INDIRA COLLEGE OF ENGINEERING AND MANAGEMENT

Approved By AICTE New Delhi, DTE (MS) and Affiliated to Pune University

ACADEMIC YEAR 2021-22

COURSE OUTCOMES

COURSE PATTERN 2019 (SE)				
SE(CIVIL)				
YEAR	**COURSE CODE**	**COURSE NAME**	**COURSE OUTCOME NO.**	**COURSE OUTCOMES**
	201001	Building Technology and Architectural Planning	201001.1	Identify types of building and basic requirements of building components.
			201001.2	Make use of Architectural Principles and Building byelaws for building construction
			201001.3	Plan effectively various types of Residential Building forms according to their utility,functions with reference to National Building Code.
			201001.4	Plan effectively various types of Public Buildings according to their utility functions withreference to National Building Code
			201001.5	Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects.
			201001.6	Understand different services and safety aspects
	201002	Mechanics of Structures	201002.1	Understand concept of stress-strain and determine different types of stress, strain in determinate,indeterminate homogeneous and composite structures.
			201002.2	Calculate shear force and bending moment in determinate beams for different loading conditionsand illustrate shear force and bending moment diagram.
			201002.3	Explain the concept of shear and bending stresses in beams and demonstrate shear and bending stress distribution diagram.
			201002.4	Use theory of torsion to determine the stresses in circular shaft and understand concept of Principal stresses and strains.
			201002.5	Analyze axially loaded and eccentrically loaded column.
			201002.6	Determine the slopes and deflection of determinate beams and trusses.
			201003.1	Understand the use of Fluid Properties, concept of Fluid statics, basic equation of Hydrostatics, measurement of fluid pressure, buoyancy & floatation and its application for solving practicalproblems.

SE (SEM-III,TERM-I)	201003	Fluid Mechanics	201003.2	Understand the concept of fluid kinematics with reference to Continuity equation and fluiddynamics with reference to Modified Bernoulli's equation and its application to practicalproblems of fluid flow
			201003.3	Understand the concept of Dimensional analysis using Buckingham's π theorem, Similarity &Model Laws and boundary layer theory and apply it for solving practical problems of fluid flow
			201003.4	Understand the concept of laminar and turbulent flow and flow through pipes and its application to determine major and minor losses and analyze pipe network using Hardy Cross method.
			201003.5	Understand the concept of open channel flow, uniform flow and depth-Energy relationships in open channel flow and make the use of Chezy's and Manning's formulae for uniform flowcomputation and design of most economical channel section.
			201003.6	Understand the concept of gradually varied flow in open channel and fluid flow aroundsubmerged objects, compute GVF profile and calculate drag and lift force on fully submergedbody.
	207001	Engineering Mathematics III	207001.1	Solve Higher order linear differential equations and its applications to modelling and analysing Civil engineering problems such as bending of beams, whirling of shafts and mass spring systems.
			207001.2	Solve System of linear equations using direct & iterative numerical techniques and developsolutions for ordinary differential equations using single step & multistep methods applied tohydraulics, geotechnics and structural systems
			207001.3	Apply Statistical methods like correlation, regression and probability theory in data analysis andpredictions in civil engineering.
			207001.4	Perform Vector differentiation &integration, analyze the vector fields and apply to fluid flowproblems.
			207001.5	Solve Partial differential equations such as wave equation, one and two dimensional heat flowequations.
			207009.1	Explain about the basic concepts of engineering geology, various rocks, and minerals both in laband on the fields and their inherent characteristics and their uses in civil engineeringconstructions.
			207009.2	Exploring the importance of mass wasting processes and various tectonic processes that hampers the design of civil engineering projects and its implications on environment and sustainability.

	207009	Engineering Geology	207009.3	Recognize effect of plate tectonics, structural geology and their significance and utility in civilengineering activities.
			207009.4	Incorporate the various methods of survey, to evaluate and interpret geological nature of the rocks present at the foundations of the dams, percolation tanks, tunnels and to infer site / alignment/level free from geological defects
			207009.5	Assess the Importance of geological nature of the site, precautions and treatments to improve thesite conditions for dams, reservoirs, and tunnels.
			207009.6	Explain geological hazards and importance of ground water and uses of common buildingstones.
		Audit Course I	201007.1	Describe functioning/working of different types of industries/sectors in Civil Engineering.
			201007.2	Describe drawings and documents required and used in different Civil Engineering works
			201007.3	Understand the importance of Code of Ethics to be practiced by a Civil Engineer and also understand the duties and responsibilities as a Civil Engineer
			201007.4	Understand different health and safety practices on the site
	201008	Geotechnical Engineering	201008.1	Identify and classify the soil based on the index properties and its formation process
			201008.2	Explain permeability and seepage analysis of soil by construction of flow net
			201008.3	Illustrate the effect of compaction on soil and understand the basics of stress distribution.
			201008.4	Express shear strength of soil and its measurement under various drainage conditions.
			201008.5	Evaluate the earth pressure due to backfill on retaining structures by using different theories.
			201008.6	Analysis of stability of slopes for different types of soils.
			201009.1	Define and Explain basics of plane surveying and differentiate the instruments used for it.
			201009.2	Express proficiency in handling surveying equipment and analyse the surveying data from these equipment.

SE (SEM-IV,TERM-II)	201009	Survey	201009.3	Describe different methods of surveying and find relative positions of points on the surface of earth.
			201009.4	Execute curve setting for civil engineering projects such as roads, railways etc.
			201009.5	Articulate advancements in surveying such as space based positioning systems.
			201009.6	Differentiate map and aerial photographs, also interpret aerial photographs.
	201010	Concrete Technology	201010.1	Able to select the various ingredients of concrete and its suitable proportion to achieved desiredstrength.
			201010.2	Able to check the properties of concrete in fresh and hardened state.
			201010.3	Get acquainted to concreting equipments, techniques and different types of special concrete.
			201010.4	Able to predict deteriorations in concrete and get acquainted to various repairing methods and techniques
	201011	Structural Analysis	201011.1	Understand the basic concept of static and kinematic indeterminacy and analysis ofindeterminate beams.
			201011.2	Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames.
			201011.3	Implement application of the slope deflection method to beams and portal frames
			201011.4	Analyze beams and portal frames using moment distribution method.
			201011.5	Determine response of beams and portal frames using structure approach of stiffness matrixmethod.
			201011.6	Apply the concepts of plastic analysis in the analysis of steel structures.
	201012	Project Management	201012.1	Describe project life cycle and the domains of Project Management.
			201012.2	Explainnetworking methods and their applications in planning and management
			201012.3	Categorizethe materials as per their annual usage and lsoCalculateproduction rate ofconstruction equipment
			201012.4	Demonstrates resource allocation techniques and applyit for manpower planning.
			201012.5	Understandeconomical terms and different laws associated with project management

			201012.6	Applythe methods of project selection andrecommendthe best economical project.
	201017	Project Based Learning	201017.1	Identify the community/ practical/ societal needs and convert the idea into a product/ process/ service.
			201017.2	Analyse and design the physical/ mathematical/ ICT model in order to solve identified problem/project.
			201017.3	Create, work in team and applying the solution in practical way to specific problem.
COURSE PATTERN 2019 (TE)				
TE(CIVIL)				
YEAR	**COURSE CODE**	**COURSE NAME**	**COURSE OUTCOME NO.**	**COURSE OUTCOMES**
	301001	Hydrology and Water Resource Engineering	301001.1	Understand government organizations, apply & analyzeprecipitation & its abstractions.
			301001.2	Understand, apply & analyzerunoff, runoff hydrographs and gauging of streams.
			301001.3	Understand, apply & analyzefloods, hydrologic routing & Q-GIS software in hydrology.
			301001.4	Understand, apply & analyzereservoir planning, capacity of reservoir & reservoir economics.
			301001.5	Understand water logging & water management, apply & analyze ground water hydrology
			301001.6	Understand irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement.
	301002	Water Supply Engineering	301002.1	Define identify, describe reliabilityof water sources, estimate water requirement for various sectors
			301002.2	Ascertain and interpret water treatment method required to be adopted with respect tosource and raw water characteristics
			301002.3	Design variouscomponents of water treatment plant and distribution system.
			301002.4	Understand and compare contemporary issues and advanced treatment operations and process available in the market, including packaged water treatment plants.
			301002.5	Design elevated service reservoir capacity and understand the rainwater harvesting.

			301002.6	Understand the requirement of water treatment plant for infrastructure and Government scheme.
TE (SEM-V,TERM-I)	301003	Design of Steel Structures	301003.1	Demonstrate knowledge about the types of steel structures, steel code provisionsand design of the adequate steel section subjected to tensile force.
			301003.2	Determine the adequate steel section subjected to compression load and design of built up columns along with lacing and battening.
			301003.3	Design eccentrically loaded column for section strength and column bases for axial load and uniaxial bending.
			301003.4	Design oflaterally restrainedand unrestrainedbeam with and without flange plate using rolled steel section.
			301003.5	Analyzethe industrial truss for dead, live and wind loadand design of gantry girderfor moving load.
			301003.6	Understand the role of components of welded plate girder and design cross section for welded plate girder including stiffeners and its connections.
	301004	Engineering Economics and Financial Management	301004.1	Understand basics of construction economics.
			301004.2	Develop an understanding of financial management in civil engineering projects.
			301004.3	Prepare and analyze the contract account.
			301004.4	Decide on right source of fund for construction projects.
			301004.5	Understand working capital and its estimation for civil engineering projects.
			301004.6	Illustrate the importance of tax planning & understand role of financial regulatory bodies
	301005 c	Elective I: Construction Management	301005 c.1	Understand the overview of construction sector.
			301005c.2	Illustrate construction scheduling, work study and work measurement.
			301005 c.3	Acquaint various labor laws and financial aspects of construction projects.
			301005c.4	Explain elements of risk management and value engineering.
			301005 c.5	tate material and human resource management techniques in construction.
			301005c.6	Understand basics of artificial intelligence techniques in civil engineering.
	301011	Audit Course : Professional Ethics and Etiquettes/Sustainable Energy Systems	301011.1	Understandthebasicperceptionofprofession,professionalethics,various moralissuesandusesofethical theories
			301011.2	Understandvarioussocialissues,industrialstandards,codeoethicsandroleofprofessional ethicsin engineeringfield.
			301011.3	Follow ethics as an engineering professional and adopt good standards andnorms ofengineeringpractice.
			301011.4	Applyethicalprinciplestoresolvesituationsthatariseintheirprofessionallives

COURSE PATTERN 2019 (TE)				
TE(CIVIL)				
TE (SEM-VI,TERM-II)	301012	Waste Water Engineering	301012.1	Recall sanitation infrastructure, quantification and characterization of wastewater, natural purification of streams
			301012.2	Design preliminary and primary unit operations in waste water treatment plant
			301012.3	Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process
			301012.4	Understand and design suspended and attached growth wastewater treatment systems
			301012.5	Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment systems
			301012.6	Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment
	301013	Design of Reinforced Concrete Structures	301013.1	Apply relevant IS provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel & concrete.
			301013.2	Recognize mode of failure as per LSM and evaluate moment of resistance for singly, doubly rectangular, and flanged sections.
			301013.3	Design & detailing of rectangular one way and two-way slab with different boundary conditions
			301013.4	Design & detailing of dog legged and open well staircase
			301013.5	Design & detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion
			301013.6	Design & detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings.
	301014	Remote Sensing and GIS	301014.1	Articulate fundamentals and principles of RS techniques.
			301014.2	Demonstrate the knowledge of remote sensing and sensor characteristics
			301014.3	Distinguish working of various spaces-based positioning systems.
			301014.4	Analyze the RS data and image processing to utilize in civil engineering
			301014.5	Explain fundamentals and applications of RS and GIS
			301014.6	Acquire skills of data processing and its applications using GIS
	301015	Elective II Architecture and	301015.1	Apply the principles of architectural planning and landscaping for improving quality of life
			301015.2	Understand the confronting issues of the area and apply the acts.

		Town Planning	301015.3	Evaluate and defend the proposals.
			301015.4	Appraise the existing condition and to develop the area for betterment.
	301021B	Audit Course- II	301021B.1	Analyze the safety problem with its solution
COURSE PATTERN 2015 (BE)				
BE(CIVIL)				
YEAR	**COURSE CODE**	**COURSE NAME**	**COURSE OUTCOME NO.**	**COURSE OUTCOMES**
BE(SEM-VII,TERM-I)	401001	Environmental Engineering – II	401001	Able to characterize sewage and design a sewage collection system.
			401001	Able to describe stream sanitation and design of primary treatment of sewage
			401001	Able to analyze and design secondary (biological) sewage treatment units for STP.
			401001	Able to analyze and design low cost sewage treatment methods
			401001.1	Able to analyze and design anaerobic treatment units
			401001.1	Able to explain different industrial waste water treatment methods
	401002	Transportation Engineering	401 002.1	Able to explain necessity of highway planning,classification of roads and to determine length of different category roads.
			401 002.2	Able to describe traffic characteristics and trafic studies.
			401 002.3	Able to design geometric elements and structural design of rigid and flexible pavement.
			401 002.4	Able to perform test on aggregate, bitumen as per IRC standards and explain the construction procedure of varius types of roads.
			401 002.5	Able to explain airport planning layout, orientation and to calculate basic runway length.
			401 002.6	Able to calculate hydroulic parameters related to bridge,explain types of bridge and their components.
	401003	Structural Design III	401003	Able to describe various systems of prestressing and analyze member strength
			401003	Able to design Prestressed member for flexure and shear
			401003	Able to do load calculations and load transfer phenomenon of structures
			401003	Able to analyze the frame structure for different load combinations
			401003	Able to design and detailing of floor beam in a frame
			401003	Able to design and detailing of different elements of special structures like retaining walls, liquid retaining structures, combined footings and their behavior under load

	401 004 (ELE-I)	Advanced Concrete Technology	401 004.1	Able to describe types of cement and aggregate to be used as a concrete and explain properties of concrete.
			401 004.2	Able to explain special types of concrete and their properties.
			401 004.3	Able to design special types of concrete mix of specified strength and able to describe various nondestructive test.
			401 004.4	Able to know properities of concrete fiber like GFRC, SFRC and SIFCON.
			401 004.5	Able to describe ferrocement analysis and design of prefabricated concrete structural element.
	401 004 (ELE-I)	Systems Approach in Civil Engineering	401 004.1	Able to formulate civil engineering problems in linear programing.
			401 004.2	Able to use concept of opration research for various engineering problems.
			401 004.3	Able to apply dynamic programming for civil engineering.
			401 004.4	Able to use nonlinear programing techniques for solving engineering problems.
			401 004.5	Able to apply game theroy .
	401 005 (ELE-II)	TQM & MIS in Civil Engineering	401 005.1	Explain the concept of quality in construction along with various terms of evolution.
			401 005.2	Application of six sigma in construction industry.
			401 005.3	Understand concept of quality manual and quality circle.
			401 005.4	Application of 5 S technique and zero defect
			401 005.5	Explain importance of MIS in construction
	401007	Dams and Hydraulics Structures	401007	Able to analyses and ,design gravity dam ,earthen dam and check its stability
			401007	Able to explain generalized information regarding dams
			401007	Able to design hydraulic structures
			401007	Able to explain river training methods and design of guide bund
			401007.1	Able to explain hydropower engineering with respect to its components and functions
	401 008	Quantity Surveying, Contracts and Tenders	401 008.1	Able to describe types of estimates and importance of approximate estimates.
			401 008.2	Able to prepare detailed estimate for Civil Engg. Structures.
			401 008.3	Able to choose suitable method of valuation of property and implement it.
			401 008.4	Able to draft suitable specifications to meet expectations of client and prepare rate analysis.
			401 008.5	Able to explain execution of works in PWD and Tendering.
			401 008.6	Able to illustate meaning, validity, conditions and laws of contract.
			401 009.1	Understand meteorological aspects governing the air pollution.

BE (SEM-VIII,TERM-II)	401 009 (ELE-III)	Air Pollution and control	401 009.2	Comprehend sampling and analysis of ambient air.
			401009	Describe and understand causes, sources, effects, measurement methods and control measures of indoor air pollution.
			401 009.4	Understand various processes and equipments used for control of air pollution
			401010	Understand economics of air pollution control and legislations used for air pollution control.
			401 009.6	Comprehend methodology of environmental impact assessment and management and know environmental impacts of various industries.
	401 010 (ELE-IV)	Construction Management	401 010.1	Able to understand concept of construction management by considering , risk management, material management & Human resource management.
			401 010.2	Able to apply the basics of construction scheduling, work study & work measurement.
			401 010.3	Able to understand Labour laws and financial aspects of construction projects Labour laws
			401 010.4	Able to understand the basics of Artificial Intelligence Techniques in construction management.
	401 006	Project	401 006.1	convert an open ended problems statement into a statement of proposed work.
			401 006.2	Decompose problem/task in to subtask and establish a methodology and process by which progress may be evaluated.
			401 006.3	select and apply appropriate methods/models or mathematical simulation of the real world and analyze the data to provide information for decisions.
			401 006.4	perform feasibility analysis and evalutes quality of solutions to select the best one.
			401 006.5	Produce usable documents of record regarding the design process.
			401 006.6	Colaborate with team members to achieve a common goal.
			401 006.7	Enhance awareness and critical self examination of ones own values, and to appriciate the relavance of personal values in the business/work place and develop skills which recignizes and resolves ethical issues while working.