeability tests
			3	Interpret engineering behavior of soils based on test results
			4	Perform laboratory compaction, CBR and in-place density test for fill quality control in the field
			5	Evaluate the strength of soil by performing various tests viz. direct shear test, unconfined compressive strength test and triaxial shear test
			6	Evaluate settlement characteristics of soils
SEMESTER VI				
1	CET302	STRUCTURAL ANALYSIS II	1	Understand the principles of plastic theory and its applications in structural analysis
			2	Examine the type of structure and decide on the method of analysis
			3	Apply approximate methods of analysis for framed structures to ascertain stress resultants approximately but quickly
			4	Apply the force method to analyse framed structures
			5	Apply the displacement methods to analyse framed structures
			6	Remember basic dynamics, understand the basic principles of structural dynamics and apply the same to simple structures
2	CET304	ENVIRONMENTAL ENGINEERING	1	To appreciate the role of environmental engineering in improving the quality of the environment
			2	To plan for the collection and conveyance of water and waste water
			3	To enhance natural water purification processes in an engineered environment
			4	To decide on appropriate technology for water and waste water treatment

3	CET306	DESIGN OF HYDRAULIC STRUCTURES	1	Elucidate the causes of failure, principles of design of different components of hydraulic structures
			2	Describe the features of canal structures and perform the design of alluvial canals
			3	Perform the hydraulic design of minor irrigation structures such as cross-drainage works, canal falls, cross regulator
			4	Prepare the scaled drawings of different minor irrigation structures
			5	Describe the design principles and features of dams and perform the stability analysis of gravity dams
4	CET308	COMPREHENSIVE COURSE WORK	1	Learn to prepare for a competitive examination
			2	Comprehend the questions in Civil Engineering field and answer them with confidence
			3	Communicate effectively with faculty in scholarly environments
			4	Analyze the comprehensive knowledge gained in basic courses in the field of Civil Engineering
5	CET352	ADVANCED CONCRETE TECHNOLOGY	1	To recall the properties and testing procedure of concrete materials as per IS code
			2	To describe the procedure of determining the properties of fresh and hardened concrete
			3	To design concrete mix using IS code methods
			4	To explain non destructive testing of concrete.
			5	To describe the various special types of concretes
6	HUT300	INDUSTRIAL ECONOMICS AND FOREIGN TRADE	1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare
			2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production
			3	Determine the functional requirement of a firm under various competitive conditions.
			4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society.
			5	Determine the impact of changes in global economic policies on the business opportunities of a firm.

7	CEL332	TRANSPORTATION ENGINEERING LAB	1	Analyse the suitability of soil as a pavement subgrade material
			2	Assess the suitability of aggregates as a pavement construction material
			3	Characterize bitumen based on its properties so as to recommend it as a pavement construction material
			4	Design bituminous mixes for pavement layers
			5	Assess functional adequacy of pavements based on the roughness of pavement surface.
8	CEL334	CIVIL ENGINEERING SOFTWARE LAB	1	To analyse and design the multi-storeyed framed structure, schedule a given set of project activities using the software.
			2	To prepare design details of different structural components, implementation plan for a project
			3	To prepare a technical document on engineering activities like surveying, structural design and project planning
SEMESTER VII				
1	CET401	DESIGN OF STEEL STRUCTURES	1	Explain the behaviour and properties of structural steel members to resist various structural forces and actions and apply the relevant codes of practice
			2	Analyses the behaviour of structural steel members and undertake design at both serviceability and ultimate limit states
			3	Explain the theoretical and practical aspects of the Design of composite Steel Structure along with the planning and design aspects
			4	Apply a diverse knowledge of the Design of Steel engineering practices applied to real-life problems
			5	Demonstrate experience in the implementation of the design of structures on engineering concepts which are applied in field of Structural Engineering
2	CET423	GROUND IMPROVEMENT TECHNIQUES	1	Classify different ground improvement methods based on the soil suitability
			2	Outline the basic concept/ design aspects of various ground improvement methods
			3	Identify the construction procedure of different ground improvement methods
			4	Choose different application of geosynthetics and soil stabilisation in Ground improvement

3	EET455	ENERGY MANAGEMENT	1	Explain the significance and procedure for energy management and audit
			2	Discuss the energy efficiency and management of electrical loads
			3	Discuss the energy efficiency in boilers and furnaces
			4	Explain the energy management opportunities in HVAC systems
			5	Compute the economic feasibility of the energy conservation measures
4	MCN401	INDUSTRIAL SAFETY ENGINEERING	1	Describe the theories of accident causation and preventive measures of industrial accidents
			2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping
			3	Explain different issues in construction industries
			4	Describe various hazards associated with different machines and mechanical material handling
			5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards
5	CEL411	ENVIRONMENTAL ENGINEERING LAB	1	Analyse various physico-chemical and biological parameters of water
			2	Compare the quality of water with drinking water standards and recommend its suitability for drinking purposes
6	CEQ413	SEMINAR	1	Identify academic documents from the literature which are related to her/his areas of interest
			2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest
			3	Prepare a presentation about an academic document
			4	Give a presentation about an academic document
			5	Prepare a technical report
7	CED415	PROJECT PHASE 1	1	Model and solve real world problems by applying knowledge across domains
			2	Develop products, processes or technologies for sustainable and socially relevant applications
			3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks
			4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms
			5	Identify technology/research gaps and propose innovative/creative solutions
			6	Organize and communicate technical and scientific findings effectively in writing and oral forms

SEMESTER VIII				
1	CET402	QUANTITY SURVEYING AND VALUATION	1	Define basic terms related to estimation, quantity surveying and contract document
			2	Interpret the item of work from drawings and explain its general specification and unit of measurement.
			3	Make use of the given data from CPWD DAR/DSR for calculating the unit rate of different items of work associated with building construction
			4	Develop detailed measurement (including BBS) and BoQ of various work like buildings, earthwork for roads, sanitary and water supply work
			5	Explain various basic terms related to the valuation of land and building
			6	Develop valuation of buildings using different methods of valuation
2	CET404	COMPREHENSIVE COURSE VIVA	1	Competent in placement tests and other competitive examinations
3	CED416	PROJECT PHASE II	1	Model and solve real world problems by applying knowledge across domains
			2	Develop products, processes or technologies for sustainable and socially relevant applications
			3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks
			4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms
			5	Identify technology/research gaps and propose innovative/creative solutions
			6	Organize and communicate technical and scientific findings effectively in written and oral forms
4	CET464	AIR QUALITY MANAGEMENT	1	Explain the sources of air pollution and different types of air pollutant.
			2	Describe the effect of air pollutants on vegetation, animals, materials and human health
			3	Discuss the different methods of ambient air quality monitoring system which supports an air quality management program.
			4	Explain the meteorological aspects of air pollutant dispersion
			5	Describe the various air pollution control strategies that can be undertaken to meet the air quality goals

5	CET456	REPAIR AND REHABILITATION OF BUILDINGS	1	Recall the basics ideas and theories associated with Concrete technology and Masonry structures
			2	Understand the need and methodology of repair and rehabilitation of structures, the various mechanisms used, and tools for diagnosis of structures
			3	Identifying the criterions for repairing / maintenance and the types and properties of repair materials used in site. Learn various techniques for repairing dam- aged and corroded structures
			4	Proposing wholesum solutions for maintenance/re habilitation and applying methodologies for repairing structures or demolishing structures
			5	Analyse and asses the damage to structures using various tests
6	CET468	CLIMATE CHANGE AND SUSTAINABILITY	1	Explain the fundamental concepts of climate and its influencing factors
			2	Explain the factors affecting climate change and the harmful impacts due to climate change
			3	Discuss the problems due to urbanization and the need for sustainable development
			4	Demonstrate the various adaptation and mitigation techniques for combating climate change
			5	Discuss multilateral agreements on climate change, Case studies on Climate change