



SAPTHAGIRI COLLEGE OF ENGINEERING

Department of Civil Engineering

Course Outcomes

II Year Civil Engineering

Course Code	Course Name	Course Outcomes-On completion of this course the students will be able to
17MAT31	Engineering mathematics-iii	<p>CO1: Find the Fourier series, half range Fourier series and Fourier coefficients of periodic functions.</p> <p>CO2: Find the Fourier and inverse Fourier transforms of periodic functions.</p> <p>CO3: Find Z-transforms and inverse Z-transform, and to solve the finite difference equations using Z-transforms.</p> <p>CO4: Apply the concept of statics for curve fitting, correlation and regression.</p> <p>CO5: Solve the algebraic/transcendental equation, interpolating polynomials, intermediate values and evaluation of integrals using appropriate numerical techniques.</p> <p>CO6: Evaluate the integrals using Green's, Stokes and Gauss divergence theorem and able to apply Euler's equation to find the maxima or minima of the functional.</p>
17CV32	Strength of materials	<p>CO1: To evaluate the strength of various structural elements internal forces such as compression, tension, shear, bending and torsion.</p> <p>CO2: To suggest suitable material from among the available in the field of construction and manufacturing.</p> <p>CO3: To evaluate the behavior and strength of structural elements under the action of compound stresses and thus understand failure concepts</p> <p>CO4: To understand the basic concept of analysis and design of members subjected to torsion.</p> <p>CO5: To understand the basic concept of analysis and design of structural elements such as columns and struts.</p>
17CV33	Fluids mechanics	<p>CO1: Possess a sound knowledge of fundamental properties of fluids and fluid Continuum</p> <p>CO2: Compute and solve problems on hydrostatics, including practical applications</p> <p>CO3: Apply principles of mathematics to represent kinematic concepts related to fluid flow</p>

		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
17CV34	Basic surveying	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
17CV35	Engineering geology	CO1: Students will able to apply the knowledge of geology and its role in Civil Engineering CO 2: Students will effectively utilize earth's materials such as mineral, rocks and water in civil engineering practices. CO3: Analyze the natural disasters and their mitigation. CO 4: Assess various structural features and geological tools in ground water exploration, Natural resource estimation and solving civil engineering problems. CO5: Apply and asses use of building materials in construction and asses their properties.
17 CV36	Building Materials and Construction	CO1: Select suitable materials for buildings and adopt suitable construction techniques. CO2: Adopt suitable repair and maintenance work to enhance durability of buildings.
17CVL37	Building materials t esting laboratory	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. 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.
17CVL38	Basic surveying practice	CO1. Apply the basic principles of engineering surveying 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.

17KL39/49	Kannada kali/ Kannada manasu	CO1: Read and understand the simple words in Kannada language CO2: Learn Vyavaharika Kannada (Kannada for Communication) CO3: Develop interest on Kannada Language and Literature
		CO1: Use kannada grammar appropriately CO2: Use kannada language in administration CO1: Understand the kannada literature
17CPH39/49	Constitution of India, Professional Ethics and Human Rights	CO1: Have general knowledge and legal literacy about Indian Constitution and there by it helps to take up competitive examinations & to manage/face complex societal issues in society. CO2: Understand state and central policies(Union and State Executive), fundamental Rights & their duties. CO3: Understand Electoral Process, Amendments and special provisions in Constitution. CO4: Understand powers and functions of Municipalities, Panchayats and Co-operative Societies, with Human Rights and NHRC. CO5: Understand Engineering & Professional ethics and responsibilities of Engineers.
17MAT41	Engineering mathematics – iii	CO1: Apply the numerical methods to solve the linear ordinary differential equations of first and second order. CO2: Derive Bessel's function, Legendre's polynomials and its properties. Also able to apply Rodrigue's formula to find the polynomials. CO3: Solve problems on analytic functions using Cauchy – Riemann equations and to solve the complex line integrals, conformal and bilinear transformations. CO4: Analyze and solve the probability distribution problems. CO5: Define hypothesis, analyze and interpret the hypothesis for the given sampling distribution and to solve stochastic process problems.
17CV42	Analysis of Determinate Structures	CO1. Evaluate the forces i n determinate trusses by method of joints and sections. CO2. Evaluate the deflection of cantilever, simply supported and overhanging beams by different methods CO3. Understand the energy principles and energy theorems and its applications to determine the

		<p>deflections of trusses and bent frames.</p> <p>CO4. Determine the stress resultants in arches and cables.</p> <p>CO5. Understand the concept of influence lines and construct the ILD diagram for the moving loads.</p>
17 CV43	Applied Hydraulics	<p>CO1. Apply dimensional analysis to develop mathematical modeling and compute the parametric values in prototype by analyzing the corresponding model parameters</p> <p>CO2. Design the open channels of various cross sections including economical channel sections</p> <p>CO3. Apply Energy concepts to flow in open channel sections, Calculate Energy dissipation,</p> <p>CO4. Compute water surface profiles at different conditions</p> <p>CO5. Design turbines for the given data, and to know their operation characteristics under different operating conditions</p>
17 CV44	Concrete Technology	<p>CO1. Relate material characteristics and their influence on microstructure of concrete.</p> <p>CO2. Distinguish concrete behaviour based on its fresh and hardened properties.</p> <p>CO3. Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes.</p>
17 CV45	Basic Geotechnical Engineering	<p>CO1. Will acquire an understanding of the procedures to determine index properties of any type of soil, classify the soil based on its index properties</p> <p>CO2. Will be able to determine compaction characteristics of soil and apply that knowledge to assess field compaction procedures</p> <p>CO3. Will be able to determine permeability property of soils and acquires conceptual knowledge about stresses due to seepage and effective stress; Also acquire ability to estimate seepage losses across hydraulic structure</p> <p>CO4. Will be able to estimate shear strength parameters of different types of soils using the data of different shear tests and comprehend Mohr-Coulomb failure theory.</p> <p>CO5. Ability to solve practical problems related to estimation of consolidation settlement of soil deposits also time required for the same.</p>
17 CV46	Advanced Surveying	<p>CO1. Apply the knowledge of geometric principles to arrive at surveying problems</p> <p>CO2. Use modern instruments to obtain geo-spatial data and analyse the same to appropriate engineering problems.</p> <p>CO3. Capture geodetic data to process and perform analysis for survey problems with the use of electronic instruments;</p> <p>CO4. Design and implement the different types of curves for deviating type of alignments.</p>
17CVL47	Fluid Mechanics and Hydraulic Machines	<p>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.</p>

	Laboratory	
17CVL48	Engineering Geology Laboratory	CO1. Identifying the minerals and rocks and utilize them effectively in civil engineering practices CO2. Understanding and interpreting the geological conditions of the area for the implementation of civil engineering projects. CO3. Interpreting subsurface information such as thickness of soil, weathered zone, depth of hard rock and saturated zone by using geophysical methods. CO4. The techniques of drawing the curves of electrical resistivity data and its interpretation for geotechnical and aquifer boundaries

HOD

III Year Civil Engineering

Course Code	Course Name	Course Outcomes-On completion of this course the students will be able to
17CV51	Design of rc structural elements	CO1. understand the design philosophy and principles 2 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
17CV52	Analysis of indeterminate structures	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
17CV53	Applied geotechnical engineering	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
17CV54	Computer aided building planning and drawing	CO1. Gain a broad understanding of planning and designing of buildings CO2. Prepare, read and interpret the drawings in a professional set up. CO3. Know the procedures of submission of drawings and Develop working and submission drawings for building CO4. Plan and design a residential or public building as per the given requirements.
17 CV552	Railways, harbour, tunneling and airports	CO1. Acquires capability of choosing alignment and also design geometric aspects of

		<p>railway system, runway and taxiway.</p> <p>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.</p> <p>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.</p> <p>CO4. Apply the knowledge gained to conduct surveying, understand the tunneling activities.</p>
17 CV561	Traffic engineering	<p>CO1. Understand the human factors and vehicular factors in traffic engineering design.</p> <p>CO2. Conduct different types of traffic surveys and analysis of collected data using statistical concepts.</p> <p>CO 3. Use an appropriate traffic flow theory and to comprehend the capacity & signalized intersection analysis.</p> <p>CO4. Understand the basic knowledge of Intelligent Transportation System.</p>
17CVL57	Geotechnical engineering lab	<p>CO1. Physical and index properties of the soil</p> <p>CO2. Classify based on index properties and field identification</p> <p>CO3. To determine OMC and MDD, plan and assess field compaction program</p> <p>CO4. Shear strength and consolidation parameters to assess strength and deformation characteristics</p> <p>CO5. In-situ shear strength characteristics (SPT- Demonstration)</p>
17CVL58	Concrete and highway materials laboratory	<p>CO1. Conduct appropriate laboratory experiments and interpret the results</p> <p>CO 2. Determine the quality and suitability of cement</p> <p>CO3. Design appropriate concrete mix</p> <p>CO4. Determine strength and quality of concrete</p> <p>CO5. Test the road aggregates and bitumen for their suitability as road material.</p> <p>CO6. Test the soil for its suitability as sub grade soil for pavements.</p>
17CV61	Construction management and entrepreneurship	<p>CO1. Understand the construction management process.</p> <p>CO2. Understand and solve variety of issues that are encountered by every professional in discharging professional duties.</p> <p>CO3. Fulfill the professional obligations effectively with global outlook</p>
17CV62	Design of steel structural elements	<p>CO1. Possess a knowledge of Steel Structures Advantages and Disadvantages of Steel structures, steel code provisions and plastic behaviour of structural steel</p>

		<p>CO2. Understand the Concept of Bolted and Welded connections.</p> <p>CO3. Understand the Concept of Design of compression members, built-up columns and columns splices.</p> <p>CO4. Understand the Concept of Design of tension members, simple slab base and gusseted base.</p> <p>CO5. Understand the Concept of Design of laterally supported and un-supported steel beams.</p>
17CV63	Highway engineering	<p>CO1. Acquire the capability of proposing a new alignment or re-alignment of existing roads, conduct necessary field investigation for generation of required data.</p> <p>CO2. Evaluate the engineering properties of the materials and suggest the suitability of the same for pavement construction.</p> <p>CO3. Design road geometrics, structural components of pavement and drainage.</p> <p>CO4. Evaluate the highway economics by few select methods and also will have a basic knowledge of various highway financing concepts.</p>
17CV64	Water supply and treatment engineering	<p>CO1. Estimate average and peak water demand for a community.</p> <p>CO2. Evaluate available sources of water, quantitatively and qualitatively and make appropriate choice for a community.</p> <p>CO3. Evaluate water quality and environmental significance of various parameters and plan suitable treatment system.</p> <p>CO4. Design a comprehensive water treatment and distribution system to purify and distribute water to the required quality standards.</p>
17CV651	Solid waste management	<p>CO1. Analyse existing solid waste management system and to identify their drawbacks.</p> <p>CO2. Evaluate different elements of solid waste management system.</p> <p>CO 3. Suggest suitable scientific methods for solid waste management elements.</p> <p>CO4. Design suitable processing system and evaluate disposal sites.</p>
17CV653	Alternative building materials	<p>CO1. Solve the problems of Environmental issues concerned to building materials and cost effective building technologies;</p> <p>CO2. Suggest appropriate type of masonry unit and mortar for civil engineering constructions; also they are able to Design Structural Masonry Elements under Axial Compression.</p> <p>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.</p> <p>CO4. Recommend various types of alternative building materials and technologies and design a energy efficient building by considering local climatic condition and building material.</p>

17CV661	Water resources management	CO1. Assess the potential of groundwater and surface water resources. CO2. Address the issues related to planning and management of water resources. CO 3. Know how to implement IWRM in different regions. CO4. Understand the legal issues of water policy. CO5. Select the method for water harvesting based on the area.
17CVL67	Software application lab	After studying this course, students will be able to: use software skills in a professional set up to automate the work and thereby reduce cycle time for completion of the work
17CVL68	Extensive survey project /camp	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. CO 4. Professional etiquettes at workplace, meeting and general CO5. Establishing trust based relationships in teams & organizational environment 6. Orientation towards conflicts in team and organizational environment, Understanding sources of conflicts, Conflict resolution styles and techniques

HOD

IV Year Civil Engineering

Course Code	Course Name	Course Outcomes-On completion of this course the students will be to
17CV71	Municipal and industrial waste water engineering	CO1. Acquires capability to design sewer and Sewerage treatment plant. CO2. Evaluate degree of treatment and type of treatment for disposal, reuse and recycle. CO3. Identify waste streams and design the industrial waste water treatment plant. CO4. Manage sewage and industrial effluent issues.
17CV72	Design of rcc and steel structures	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.
17CV73	Hydrology and irrigation engineering	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.
17CV741	Design of bridges	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.
17CV751	Urban transportation and planning	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.
17CVL76	Environmental engineering laboratory	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.

17CVL77	Computer aided detailing of structures	CO1: Prepare detailed working drawings
17CV81	Quantity surveying and contracts management	CO1. Prepare detailed and abstract estimates for roads and building. CO2. Prepare valuation reports of buildings. CO3. Interpret Contract document's of domestic and international construction works
17CV82	Design of pre stressed concrete elements	CO1 Understand the requirement of PSC members for present scenario. CO2 Analyse the stresses encountered in PSC element during transfer and at working. CO3 Understand the effectiveness of the design of PSC after studying losses CO4 Capable of analyzing the PSC element and finding its efficiency. CO5 Design PSC beam for different requirements.
17CV833	Pavement design	CO1. Systematically generate and compile required data's for design of pavement (Highway & Airfield). CO2. Analyze stress, strain and deflection by boussinesq's, burmister'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.
17CV84	Internship /professional practice	CO1: Apply gained knowledge and skills in engineering practice. CO2: Analyze and design solutions for engineering problems. CO3: Work individually, in team and communicate effectively through reports and presentations. CO4: Demonstrate apt workplace attitude and ethics.
17CV85	Project phase- ii	CO1: Identify, formulate and analyze engineering problems for the need of society. CO2: Design solutions for engineering problems using modern tool/technology to investigate with interpretation of data. CO3: Understand the impact of the engineering solutions in societal and environmental contexts for sustainable development with commit to professional ethics. CO4: Work individually and in team, Communicate effectively through reports and presentations. CO5: Apply engineering, management and ethical principles for Project management and finance.
17CVS86	Seminar	CO1: Identify and explore recent trends in mechanical engineering.

		CO2: Prepare effective report on the selected topic. CO3: Prepare power point presentation (PPT), communicate and answer the queries on the topic.
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