

Gopalan College of Engineering & Management
Dept Of Civil - Regulation 2018

Year:II

SEM:III

Course code:18MAT31		Course Name: TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.	
CO2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.	
CO3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.	
CO4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.	
CO5	Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.	

Course code:18CV32		Course:STRENGTH OF MATERIALS
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	To evaluate the basic concepts of the stresses and strains for different materials and strength of structural elements.	
CO2	To evaluate the development of internal forces and resistance mechanism for one dimensional and two dimensional structural elements.	
CO3	To analyse different internal forces and stresses induced due to representative loads on structural elements.	
CO4	To evaluate slope and deflections of beams.	
CO5	To evaluate the behaviour of torsion members, columns and struts.	

Course code:18CV33		Course:FLUIDS MECHANICS
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Possess a sound knowledge of fundamental properties of fluids and fluid Continuum	
CO2	Compute and solve problems on hydrostatics, including practical applications	
CO3	Apply principles of mathematics to represent kinematic concepts related to fluid flow	
CO4	Apply fundamental laws of fluid mechanics and the Bernoulli's principle for practical applications	
CO5	Compute the discharge through pipes and over notches and weirs	

Course code:18CV34		Course:BUILDING MATERIALS AND CONSTRUCTION
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Select suitable materials for buildings and adopt suitable construction techniques.	
CO2	Decide suitable type of foundation based on soil parameters	
CO3	Supervise the construction of different building elements based on suitability	
CO4	Exhibit the knowledge of building finishes and form work requirements	

Course code:18CV35		Course: BASIC SURVEYING
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Posses a sound knowledge of fundamental principles Geodetics	
CO2	Measurement of vertical and horizontal plane, linear and angular dimensions to arrive at solutions to basic surveying problems.	
CO3	Capture geodetic data to process and perform analysis for survey problems]	
CO4	Analyse the obtained spatial data and compute areas and volumes. Represent 3D data on plane figures as contours	

Course code:18CV36		Course:ENGINEERING GEOLOGY
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Apply geological knowledge in different civil engineering practice	

CO1	Apply geological knowledge in different civil engineering practice.
CO2	Students will acquire knowledge on durability and competence of foundation rocks, and confidence enough to use the best building materials.
CO3	Civil Engineers are competent enough for the safety, stability, economy and life of the structures that they construct.
CO4	Able to solve various issues related to ground water exploration, build up dams, bridges, tunnels which are often confronted with ground water problems.
CO5	Intelligent enough to apply GIS, GPS and remote sensing as a latest tool in different civil engineering construction

Course code:18CVL37		Course:COMPUTER AIDED BUILDING PLANNING AND DRAWING
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Prepare, read and interpret the drawings in a professional set up.	
CO2	Know the procedures of submission of drawings and Develop working and submission drawings for building.	
CO3	Plan and design a residential or public building as per the given requirements.	

Course code:18CVL38		Course:BUILDING MATERIALS TESTING LABORATORY
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion.	
CO2	Identify, formulate and solve engineering problems of structural elements subjected to flexure.	
CO3	Construct flips-flops, counters and shift registers	
CO4	Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to unsuitable materials.	

Course code:18CPC39/49		Course:CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW (CPC)
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Have constitutional knowledge and legal literacy.	
CO2	Understand Engineering and Professional ethics and responsibilities of Engineers.	
CO3	Understand the the cybercrimes and cyber laws for cyber safety measures.	

Course code:18MATDIP31		Course:ADDITIONAL MATHEMATICS – I
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Apply concepts of complex numbers and vector algebra to analyze the problems arising in related area	
CO2	Use derivatives and partial derivatives to calculate rate of change of multivariate functions.	
CO3	Analyze position, velocity and acceleration in two and three dimensions of vector valued functions.	
CO4	Learn techniques of integration including the evaluation of double and triple integrals.	
CO5	Identify and solve first order ordinary differential equations	

Year:II		SEM:IV
Course code:18MAT41		Course:COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.	
CO2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.	
CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.	
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.	
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.	

Course code:18CV42		Course:ANALYSIS OF DETERMINATE STRUCTURES
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Identify different forms of structural systems.	
CO2	Construct ILD and analyse the beams and trusses subjected to moving loads	
CO3	Design sinusoidal and non-sinusoidal oscillators.	
CO4	Determine the stress resultants in arches and cables.	

Course code:18CV43		Course:APPLIED HYDRUALICS
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Apply dimensional analysis to develop mathematical modeling and compute the parametric values in prototype by analyzing the corresponding model parameters	
CO2	Design the open channels of various cross sections including economical channel sections	
CO3	Apply Energy concepts to flow in open channel sections. Calculate Energy dissipation.	
CO4	Compute water surface profiles at different conditions	
CO5	Design turbines for the given data, and to know their operation characteristics under different operating conditions	

Course code:18CV44		Course: CONCRETE TECHNOLOGY
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Relate material characteristics and their influence on microstructure of concrete.	
CO2	Distinguish concrete behavior based on its fresh and hardened properties.	
CO3	Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes.	
CO4	Adopt suitable concreting methods to place the concrete based on requirement.	
CO5	Select a suitable type of concrete based on specific application.	

Course code:18CV45		Course: ADVANCED SURVEYING
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Apply the knowledge of geometric principles to arrive at surveying problems	
CO2	Use modern instruments to obtain geo-spatial data and analyse the same to appropriate engineering problems.	
CO3	Capture geodetic data to process and perform analysis for survey problems with the use of electronic instruments;	
CO4	Design and implement the different types of curves for deviating type of alignments.	

Course code:18CV46		Course:WATER SUPPLY AND TREATMENT ENGINEERING
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Estimate average and peak water demand for a community.	
CO2	Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice for a community.	
CO3	Evaluate water quality and environmental significance of various parameters and plan suitable treatment system	
CO4	Design a comprehensive water treatment and distribution system to purify and distribute water to the required quality standards.	

Course code:18CVL47		Course:ENGINEERING GEOLOGY LABORATORY
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	The students able to identify the minerals, rocks and utilize them effectively in civil engineering practices.	
CO2	The students will interpret and understand the geological conditions of the area for implementation of civil engineering projects.	
CO3	The students will interpret subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods.	
CO4	The students will learn the techniques in the interpretation of LANDSAT Imageries to find out the lineaments and other structural features for the given area.	
CO5	The students will be able to identify the different structures in the field.	

Course code:18CVL48		Course:FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Properties of fluids and the use of various instruments for fluid flow measurement.	
CO2	Working of hydraulic machines under various conditions of working and their characteristics.	

Course code:18MATDIP41		Course:ADDITIONAL MATHEMATICS – II
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Solve systems of linear equations using matrix algebra.	
CO2	Apply the knowledge of numerical methods in modelling and solving of engineering problems.	
CO3	Apply the knowledge of numerical methods in modelling and solving of engineering problems.	
CO4	Classify partial differential equations and solve them by exact methods.	
CO5	Apply elementary probability theory and solve related problems.	

Year:III		SEM:V
Course code:18CV51		Course: CONSTRUCTION MANAGEMENT AND ENTREPRENEURSHIP
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Prepare a project plan based on requirements and prepare schedule of a project by understanding the activities and their sequence.	
CO2	Understand labour output, equipment efficiency to allocate resources required for an activity / project to achieve desired quality and safety.	
CO3	Analyze the economics of alternatives and evaluate benefits and profits of a construction activity based on monetary value and time value.	
CO4	Establish as an ethical entrepreneur and establish an enterprise utilizing the provisions offered by the federal agencies.	

Course code:18CV52		Course: ANALYSIS OF INDETERMINATE STRUCTURES
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Determine the moment in indeterminate beams and frames having variable moment of inertia and subsidence using slope deflection method	
CO2	Determine the moment in indeterminate beams and frames of no sway and sway using moment distribution method.	
CO3	Construct the bending moment diagram for beams and frames by Kani's method.	
CO4	Construct the bending moment diagram for beams and frames using flexibility method	
CO5	Analyze the beams and indeterminate frames by system stiffness method.	

Course code:18CV53		Course: DESIGN OF RC STRUCTURAL ELEMENTS
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Understand the design philosophy and principles.	
CO2	Solve engineering problems of RC elements subjected to flexure, shear and torsion.	
CO3	Demonstrate the procedural knowledge in designs of RC structural elements such as slabs, columns and footings.	
CO4	Owns professional and ethical responsibility.	

Course code:18CV54		Course:BASIC GEOTECHNICAL ENGINEERING
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Ability to plan and execute geotechnical site investigation program for different civil engineering projects	
CO2	Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils	
CO3	Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures	
CO4	Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure	
CO5	Capable of estimating load carrying capacity of single and group of piles	

Course code:18CV55		Course:MUNICIPAL WASTEWATER ENGINEERING
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Select the appropriate sewer appurtenances and materials in sewer network.	
CO2	Design the sewers network and understand the self purification process in flowing water.	
CO3	Design the various physico-chemical treatment units	
CO4	Design the various biological treatment units	
CO5	Design various AOPs and low cost treatment units.	

Course code:18CV56		Course: HIGHWAY ENGINEERING
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Acquire the capability of proposing a new alignment or re-alignment of existing roads, conduct necessary field investigation for generation of required data.	
CO2	Evaluate the engineering properties of the materials and suggest the suitability of the same for pavement construction.	
CO3	Design road geometrics, structural components of pavement and drainage.	
CO4	Evaluate the highway economics by few select methods and also will have a basic knowledge of various highway financing concepts.	

Course code:18CVL57		Course: SURVEYING PRACTICE
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Apply the basic principles of engineering surveying and for linear and angular measurements.	
CO2	Comprehend effectively field procedures required for a professional surveyor.	
CO3	Use techniques, skills and conventional surveying instruments necessary for engineering practice.	

Course code:18CVL58		Course: CONCRETE AND HIGHWAY MATERIALS LABORATORY
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Able to interpret the experimental results of concrete and highway materials based on laboratory tests.	
CO2	Determine the quality and suitability of cement.	
CO3	Design appropriate concrete mix Using Professional codes.	
CO4	Determine strength and quality of concrete.	
CO5	Evaluate the strength of structural elements using NDT techniques.	
CO6	Test the soil for its suitability as sub grade soil for pavements.	

Course code:18CV59		Course: ENVIRONMENTAL STUDIES
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.	
CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.	
CO3	Demonstrate ecology knowledge of a complex relationship between biotic and a biotic components	
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.	

Year:III		SEM:VI
Course code:18CV61		Course: DESIGN OF STEEL STRUCTURAL ELEMENTS
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Possess knowledge of Steel Structures Advantages and Disadvantages of Steel structures, steel code provisions and plastic behaviour of structural steel.	
CO2	Understand the Concept of Bolted and Welded connections.	
CO3	Understand the Concept of Design of compression members, built-up columns and columns splices.	
CO4	Understand the Concept of Design of tension members, simple slab base and gusseted base.	
CO5	Understand the Concept of Design of laterally supported and un-supported steel beams.	

Course code:18CV62		Course:APPLIED GEOTECHNICAL ENGINEERING
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Ability to plan and execute geotechnical site investigation program for different civil engineering projects	
CO2	Understanding of stress distribution and resulting settlement beneath the loaded footings on sand and clayey soils	
CO3	Ability to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures	
CO4	Ability to determine bearing capacity of soil and achieve proficiency in proportioning shallow isolated and combined footings for uniform bearing pressure	
CO5	Capable of estimating load carrying capacity of single and group of piles	

Course code:18CV63		Course:HYDROLOGY AND IRRIGATION ENGINEERING
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Understand the importance of hydrology and its components.	
CO2	Measure precipitation and analyze the data and analyze the losses in precipitation.	
CO3	Estimate runoff and develop unit hydrographs.	
CO4	Find the benefits and ill-effects of irrigation.	
CO5	Find the quantity of irrigation water and frequency of irrigation for various crops.	
CO6	Find the canal capacity, design the canal and compute the reservoir capacity.	

Course code:18CV641		Course: MATRIX METHOD OF STRUCTURAL ANALYSIS
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Evaluate the structural systems to application of concepts of flexibility and stiffness matrices for simple problems.	
CO2	Identify, formulate and solve engineering problems with respect to flexibility and stiffness matrices as applied to continuous beams, rigid frames and trusses.	
CO3	Identify, formulate and solve engineering problems by application of concepts of direct stiffness method as applied to continuous beams and trusses.	
CO4	Evaluate secondary stresses.	

Course code:18CV642		Course: SOLID WASTE MANAGEMENT
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Analyse existing solid waste management system and to identify their drawbacks.	
CO2	Evaluate different elements of solid waste management system.	
CO3	Suggest suitable scientific methods for solid waste management elements.	
CO4	Design suitable processing system and evaluate disposal sites.	

Course code:18CV643		Course: ALTERNATE BUILDING MATERIALS
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Solve the problems of Environmental issues concerned to building materials and cost effective building technologies;	
CO2	Select appropriate type of masonry unit and mortar for civil engineering constructions; also they are able to Design Structural Masonry Elements under Axial Compression.	
CO3	Analyse different alternative building materials which will be suitable for specific climate and in an environmentally sustainable manner. Also capable of suggesting suitable agro and industrial wastes as a building material.	
CO4	Recommend various types of alternative building materials and technologies and design a energy efficient building by considering local climatic condition and building material.	

Course code:18CV644		Course: GROUND IMPROVEMENT TECHNIQUES
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Give solutions to solve various problems associated with soil formations having less strength.	

CO2	Use effectively the various methods of ground improvement techniques depending upon the requirements.
CO3	utilize properly the locally available materials and techniques for ground improvement so that economy in the design of foundations of various civil engineering structures

Course code:18CV645		Course: RAILWAYS, HARBOUR, TUNNELING AND AIRPORTS
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Acquires capability of choosing alignment and also design geometric aspects of railway system, runway and taxiway.	
CO2	Suggest and estimate the material quantity required for laying a railway track and also will be able to determine the hauling capacity of a locomotive.	
CO3	Develop layout plan of airport, harbor, dock and will be able relate the gained knowledge to identify required type of visual and/or navigational aids for the same.	
CO4	Apply the knowledge gained to conduct surveying, understand the tunneling activities.	

Course code:18CV651		Course: REMOTE SENSING AND GIS
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Collect data and delineate various elements from the satellite imagery using their spectral signature.	
CO2	Analyze different features of ground information to create raster or vector data.	
CO3	Perform digital classification and create different thematic maps for solving specific problems	
CO4	Make decision based on the GIS analysis on thematic maps.	

Course code:18CV652		Course: TRAFFIC ENGINEERING
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Understand the human factors and vehicular factors in traffic engineering design.	
CO2	Conduct different types of traffic surveys and analysis of collected data using statistical concepts.	
CO3	Use an appropriate traffic flow theory and to comprehend the capacity & signalized intersection analysis.	
CO4	Understand the basic knowledge of Intelligent Transportation System.	

Course code:18CV653		Course: OCCUPATIONAL HEALTH AND SAFETY
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Identify hazards in the workplace that pose a danger or threat to their safety or health, or that of others.	
CO2	Control unsafe or unhealthy hazards and propose methods to eliminate the hazard.	
CO3	Present a coherent analysis of a potential safety or health hazard both verbally and in writing, citing the occupational Health and Safety Regulations as well as supported legislation.	
CO4	Discuss the role of health and safety in the workplace pertaining to the responsibilities of workers, managers, supervisors.	
CO5	Identify the decisions required to maintain protection of the environment, workplace as well as personal health and safety.	

Course code:18CV654		Course: SUSTAINABILITY CONCEPTS IN CIVIL ENGINEERING
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Learn the sustainability concepts; understand the role and responsibility of engineers in sustainable development.	
CO2	Quantify sustainability, and resource availability, Rationalize the sustainability based on scientific merits.	
CO3	Understand and apply sustainability concepts in construction practices, designs, product developments and processes across various engineering disciplines.	
CO4	Make a decision in applying green engineering concepts and become a lifelong advocate of sustainability in society.	

Course code:18CVL66		Course: SOFTWARE APPLICATION LABORATORY
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	use software skills in a professional set up to automate the work and thereby reduce cycle time for completion of the work	

Course code:18CVL67		Course: ENVIRONMENTAL ENGINEERING LABORATORY
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Acquire capability to conduct experiments and estimate the concentration of different parameters.	
CO2	Compare the result with standards and discuss based on the purpose of analysis.	
CO3	Determine type of treatment, degree of treatment for water and waste water.	
CO4	Identify the parameter to be analyzed for the student project work in environmental stream.	

Course code:18CVP68		Course: EXTENSIVE SURVEY PROJECT
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Apply Surveying knowledge and tools effectively for the projects	
CO2	Understanding Task environment, Goals, responsibilities, Task focus, working in Teams towards common goals, Organizational performance expectations, technical and behavioral competencies.	
CO3	Application of individual effectiveness skills in team and organizational context, goal setting, time management, communication and presentation skills.	
CO4	Professional etiquettes at workplace, meeting and general	
CO5	Establishing trust based relationships in teams & organizational environment	

CO6	Orientation towards conflicts in team and organizational environment, Understanding sources of conflicts, Conflict resolution styles and techniques
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Year:IV		SEM:VII
Course code:18CV71		Course: QUANTITY SURVEYING AND CONTRACT
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Taking out quantities and work out the cost and preparation of abstract for the estimated cost for various civil engineering works.	
CO2	Prepare detailed and abstract estimates for various road works, structural works and water supply and sanitary works.	
CO3	Prepare the specifications and analyze the rates for various items of work.	
CO4	Assess contract and tender documents for various construction works.	
CO5	Prepare valuation reports of buildings.	

Course code:18CV72		Course: DESIGN OF RCC AND STEEL STRUCTURES
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Students will acquire the basic knowledge in design of RCC and Steel Structures.	
CO2	Students will have the ability to follow design procedures as per codal provisions and skills to arrive at structurally safe RC and Steel members.	

Course code:18CV731		Course: THEORY OF ELASTICITY
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Ability to apply knowledge of mechanics and mathematics to model elastic bodies as continuum.	
CO2	Ability to formulate boundary value problems; and calculate stresses and strains.	
CO3	Ability to comprehend constitutive relations for elastic solids and compatibility constraints.	
CO4	Ability to solve two-dimensional problems (plane stress and plane strain) using the concept of stress function.	

Course code:18CV732		Course: AIR POLLUTION AND CONTROL
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Identify the major sources of air pollution and understand their effects on health and environment.	
CO2	Evaluate the dispersion of air pollutants in the atmosphere and to develop air quality models.	
CO3	Ascertain and evaluate sampling techniques for atmospheric and stack pollutants.	
CO4	Choose and design control techniques for particulate and gaseous emissions.	

Course code:18CV733		Course: PAVEMENT MATERIALS AND CONSTRUCTION
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Students will be able to evaluate and assess the suitability of any pavement material to be used in various components of pavement by conducting required tests as per IS,IRC specifications	
CO2	Students will be able to formulate the proportions of different sizes of aggregates to suit gradation criteria for various mixes as per MORTH and also design bituminous mixes.	
CO3	Students will be competent to adapt suitable modern technique and equipment for speedy and economic construction.	
CO4	Student will be able to execute the construction of embankment, flexible, rigid pavement and perform required quality control tests at different stages of pavement construction.	

Course code:18CV 734		Course: GROUND WATER HYDRAULICS
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Find the characteristics of aquifers.	
CO2	Estimate the quantity of ground water by various methods.	
CO3	Locate the zones of ground water resources.	
CO4	Select particular type of well and augment the ground water storage.	

Course code:18CV735		Course: MASONRY STRUCTURES
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Select suitable material for masonry construction by understanding engineering properties.	
CO2	Compute loads, load combinations and analyze the stresses in masonry.	
CO3	Design masonry under compression (Axial load) for various requirements and conditions.	
CO4	Design masonry under bending (Eccentric, lateral, transverse load) for various requirements and conditions.	
CO5	Assess the behavior of shear wall and reinforced masonry.	

Course code:18CV741		Course: EARTHQUAKE ENGINEERING
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Acquire basic knowledge of engineering seismology.	

CO2	Develop response spectra for a given earthquake time history and its implementation to estimate response of a given structure.
CO3	Understanding of causes and types of damages to civil engineering structures during different earthquake scenarios.
CO4	Analyze multi-storied structures modeled as shear frames and determine lateral force distribution due to earthquake input motion using IS-1893 procedures
CO5	Comprehend planning and design requirements of earthquake resistant features of RCC and Masonry structures thorough exposure to different IS-codes of practices.

Course code:18CV742		Course: DESIGN CONCEPT OF BUILDING SERVICES
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Describe the basics of house plumbing and waste water collection and disposal.	
CO2	Discuss the safety and guidelines with respect to fire safety.	
CO3	Describe the issues with respect to quantity of water, rain water harvesting and roof top harvesting.	
CO4	Understand and implement the requirements of thermal comfort in buildings.	

Course code:18CV743		Course: REINFORCED EARTH STRUCTURES
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	identify, formulate reinforced earth techniques that are suitable for different soils and in different structures;	
CO2	understand the laboratory testing concepts of Geo synthetics	
CO3	design RE retaining structures and Soil Nailing concepts	
CO4	Determine the load carrying capacity of Foundations resting on RE soil bed.	
CO5	asses the use of Geo synthetics in drainage requirements and landfill designs	

Course code:18CV744		Course: DESIGN OF HYDRAULIC STRUCTURES
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Check the stability of gravity dams and design the dam	
CO2	Estimate the quantity of seepage through earth dams.	
CO3	Design spillways and aprons for various diversion works.	
CO4	Select particular type of canal regulation work for canal network.	

Course code:18CV745		Course: URBAN TRANSPORT PLANNING
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Design, conduct and administer surveys to provide the data required for transportation planning.	
CO2	Supervise the process of data collection about travel behavior and analyze the data for use in transport planning.	
CO3	Develop and calibrate modal split, trip generation rates for specific types of land use developments.	
CO4	Adopt the steps that are necessary to complete a long-term transportation plan.	

Course code:18CV751		Course: FINITE ELEMENT METHOD
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	The student will have the knowledge on advanced methods of analysis of structures.	

Course code:18CV752		Course: NUMERICAL METHODS AND APPLICATIONS
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	After studying this course, The students will have a clear perception of the power of numerical techniques, ideas and would be able to demonstrate the applications of these techniques to problems drawn from Industry, management and other engineering fields.	

Course code:18CV753		Course: ENVIRONMENTAL PROTECTION AND MANAGEMENT
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Appreciate the elements of Corporate Environmental Management systems complying to international environmental management system standards.	
CO2	Lead pollution prevention assessment team and implement waste minimization options.	
CO3	Develop, Implement, maintain and Audit Environmental Management systems for Organizations.	

Course code:18CVL76		Course: COMPUTER AIDED DETAILING OF STRUCTURES
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Prepare detailed working drawings	

Course code:18CVL77		Course: GEOTECHNICAL ENGINEERING LABORATORY
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Physical and index properties of the soil	
CO2	Classify based on index properties and field identification	
CO3	To determine OMC and MDD, plan and assess field compaction program	
CO4	Shear strength and consolidation parametersto assess strength and deformation characteristics	
CO5	In-situ shear strength characteristics(SPT-Demonstration)	

Year:IV		SEM:VIII
Course code:18CV81		Course:DESIGN OF PRE-STRESSE CONCRETE
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Understand the requirement of PSC members for present scenario.	
CO2	Analyse the stresses encountered in PSC element during transfer and at working.	
CO3	`	
CO4	Capable of analyzing the PSC element and finding its efficiency.	
CO5	Design PSC beam for different requirements.	

Course code:18CV821		Course:BRIDGE ENGINEERING
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Understand the load distribution and IRC standards.	
CO2	Design the slab and T beam bridges.	
CO3	Design Box culvert, pipe culvert	
CO4	Use bearings, hinges and expansion joints and	
CO5	Design Piers and abutments.	

Course code:18CV822		Course: PREFABRICATED STRUCTURES
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Use modular construction, industrialized construction	
CO2	Design prefabricated elements	
CO3	Design some of the prefabricated elements	
CO4	Use the knowledge of the construction methods and prefabricated elements in buildings	

Course code:18CV823		Course:ADVANCED FOUNDATION ENGINEERING
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Estimate the size of isolated and combined foundations to satisfy bearing capacity and settlement criteria.	
CO2	Estimate the load carrying capacity and settlement of single piles and pile groups including laterally loaded piles.	
CO3	Understand the basics of analysis and design principles of well foundation, drilled piers and caissons.	
CO4	Understand basics of analysis and design principles of machine foundations.	

Course code:18CV824		Course: REHABILITATION AND RETROFITTING
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Identify the causes for structural (Concrete) deterioration.	
CO2	Assess the type and extent of damage and carry out damage assessment of structures through various types of tests.	
CO3	Recommend maintenance requirements of the buildings and preventive measures against influencing factors.	
CO4	Select suitable material and suggest an appropriate method for repair and rehabilitation.	

Course code:18CV25		Course: PAVEMENT DESIGN
CO No.	COURSE OUTCOMES (Cos)	
At the end the course student will able to		
CO1	Systematically generate and compile required data's for design of pavement (Highway & Airfield).	
CO2	Analyze stress, strain and deflection by boussinesq's, bur mister's and westergaard's theory.	
CO3	Design rigid pavement and flexible pavement conforming to IRC58-2002 and IRC37-2001.	
CO4	Evaluate the performance of the pavement and also develops maintenance statement based on site specific requirements.	

Course code:18CVP83		Course: PROJECT WORK PHASE-2
CO No.	COURSE OUTCOMES (Cos)	

	At the end the course student will able to
CO1	Describe the project and be able to defend it.
CO2	Develop critical thinking and problem solving skills.
CO3	Learn to use modern tools and techniques.
CO4	Communicate effectively and to present ideas clearly and coherently both in written and oral forms.
CO5	Develop skills to work in a team to achieve common goal.
CO6	Develop skills of project management and finance.
CO7	Develop skills of self learning, evaluate their learning and take appropriate actions to improve it.
CO8	Prepare them for life-long learning to face the challenges and support the technological changes to meet the societal needs.

Course code:18CVS84		Course: TECHNICAL SEMINAR
CO No.	COURSE OUTCOMES (Cos)	
	At the end the course student will able to	
CO1	Develop knowledge in the field of Civil Engineering and other disciplines through independent learning and collaborative study.	
CO2	Identify and discuss the current, real-time issues and challenges in engineering & technology.	
CO3	Develop written and oral communication skills.	
CO4	Explore concepts in larger diverse social and academic contexts.	
CO5	Apply principles of ethics and respect in interaction with others.	
CO6	Develop the skills to enable life-long learning.	