R K COLLEGE OF ENGINEERING

(Approved by AICTE, New Delhi & Affiliated to JNTUK, Kakinada & SBTET, Amaravati)
(An ISO 9001:2015 Certified Institution)
Kethanakonda (V), Ibrahimpatnam (M), Vijayawada, AMARAVATI - AP - 521456

DEPARTMENT OF CIVIL ENGINEERING

COURSE OUTCOMES (COs)

Course Outcomes (COs) describe what students can able to do after completion of the course.

S.No	Year-Sem	Course Code	Course Name	Course Outcomes After completion of the course student can able to
1	II-I	BSC301	Mathematics -III	CO1: interpret the physical meaning of different operators such as gradient, curl and divergence
				CO2: estimate the work done against a field, circulation and flux using vector calculus
				CO3: apply the Laplace transform for solving differential equations
				CO4: find or compute the Fourier series of periodic signals
				CO5: know and be able to apply integral expressions for the forwards and inverse Fourier transform to a range of non-periodic waveforms
				CO6: identify solution methods for partial differential equations that model physical processes
2	II-I	PCC301	Strength of materials-I	CO1: The student will be able to understand the basic materials behavior under the influence of different external loading conditions and the support conditions
				CO2: The student will be able to draw the diagrams indicating the variation of the key performance features like bending moment and shear forces
				CO3: The student will have knowledge of bending concepts and calculation of section modulus and for determination of stresses developed in the beams and deflections due to various loading conditions
				CO4: The student will be able to assess stresses across section of the thin and thick cylinders to

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				arrive at optimum sections to withstand the internal pressure using Lame's equation
3	II-I	PCC302	Fluid Mechanics	**CO1:** Understand the various properties of fluids and their influence on fluid motion and analyses a variety of problems in fluid statics and dynamics
				CO2: Calculate the forces that act on submerged planes and curves
				CO3: Ability to analyses various types of fluid flows
				CO4: Apply the integral forms of the three fundamental laws of fluid mechanics to turbulent and laminar flow through pipes and ducts in order to predict relevant pressures, velocities and forces.
				CO5: Able Measure the quantities of fluid flowing in pipes, tanks and channels.
4	II-I	PCC302	Surveying and Geometrics	**CO1:** Apply the knowledge to calculate angles, distances and levels
				CO2: Identify data collection methods and prepare field notes
				CO3: Understand the working principles of survey instruments, measurement errors and corrective measures
				CO4: Interpret survey data and compute areas and volumes, levels by different type of equipment and relate the knowledge to the modern equipment and methodologies
5	II-I	PCC303	Highway Engineering	**CO1:** Plan highway network for a given area.
				CO2: Determine Highway alignment and design highway geometrics.
				CO3: Design Intersections and prepare traffic management plans
				CO4: Judge suitability of pavement materials and design flexible and rigid pavements
6	II-I	PCC304	Concrete Technology Lab	**CO1:** Determine consistency and fineness of cement
				CO2: Determine setting times of cement
				CO3: Determine specific gravity and soundness of cement
				CO4: Determine compressive strength of cement
				CO5: Determine workability of cement concrete by compaction factor, slump and Vee – Beetests
				CO6: Determine specific gravity of coarse

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				aggregate and fine aggregate by Sieve analysis.
				CO7: Determine flakiness and elongation index of aggregates
				CO8: Determine bulking of sand.
				CO9: Understand non-destructive testing procedures on concrete
7	II-I	PCC305	Highway Engineering Lab	**CO1:** Test aggregates and judge the suitability of materials for the road construction
				CO2: Test the given bitumen samples and judge their suitability for the road construction.
				CO3: Obtain the optimum bitumen content for Bituminous Concrete
				CO4: Determine the traffic volume, speed and parking characteristics.
				CO5: Draw highway cross sections and intersections
8	II-II	PC401	Complex Variables and Statistical Methods	**CO1:** apply Cauchy-Riemann equations to complex functions in order to determine whether a given continuous function is analytic
				CO2: find the differentiation and integration of complex functions used in engineering problems
				CO3: make use of the Cauchy residue theorem to evaluate certain integrals
				CO4: apply discrete and continuous probability distributions
				CO5: design the components of a classical hypothesis test (L6)
				CO6: infer the statistical inferential methods based on small and large sampling tests
9	II-II	PC402	Strength of Materials -II	**CO1:** The student will be able to understand the basic concepts of Principal stresses developed in a member when it is subjected to stresses along different axes and design the sections.
				CO2: The student can assess stresses in different engineering applications like shafts, springs, columns and struts subjected to different loading conditions
10	II-II	ES401	Hydraulics and Hydraulic Machinery	**CO1:** Solve uniform and non-uniform open channel flow problems.
				CO2: Apply the principals of dimensional analysis and similitude in hydraulic model testing.

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				CO3: Understand the working principles of various hydraulic machineries and pumps
11	II-II	PC403	Environmental Engineering	**CO1:** Select a source based on quality and quantity and Estimate design population and water demand
				CO2: Design a water treatment plant for a village/city
				CO3: Design a sewer by estimating DWF and Strom water flow and plumbing system for buildings
				CO4: Design a Sewage Treatment Plant for a town/city
12	II-II	PC404	Managerial Economics & Financial Analysis	**CO1:** The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product
				CO2: The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.
				CO3: The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.
				CO4: The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis
				CO5: The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.
13	II-II	PC405	Environmental Engineering Lab	**CO1:** Estimate some important characteristics of water, wastewater and soil in the laboratory
				CO2: Draw some conclusion and decide whether the water is suitable for Drinking/Construction / Agriculture/ Industry.
				CO3: Estimate Chloride, EC and Salinity of Soil and suggest their suitability for Construction/Agriculture
				CO4: Estimation of the strength of the sewage in terms of BOD and COD and Decide whether the water body is polluted or not with reference to the stated parameters in the list of experiments
				CO5: Demonstration of various instruments used

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				in testing of water and soil and study of Drinking water standards, WHO guidelines, Effluent standards and standards for Construction/ Agriculture/ Industry
14	III-I	PC501	STRUCTURAL ANALYSIS	**CO1:** Distinguish between the determinate and indeterminate structures.
				CO2: Identify the behavior of structures due to the expected loads, including the moving loads, acting on the structure.
				CO3: Estimate the bending moment and shear forces in beams for different fixity conditions.
				CO4: Analyze the continuous beams using various methods -, three moment method, slope deflection method, energy theorems.
				CO5: Draw the influence line diagrams for various types of moving loads on beams/bridges..
				CO6: Analyze the loads in Pratt and Warren trusses when loads of different types and spans are passing over the truss
15	III-I	PC502	CONCRETE TECHNOLOGY	**CO1:** understand basic concepts of concrete.
				CO2: realize importance of quality of concrete
				CO3: familiarize basic ingredients of concrete and their role in concrete and their behaviour in the field
				CO4: test fresh concrete properties and hardened concrete properties..
				CO5: evaluate ingredients of concrete through lab tests. design concrete mix by IS method
				CO6: familiarize basic concepts of special concrete and their production and applications. understand the behavior of concrete in various environments
16	III-I	PC503	WATER RESOURCES ENGINEERING - I	**CO1:** be able to quantify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects
				CO2: develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
				CO3: ability to develop design storms and carry out frequency analysis .
				CO4: be able to determine storage capacity and life of reservoirs and develop unit hydrograph and

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				synthetic hydrograph.
				CO5: be able to estimate flood magnitude and carry out flood routing.
				CO6: be able to determine aquifer parameters and yield of wells.
				CO7: Ability to develop the hydrological models
17	III-I	PC504	ENVIRONMENTAL ENGINEERING - II	**CO1:** Plan and design the sewerage systems by estimating the flow
				CO2: Estimation of BOD and COD and Suggest a suitable disposal method with respect to effluent standards, and Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river
				CO3: Analyze sewage and design suitable treatment system for sewage treatment for a village/City.
				CO4: Design of sewage treatment systems like Septic tank soak pit system and FAB reactor for buildings and understanding tertiary treatment of sewage.
				CO5: Design of Plumbing for an apartment, Gated community or Hotels or Individual houses and Select the appropriate appurtenances in the sewerage systems
18	III-I	PE501	Environmental Impact Assessment	**CO1:** Prepare EMP, EIS and EIA report, estimate cost benefit ratio of a project
				CO2: election of an appropriate EIA methodology
				CO3: Evaluation of impacts on environment
				CO4: Evaluation of risk assessment
				CO5: now the latest acts and guidelines of MoEF& CC
19	III-I	OE501	WASTE WATER TREATMENT	**CO1:** Know the quality and quantity of water for various industries and Advanced water treatment methods
				CO2: Learn the common methods of treatment of wastewaters and Biological treatment methods
				CO3: Study of methods to reduce impacts of disposal of wasters into environment and CETPs.
				CO4: Study of methods of treatment of wastewaters from specific industries like steel plants, refineries, and power plants, that imply biological treatment methods

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				CO5: Study of methods of treatment of wastewaters from industries like Aqua, dairy, sugar plants, and distilleries that imply biological treatment methods
20	III-I	PC506	CONCRETE TECHNOLOGY LAB	**CO1:** Determine consistency and fineness of cement
				CO2: Determine setting times of cement
				CO3: Determine specific gravity and soundness of cement.
				CO4: Determine compressive strength of cement
				CO5: Determine workability of cement concrete by compaction factor, slump and Vee – Beetests
				CO6: Determine specific gravity of coarse aggregate and fine aggregate by Sieve analysis
				CO7: Determine flakiness and elongation index of aggregates
				CO8: Determine bulking of sand.
				CO9: Understand non-destructive testing procedures on concrete
21	III-II	PC601	DESIGN AND DRAWING OF REINFORCED CONCRETE STRUCTURES	**CO1:** Work on different types of design methods
				CO2: Carryout analysis and design of flexural members and detailing
				CO3: Design structures subjected to shear, bond and torsion • Design different type of compression members and footings
				CO4: Design different type of compression members and footings
22	III-II	PC602	Water Resources Engineering – II	**CO1:** be able to estimate irrigation water requirements ability to design irrigation canals and canal network
				CO2: plan an irrigation system
				CO3: design irrigation canal structures
				CO4: plan and design diversion head works
				CO5: analyses stability of gravity and earth dams
				CO6: design ogee spillways and energy dissipation work
				CO1: The student must know the definition of the various quantities related to soil mechanics and establish their inter-relationships.

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23	III-II	PC603	Geotechnical Engineering - I	**CO2:** The student should be able to know the methods of determination of the various index properties of the soils and classify the soils
				CO3: The student should be able to know the importance of the different engineering properties of the soil such as compaction, permeability, consolidation and shear strength and determine them in the laboratory.
				CO4: The student should be able to apply the above concepts in day-to-day civil engineering practice
24	III-II	HS601	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	**CO1:** The Learner is equipped with the knowledge of estimating the Demand and demand elasticity's for a product.
				CO2: The knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs..
				CO3: The pupil is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units
				CO4: The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis.
				CO5: The Learner can able to evaluate various investment project proposals with the help of capital budgeting techniques for decision making
25	III-II	PE601	Pre-stressed Concrete	**CO1:** Understand different methods of prestressing
				CO2: Estimate effective prestress including short and long term losses
				CO3: Analyze and design prestressed concrete beams under flexure and shear
				CO4: Understand the relevant IS Code provisions for prestressed concrete
26	III-II	OC601	PROJECT MANAGEMENT	**CO1:** appreciate the importance of construction planning
				CO2: understand the functioning of various earth moving equipment
				CO3: know the methods of production of aggregate products and concreting
				CO4: apply the gained knowledge to project

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				management and construction techniques
27	III-II	PC604	CAD LAB	**CO1:** Model the geometry of real-world structure Represent the physical model of structural element/structure
				CO2: Perform analysis
				CO3: Interpret from the Post processing results
				CO4: Design the structural elements and a system as per IS Codes
28	III-II	PC605	EVIRONMENTAL ENGINEERING LAB	**CO1:** Estimate some important characteristics of water, wastewater and soil in the laboratory
				CO2: Draw some conclusion and decide whether the water is suitable for Drinking/Construction / Agriculture/ Industry.
				CO3: Estimate Chloride, EC and Salinity of Soil and suggest their suitability for Construction/Agriculture
				CO4: Estimation of the strength of the sewage in terms of BOD and COD and Decide whether the water body is polluted or not with reference to the stated parameters in the list of experiments
				CO5: Demonstration of various instruments used in testing of water and soil and study of Drinking water standards, WHO guidelines, Effluent standards and standards for Construction/ Agriculture/ Industry
29	IV-I		ENVIRONMENTAL ENGINEERING -II	**CO1:** Plan and design the sewerage systems
				CO2: Select the appropriate appurtenances in the sewerage systems
				CO3: Analyze sewage and suggest and design suitable treatment system for sewage treatment
				CO4: Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river
				CO5: Suggest a suitable disposal method with respect to effluent standards.
				CO1: estimate irrigation water requirements
				CO2: design irrigation canals and canal network
				CO3: plan an irrigation system
				CO4: design irrigation canal structures
				CO5: plan and design diversion head works

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30	IV-I		WATER RESOURCES ENGINEERING–II	**CO6:** analyses stability of gravity and earth dams
				CO7: design ogee spillways and energy dissipation work
31	IV-I		GEOTECHNICAL ENGINEERING – II	**CO1:** The student must be able to understand the various types of shallow foundations and decide on their location based on soil characteristics.
				CO2: The student must be able to compute the magnitude of foundation settlement to decide the size of the foundation.
				CO3: the student must be able to use the field test data and arrive at the bearing capacity.
				CO4: The student must be able to design Piles based on the principles of bearing capacity
32	IV-I		REMOTE SENSING AND GIS APPLICATIONS	**CO1:** be familiar with ground, air and satellite-based sensor platforms.
				CO2: interpret the aerial photographs and satellite imageries
				CO3: create and input spatial data for GIS applications
				CO4: apply RS and GIS concepts in water resources engineering
				CO5: applications of various satellite data
33	IV-I		AIR POLLUTION AND CONTROL	**CO1:** Decide the ambient air quality based on the analysis of air pollutants
				CO2: Design particulate and gaseous control measures for an industry
				CO3: Judge the plume behavior in a prevailing environmental condition
				CO4: Estimate carbon credits for various day to day activity
34	IV-I		ENVIRONMENTAL IMPACT ASSESSMENT AND MANAGEMENT	**CO1:** Prepare EMP, EIS, and EIA report
				CO2: Identify the risks and impacts of a project
				CO3: Selection of an appropriate EIA methodology
				CO4: Evaluation the EIA report
				CO5: Estimate the cost benefit ratio of a project
				CO6: Know the role of stakeholder and public hearing in the preparation of EIA
				CO1: work comfortably on GIS software

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35	IV-I		GIS & CAD LAB	**CO2:** digitize and create thematic map and extract important features
				CO3: develop digital elevation model
				CO4: use structural analysis software to analyze and design 2D and 3D frames
				CO5: design and analyze retaining wall and simple towers using CADD software
36	IV-I		IRRIGATION DESIGN AND DRAWING	**CO1:** To design irrigation structures like Surplus weir
				CO2: To design irrigation structures Tank sluice with a tower head
				CO3: To design irrigation structures Canal drop-Notch type
				CO4: To design irrigation structures Canal regulator and Under tunnel
37	IV-II		ESTIMATION SPECIFICATION & CONTRACTS	**CO1:** The student should be able to determine the quantities of different components of buildings
				CO2: The student should be in a position to find the cost of various building components.
				CO3: The student should be capable of finalizing the value of structures.
38	IV-II		CONSTRUCTION TECHNOLOGY AND MANAGEMENT	**CO1:** appreciate the importance of construction planning
				CO2: understand the functioning of various earth moving equipment
				CO3: know the methods of production of aggregate products and concreting and usage of machinery required for the works
				CO4: apply the gained knowledge to project management and construction techniques
39	IV-II		PRESTRESSED CONCRETE	**CO1:** Understand the different methods of prestressing
				CO2: Estimate effective prestress including the short- and long-term losses
				CO3: Analyze and design prestressed concrete beams under flexure and shear
				CO4: Understand the relevant IS Codal provisions for prestressed concrete
				CO1: Design the collection systems of solid waste of a town

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40	IV-II		SOLID AND HAZARDOUS WASTE MANAGEMENT	CO2: Design treatment of municipal solid waste and landfill
				CO3: Know the criteria for selection of landfill
				CO4: Characterize the solid waste and design a composting facility
				CO5: Know the Method of treatment and disposal of Hazardous wastes
41	IV-II		PROJECT WORK	CO1: Apply all levels of Engineering knowledge in solving the Engineering problems.
				CO2: Work together with team spirit.
				CO3: Use Civil Engineering software at least one.

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