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DEPARTMENT OF CIVIL ENGINEERING
1.1.1 -CO-PO-PSO MAPPING

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Sem	Course Code	Title of the Course	COs	POS									
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
SEM 1	19147S11	Communicative English	Read articles of a general kind in magazines and newspapers.			✓							
			Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.			✓				✓			
			Comprehend conversations and short talks delivered in English			✓							
			Write short essays of a general kind and personal letters and emails in English		✓								
			Read articles of a general kind in magazines and newspapers.								✓		
	19148S12	Engineering Mathematics – I	Use both the limit definition and rules of differentiation to differentiate functions.	✓									✓
			Apply differentiation to solve maxima and minima problems.	✓									
			Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.	✓									

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			Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.	✓										
			Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.	✓										
			Determine convergence/divergence of improper integrals and evaluate convergent improper integrals.	✓										
			Apply various techniques in solving differential equations.	✓										✓
	19149S13	Engineering Physics	The students will gain knowledge on the basics of properties of matter and its applications,	✓			✓	✓						
			The students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,	✓										
			The students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,		✓									
			The students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes, and	✓										
			The students will understand the basics of crystals, their structures and different crystal growth techniques.			✓	✓							✓

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	19149S14	Engineering Chemistry	The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.	✓	✓		✓	✓	✓				
	19150S15	Engineering Graphics	Draw free hand sketching of basic geometrical shapes and multiple views of objects.	✓	✓		✓	✓	✓		✓	✓	
			Draw orthographic projections of lines and planes	✓									
			Draw orthographic projections of solids	✓									
			Draw development of the surfaces of objects	✓									
	19154S16	Problem Solving and Python Programming	Develop algorithmic solutions to simple computational problems	✓			✓	✓	✓				
			Read, write, execute by hand simple Python programs.										
			Structure simple Python programs for solving problems.										
			Decompose a Python program into functions.										
			Represent compound data using Python lists, tuples, and dictionaries.					✓					✓
			Read and write data from/to files in Python Programs.										
	19150L17	Problem Solving and Python Programming Laboratory	Develop algorithmic solutions to simple computational problems	✓			✓	✓	✓				
			Read, write, execute by hand simple Python	✓									

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			programs.											
			Structure simple Python programs for solving problems.	✓										✓
			Decompose a Python program into functions.	✓										
			Represent compound data using Python lists, tuples, and dictionaries.	✓										
			Read and write data from/to files in Python Programs.	✓										✓
	19149L18	Physics and Chemistry Laboratory	To determine various moduli of elasticity and also various thermal and optical properties of materials.	✓			✓	✓	✓					
			To determine the velocity of ultrasonic waves, band gap determination and viscosity of liquids.			✓								
			To analyse the quality of water samples with respect to their acidity, alkalinity, hardness and DO.					✓						
			To determine the amount of metal ions through volumetric and spectroscopic techniques					✓						
			To determine the molecular weight of polymers by viscometric method.					✓						
			To quantitatively analyse the impurities in solution by electroanalytical techniques				✓							
			To design and analyse the kinetics of reactions and corrosion of metals			✓								
	191VEA19	Value Education	Developing respect for the dignity of individual and society.	✓										

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			Inculcation of a spirit of patriotism and national integration.											
			Developing a democratic way of thinking and living.											
SEM 2	19147S21	Technical English	Read technical texts and write area- specific texts effortlessly.			✓				✓				
			Listen and comprehend lectures and talks in their area of specialisation successfully.			✓								
			Speak appropriately and effectively in varied formal and informal contexts.			✓								✓
			Write reports and winning job applications.							✓				
	19148S22A	Engineering Mathematics – II	Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.	✓										
			Gradient, divergence and curl of a vector point function and related identities.											✓
			Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.	✓										
			Analytic functions, conformal mapping and complex integration.		✓									
			Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant					✓						

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			coefficients.											
	19149S23D	Physics for Civil Engineering	The students will have knowledge on the thermal performance of buildings,	✓	✓	✓	✓	✓						
			the students will acquire knowledge on the acoustic properties of buildings,											
			the students will get knowledge on various lighting designs for buildings,		✓									
			the students will gain knowledge on the properties and performance of engineering materials, and			✓								
			The students will understand the hazards of buildings.	✓				✓						
	19153S24A	Environmental Science and Engineering	Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.						✓		✓			
			Public awareness of environmental is at infant stage.											
			Ignorance and incomplete knowledge has lead to misconceptions						✓		✓			
			Development and improvement in std. of living has lead to serious environmental disaster											
	19149S25E	Basic Electrical and Electronics Engineering	Ability to identify the electrical components and explain the characteristics of electrical machines.	✓										
			ability to identify electronics components and understand the characteristics											

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	19154S26D	Engineering Mechanics	illustrate the vectorial and scalar representation of forces and moments	✓	✓		✓	✓	✓		✓		
			analyse the rigid body in equilibrium		✓								
			evaluate the properties of surfaces and solids	✓				✓					
			calculate dynamic forces exerted in rigid body				✓				✓	✓	
			determine the friction and the effects by the laws of friction										
	19154L27	Engineering Practices Laboratory	Fabricate carpentry components and pipe connections including plumbing works.						✓				
			Use welding equipments to join the structures.										
			Carry out the basic machining operations					✓					
			Make the models using sheet metal works					✓	✓				
			Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundry and fittings	✓									
			Carry out basic home electrical works and appliances										
			Measure the electrical quantities										
			Elaborate on the components, gates, soldering practices.										
	19155L28E	Computer Aided Building Drawing	The students will be able to draft the plan, elevation and sectional views of the buildings, industrial structures, and framed buildings using computer software's.	✓			✓						
	191ICA29	Fundamentals of Indian constitution and Economy	Describe the salient features of the constitution of India	✓									

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			interpret, integrate and critically analyse the political economy of Indian international relations.										
SEM 3	19148C31C	Transforms and Partial Differential Equations	Understand how to solve the given standard partial differential equations.	✓									
			Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.	✓									
			Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.	✓									
			Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.	✓									
			Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems	✓									
	19155C32	Engineering Geology	Will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.	✓	✓		✓		✓			✓	
			Will get basics knowledge on properties of minerals.										
			Gain knowledge about types of rocks, their distribution and uses.										
			Will understand the methods of study on geological structure.										✓

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			Will understand the application of geological investigation in projects such as dams, tunnels, bridges, roads, airport and harbour										
	19155C33	Construction Materials	Compare the properties of most common and advanced building materials.	✓			✓		✓			✓	
			understand the typical and potential applications of lime, cement and aggregates				✓		✓			✓	
			Know the production of concrete and also the method of placing and making of concrete elements.	✓	✓								✓
			understand the applications of timbers and other materials										
			Understand the importance of modern material for construction.										
	19155C34	Strength of Materials I	Understand the concepts of stress and strain, principal stresses and principal planes.	✓	✓	✓	✓					✓	
			Determine Shear force and bending moment in beams and understand concept of theory of simple bending.		✓	✓							
			Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.	✓			✓					✓	
			Apply basic equation of torsion in design of circular shafts and helical springs, .										
			Analyze the pin jointed plane and space trusses										
	19155C35	Fluid Mechanics	Get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.	✓		✓			✓			✓	
			Understand and solve the problems related to equation of motion.			✓							

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			Gain knowledge about dimensional and model analysis.	✓					✓			✓	
			Learn types of flow and losses of flow in pipes.										
			Understand and solve the boundary layer problems.										
	19155C36	Surveying	The use of various surveying instruments and mapping	✓	✓		✓		✓			✓	
			Measuring Horizontal angle and vertical angle using different instruments						✓			✓	
			Methods of Levelling and setting Levels with different instruments										✓
			Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth	✓	✓		✓						
			Concept and principle of modern surveying.										
	19155L37	Surveying Laboratory	Students completing this course would have acquired practical knowledge on handling basic survey instruments including Theodolite, Tacheometry, Total Station and GPS and have adequate knowledge to carryout Triangulation and Astronomical surveying including general field marking for various engineering projects and Location of site etc.	✓	✓		✓		✓			✓	
	19155L38	Construction Materials Laboratory	the students will have the required knowledge in the area of testing of construction materials and components of construction elements experimentally.	✓	✓				✓				
	19155L39	Interpersonal Skills / Listening and Speaking	Listen and respond appropriately.	✓									✓
			Participate in group discussions	✓									
			Make effective presentations	✓									

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			Participate confidently and appropriately in conversations both formal and informal	✓									✓
SEM 4	19148S41C	Numerical Methods	Understand the basic concepts and techniques of solving algebraic and transcendental equations.	✓									
			Appreciate the numerical techniques of interpolation and error approximations in various intervals in real life situations.	✓									
			Apply the numerical techniques of differentiation and integration for engineering problems.	✓									
			Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.	✓									
			Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.	✓									
	19155C42	Construction Techniques and Practices	know the different construction techniques and structural systems	✓			✓		✓		✓	✓	
			Understand various techniques and practices on masonry construction, flooring, and roofing.										
			Plan the requirements for substructure construction.				✓		✓		✓	✓	
			Know the methods and techniques involved in the construction of various types of super structures	✓									
			Select, maintain and operate hand and power tools and equipment used in the building construction sites.						✓		✓		

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	19155C43	Strength of Materials II	Determine the strain energy and compute the deflection of determinate beams, frames and trusses using energy principles.	✓	✓	✓	✓	✓					✓
			Analyze propped cantilever, fixed beams and continuous beams using theorem of three moment equation for external loadings and support settlements.	✓	✓	✓							
			find the load carrying capacity of columns and stresses induced in columns and cylinders										
			Determine principal stresses and planes for an element in three dimensional state of stress and study various theories of failure				✓	✓					
			Determine the stresses due to Unsymmetrical bending of beams, locate the shear center, and find the stresses in curved beams.										✓
	19155C44	Applied Hydraulic Engineering	Apply their knowledge of fluid mechanics in addressing problems in open channels.	✓	✓		✓			✓	✓	✓	✓
			Able to identify a effective section for flow in different cross sections.							✓	✓		
			To solve problems in uniform, gradually and rapidly varied flows in steady state conditions.	✓	✓								
			Understand the principles, working and application of turbines.				✓					✓	✓
			Understand the principles, working and application of pumps.										
	19155C45	Concrete Technology	The various requirements of cement, aggregates and water for making concrete	✓	✓		✓			✓	✓	✓	✓
			The effect of admixtures on properties of concrete				✓						✓
			The concept and procedure of mix design as per IS method	✓	✓					✓	✓		

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			The properties of concrete at fresh and hardened state									✓	
			The importance and application of special concretes.										
	19155C46	Soil Mechanics	Classify the soil and assess the engineering properties, based on index properties.	✓	✓					✓	✓	✓	✓
			Understand the stress concepts in soils							✓	✓		
			Understand and identify the settlement in soils.	✓	✓							✓	
			Determine the shear strength of soil										✓
			Analyze both finite and infinite slopes.										
	19155L47	Strength of Materials Lab	The students will have the required knowledge in the area of testing of materials and components of structural elements experimentally.	✓	✓	✓	✓	✓					✓
	19155L48	Hydraulic Engineering Lab	The students will be able to measure flow in pipes and determine frictional losses.	✓		✓		✓	✓	✓	✓	✓	✓
			The students will be able to develop characteristics of pumps and turbines.					✓	✓		✓	✓	
	19155L49	Advanced Reading & Writing	Write different types of essays.	✓									
			Write winning job applications.										
			Read and evaluate texts critically.	✓			✓						
	19155CRS	Research Led Seminar	Exposure to various research domains	✓									
			Acquaintance with languages of research										
			Development of research aptitude										

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SEM 5	19155C51	Design of Reinforced Cement Concrete Elements	Understand the various design methodologies for the design of RC elements.	✓	✓	✓	✓	✓					✓
			Know the analysis and design of flanged beams by limit state method and sign of beams for shear, bond and torsion.		✓	✓							✓
			design the various types of slabs and staircase by limit state method.	✓	✓								
			Design columns for axial, uniaxial and biaxial eccentric loadings.				✓	✓					
			Design of footing by limit state method.										
	19155C52	Structural Analysis I	Analyze continuous beams, pin-jointed indeterminate plane frames and rigid plane frames by strain energy method	✓	✓	✓	✓	✓				✓	✓
			Analyze the continuous beams and rigid frames by slope defection method.				✓					✓	✓
			Understand the concept of moment distribution and analysis of continuous beams and rigid frames with and without sway.	✓	✓								
			Analyze the indeterminate pin jointed plane frames continuous beams and rigid frames using matrix flexibility method.		✓	✓						✓	✓
			Understand the concept of matrix stiffness method and analysis of continuous beams, pin jointed trusses and rigid plane frames.			✓	✓	✓	✓			✓	
	19155C53	Water Supply Engineering	an insight into the structure of drinking water supply systems, including water transport, treatment and distribution					✓					
			the knowledge in various unit operations and processes in water treatment										

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			an ability to design the various functional units in water treatment						✓			✓	
			an understanding of water quality criteria and standards, and their relation to public health			✓	✓					✓	
			the ability to design and evaluate water supply project alternatives on basis of chosen criteria							✓			
	19155E55A	Digital Cadastre	Identify the legal and technical requirements for making a cadastral survey							✓			
			Explain the preparation of the corresponding documentation in the form of plans and reports					✓					
			Practically perform a cadastral survey		✓								
			To perform survey computations with programmable calculators and computer software and to produce cadastral survey documents using computer aided drafting						✓				
	19155E55B	Advanced Surveying	The students will get a diverse knowledge of surveying practices applied for real life problems.	✓		✓							
			The students will learn to work with various surveying equipments, like, Theodolite, Total station, etc. in order to apply the theoretical knowledge to carry out practical field work.		✓								
			The knowledge of limits of accuracy will be obtained by making measurements with various surveying equipment employed in practice.	✓									

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	19155E55C	Geographic Information System	Have basic idea about the fundamentals of GIS.	✓									
			Understand the types of data models.				✓					✓	✓
			Get knowledge about data input and topology.	✓	✓								
			Gain knowledge on data quality and standards.		✓	✓						✓	✓
			Understand data management functions and data output			✓	✓	✓	✓			✓	
	19155E55D	Geo informatics Applications For Civil Engineers	To understand these basic concepts in context of transportation and transportation networks.					✓					
			To learn the data needs and database development for doing transportation analysis in GIS environment.				✓					✓	✓
			To understand the concepts of transportation networks and algorithms and how they are incorporated into GIS.	✓	✓								
	19155E55E	Failure Analysis of Structures	To impart knowledge about various methods involved in the analysis of indeterminate structures.		✓	✓						✓	✓
			To apply these methods for analyzing the indeterminate structures to evaluate the response of structures			✓	✓	✓	✓			✓	
			To enable the student get a feeling of how real-life structures behave					✓					
	19155E55F	A seismic Design of	Discuss the equations of motion for undamped free vibrations for SDOF and 2DOF systems				✓					✓	✓
			Explain the engineering seismology including causes and effects of earthquakes	✓	✓								
			Analyse amulti-storeyedstructure using Equivalent Static Method and Response Spectrum methods		✓	✓						✓	✓

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		Structures											
	19155E55G	Industrial Wastewater Treatment	Identify the characteristics of industrial waste waters			✓	✓	✓	✓			✓	
			Describe pollution effects of disposal of industrial effluent					✓					
			Identify and design treatment options for industrial waste water				✓					✓	✓
			Formulate environmental management plan	✓	✓								
	19155C56	Foundation Engineering	Understand the site investigation, methods and sampling.		✓	✓						✓	✓
			Get knowledge on bearing capacity and testing methods.			✓	✓	✓	✓			✓	
			Design shallow footings.					✓					
			Determine the load carrying capacity, settlement of pile foundation.						✓			✓	
			Determine the earth pressure on retaining walls and analysis for stability.			✓	✓					✓	
	19155L57	Soil Mechanics Lab	Students are able to conduct tests to determine both the index and engineering properties of soils and to characterize the soil based on their properties.			✓	✓					✓	
	19155L58	Water and Waste Water Analysis Lab	Quantify the pollutant concentration in water and wastewater							✓			
			Suggest the type of treatment required and amount of dosage required for the treatment							✓			
			Examine the conditions for the growth of micro-organisms		✓		✓						✓
	19155L59	Survey Camp	Interpret the contours			✓	✓					✓	

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			Work in a teamwork							✓			✓
			Mark a road alignment of (L-section, Cross-section) a given gradient connecting any two stations on the map				✓	✓					✓
			Calculate the earth work			✓							
	19155CRM	Research Methodology	Prepare a topographical plan of a given area Ability to carry out independent literature survey corresponding to the specific publication type and assess basic experimental as well as conceptual set up.	✓									
SEM 6	19155C61	Design of Steel Structural Elements	Understand the concepts of various design philosophies	✓	✓	✓	✓	✓					✓
			Design common bolted and welded connections for steel structures			✓	✓						
			Design tension members and understand the effect of shear lag.		✓								✓
			Understand the design concept of axially loaded columns and column base connections.										✓
			Understand specific problems related to the design of laterally restrained and unrestrained steel beams.	✓									
	19155C62	Structural Analysis II	Draw influence lines for statically determinate structures and calculate critical stress resultants.	✓	✓	✓	✓	✓				✓	✓
			Understand Muller Breslau principle and draw the influence lines for statically indeterminate beams.			✓	✓					✓	

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			Analyse of three hinged, two hinged and fixed arches.					✓					✓
			Analyse the suspension bridges with stiffening girders	✓	✓								
			Understand the concept of Plastic analysis and the method of analyzing beams and rigid frames.						✓			✓	
	19155C63	Irrigation Engineering	Have knowledge and skills on crop water requirements.	✓		✓	✓					✓	
			Understand the methods and management of irrigation.				✓						
			Gain knowledge on types of Impounding structures	✓	✓								
			Understand methods of irrigation including canal irrigation.							✓			✓
			Get knowledge on water management on optimization of water use.				✓	✓					✓
	19155C64	Highway Engineering	Get knowledge on planning and aligning of highway.		✓	✓	✓	✓			✓		
			Geometric design of highways				✓						
			Design flexible and rigid pavements.								✓		
			Gain knowledge on Highway construction materials, properties, testing methods					✓					
			Understand the concept of pavement management system, evaluation of distress and maintenance of pavements.		✓	✓							
	19155C65	Waste Water Engineering	An ability to estimate sewage generation and design sewer system including sewage pumping stations	✓	✓		✓						
			The required understanding on the characteristics and composition of sewage, self-purification of streams				✓						

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			An ability to perform basic design of the unit operations and processes that are used in sewage treatment	✓	✓									
			Understand the standard methods for disposal of sewage.				✓							
	19155E66A	Ground Improvement Techniques	Gain knowledge on methods and selection of ground improvement techniques.	✓			✓			✓				
			Understand dewatering techniques and design for simple cases.	✓										
			Get knowledge on insitu treatment of cohesionless and cohesive soils.							✓				
			Understand the concept of earth renforcement and design of reinforced earth.						✓					
			Get to know types of grouts and grouting technique.					✓						
	19155E66B	Introduction to soil dynamics and machine foundation	Understand the theory and measurement of vibration.	✓						✓				
			Understand the concept of wave propagation in infinite medium and due to machine foundation.	✓			✓		✓					
			Get knowledge on dynamic properties of soils and laboratory and field testing.											
			Design of foundation for different types of machines						✓					
			Understand liquefaction, motion isolation and vibration control.					✓						
	19155E66C	Rock Engineering	Classify the rocks, study the index properties of rock systems.	✓										
			Understand the modes of rock failure, stares-strain characteristics, failure criteria.	✓		✓	✓							

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			Estimate the stresses in rocks.						✓			✓	
			Apply rock mechanics in engineering.			✓	✓					✓	
			Get knowledge on rock stabilization.					✓					
	19155E66D	Urban planning and development	Describe basic issues in urban planning	✓									
			Formulate plans for urban and rural development and	✓		✓	✓						
			Plan and analyse socio economic aspects of urban and rural planning			✓	✓		✓				
			Design of urban development projects.						✓			✓	
			Manage urban development projects.			✓	✓					✓	
	19155E66E	Air pollution and control engineering	an understanding of the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management	✓					✓				
			ability to identify, formulate and solve air and noise pollution problems	✓		✓							✓
			ability to design stacks and particulate air pollution control devices to meet applicable standards.			✓	✓		✓				
			Ability to select control equipments.						✓			✓	
			Ability to ensure quality, control and preventive measures.			✓	✓					✓	
	19155E66F	Stability of Structures	The students will be able to analyze structures with linear and nonlinear behavior.	✓				✓					
			To impart the students, with the knowledge of Stability of continuous systems.			✓							
			To impart the students, with the knowledge of Combined axialflexural-torsion buckling.					✓			✓		

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	19155E66G	Industrial Structures	Discuss the planning and functional requirements of Industrial structures.	✓										
			Discover the need to learn about the design concepts, and constructional aspects of Industrial structures				✓							
			Analyse and evaluate the importance of various construction materials for Industrial constructions							✓				
	19155L67	Highway Engineering Laboratory	Student knows the techniques to characterize various pavement materials through relevant tests.	✓			✓				✓			
	19155L68	Irrigation and Environmental Engineering Drawing	The students after completing this course will be able to design and draw various units of Municipal water treatment plants and sewage treatment plants.	✓	✓		✓							
	19155L69	Professional communication	Make effective presentations	✓			✓							
			Participate confidently in Group Discussions.											
			Attend job interviews and be successful in them.		✓			✓						
			Develop adequate Soft Skills required for the workplace						✓			✓		
	19155CBR	Participation in Bounded Research	Hands on exposure to problem solving tools in contemporary research	✓		✓	✓					✓		
			Evolution of research intuitiveness and orientation									✓		
			Familiarity with cutting edge research trends		✓			✓						
	19155C71	Estimation , Costing &	Estimate the quantities for buildings,	✓	✓				✓	✓				

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SEM 7		Valuation Engineering	Rate Analysis for all Building works, canals, and Roads and Cost Estimate.											
			Understand types of specifications, principles for report preparation, tender notices types.	✓	✓									
			Gain knowledge on types of contracts						✓	✓				
			Evaluate valuation for building and land.						✓			✓		
	19155C72	Railways, Airports, Docks And Harbour Engineering	Understand the methods of route alignment and design elements in Railway Planning and Constructions.			✓	✓					✓		
			Understand the Construction techniques and Maintenance of Track laying and Railway stations.		✓					✓		✓		
			Gain an insight on the planning and site selection of Airport Planning and design.											
			Analyze and design the elements for orientation of runways and passenger facility systems.				✓			✓				
			Understand the various features in Harbours and Ports, their construction, coastal protection works and coastal Regulations to be adopted.									✓		
	19155C73	Structural Design and drawing	Design and draw reinforced concrete Cantilever and Counterfort Retaining Walls	✓	✓	✓	✓		✓					
			Design and draw flat slab as per code provisions			✓	✓							
			Design and draw reinforced concrete and steel bridges	✓	✓									
			Design and draw reinforced concrete and steel water tanks		✓	✓	✓	✓		✓				

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		Design and detail the various steel trusses and cantry girders						✓					
19155E75A	Transport and Environment	Understood the impact of Transportation projects on the environment.	✓	✓	✓	✓		✓					
		Get knowledge on methods of impact analysis and their applications.		✓									
		Understand environmental Laws on Transportation Projects and the mitigative measures adopted in the planning stage.					✓		✓				
		Predict and assess the impact of transportation projects.				✓		✓					
19155E75B	Design of Prestressed Concrete Structures	Understand the behaviour of prestressed concrete members and able to analyze the prestressed concrete beams.		✓		✓							
		Design the prestressed concrete members for flexure and shear as per the relevant design code (IS 1343).					✓		✓				
		Analyze for deflection of prestressed concrete members and design the anchorage zone.				✓		✓					
		Analyze and design of composite beams and continuous beams.		✓		✓							
		Design of prestressed concrete structures - sleepers, Tanks, pipes and poles.							✓		✓		
19155E75C	Construction planning and scheduling	Understand basic concepts of construction planing.	✓	✓		✓							
		Schedule the construction activities.				✓							

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		Forecast and control the cost in a construction.	✓	✓		✓						
		Understand the quality control and safety during construction.		✓		✓			✓		✓	
19155E75D	Municipal solid waste management	understanding of the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management.	✓			✓			✓			
		Reduction, reuse and recycling of waste.		✓		✓			✓		✓	
		ability to plan and design systems for storage, collection, transport, processing and disposal of municipal solid waste.							✓			✓
		knowledge on the issues on solid waste management from an integrated and holistic perspective, as well as in the local and international context.		✓		✓			✓		✓	
		Design and operation of sanitary landfill.		✓		✓			✓		✓	
		Determine the causes of distress in rigid and flexible pavements.							✓		✓	
		Understand stailisation of pavements, testing and field control.				✓						
19155E75E	Pavement Engineering	Get knowledge about types of rigid and flexible pavements.		✓		✓			✓		✓	
		Able to design of rigid pavements.							✓			
		Able to design of flexible pavements.							✓			
		Determine the causes of distress in rigid and flexible pavements.	✓		✓					✓		
19155E75F	Environmental and social impact assessment	carry out scoping and screening of developmental projects for environmental and social assessments		✓		✓			✓		✓	

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		explain different methodologies for environmental impact prediction and assessment							✓		✓	
		plan environmental impact assessments and environmental management plans		✓		✓						
		evaluate environmental impact assessment reports							✓			
19155E75G	Water Recourses System Engineering	Various components of hydrologic cycle that affect the movement of water in the earth	✓			✓						
		The basic requirements of irrigation and various irrigation techniques, requirements of the crops			✓	✓					✓	
		Apply math, science, and technology in the field of water resource Engineering.		✓	✓	✓						
19155L76	Creative and Innovation project (activity based – subject related)	On completion of the design project students will have a better experience in designing various design problems related to Civil Engineering.		✓	✓	✓						
19155L77	Industrial Training (4weeks During VI Semester – Summer)	The intricacies of implementation textbook knowledge into practice.							✓	✓		
		The concepts of developments and implementation of new techniques.							✓			
19155L78	Technical Seminar	To effectively communicate by making an oral presentation.		✓		✓			✓			
		To study research papers for understanding of anew field, in the absence of a text book, to summarize and review them.		✓		✓			✓			
19155CSR	Design / Socio - Technical Project (Scaffolded Research)	Sensitization of social needs for innovation.		✓	✓	✓						
		Team work towards interdisciplinary synchronous research strategy.							✓	✓		

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		Development of critical thinking and synergistic research approach							✓				
19155E81A	Coastal Engineering	Understand coastal engineering aspects of harbors methods to improve navigation.		✓		✓			✓				
		Understand the wave properties and analysis of wave.		✓		✓			✓				
		Understand the concepts of sediment transport.					✓		✓				
		Design of shore defense structures.					✓		✓				
		Gain knowledge in modeling in coastal engineering.					✓		✓				
19155E81B	Integrated water resources management	Understand objectives, principles and evolution of integrated water resources management.											
		Have an idea of contextualizing IWRM.					✓		✓				
		Gain knowledge in emerging issues in water management, flood, drought, pollution and poverty.					✓						
		Understand the water resources development in India and wastewater reuse.					✓						
		Gain knowledge on integrated development of water management.				✓		✓					
19155E81C	Groundwater engineering	Understand aquifer properties and its dynamics.	✓	✓		✓		✓					
		Get an exposure towards well design and practical problems.				✓		✓					
		Develop a model for groundwater management.											

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			Students will be able to understand the importance of artificial recharge and groundwater quality concepts.	✓			✓		✓				
			Gain knowledge on conservation of groundwater.	✓			✓						
	19155E81D	Hydrology and water resources engineering	An understanding of the key drivers on water resources, hydrological processes and their integrated behaviour in catchments.				✓						
			Ability to construct and apply a range of hydrological models to surface water and groundwater problems including Hydrograph, Flood/Drought management, artificial recharge.			✓		✓					
			Ability to conduct Spatial analysis of rainfall data and design water storage reservoirs.			✓		✓					
			Understand the concept and methods of ground water management.			✓		✓					
	19155E81E	Computer aided design of structures	Understand the fundamentals of finite element analysis and be able use software for modeling, analysis and design of structures.										
						✓		✓					
			Understand the concepts of Optimization techniques and its practical applications to structural engineering.			✓							
			Acquire the knowledge in Artificial Intelligence and Knowledge based expert systems.			✓							
	\	Total Station and GPS Surveying	To learn to work as team, ethics and prepare technical reports of surveying.				✓		✓				
			To relate theoretical knowledge of surveying to resolve real field problems.	✓	✓		✓		✓				

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SEM 8	19155E81F		To prepare topographical map and contour map on an area.				✓		✓				
	19155E81G	Traffic Engineering and Management	Analyse traffic problems and plan for traffic systems various uses										
			Design Channels, Intersections, signals and parking arrangements	✓			✓		✓				
	19155E82A	Maintenance, repair and rehabilitation of structures	The importance of maintenance and assessment method of distressed structures.	✓			✓						
			The strength and durability properties ,their effects due to climate and temperature.				✓		✓				
			Recent development in concrete.	✓	✓		✓		✓				
			The techniques for repair rand protection methods.				✓		✓				
			Repair, rehabilitation and retrofitting of structures and demolition methods.										
	19155E82B	Structural dynamics and earthquake engineering	Student will develop knowledge in the simulation and mathematical model development.	✓			✓		✓				
			Students will be trained to identify, formulate and solve complicated problem.	✓			✓						
			Students will be able to understand the role of natural calamity in the damage of structures.						✓	✓			
			Students will be able to develop the skill to analyse data and to apply the same in the practical problems.						✓				
			Students will be able to apply the developed methodologies for the safe and stable design of structures.	✓		✓			✓				
	19155E82C	Prefabricated structures	The student will have good knowledge about design principles, layout of factory and stages of loading in	✓		✓			✓				

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		precast construction.										
		Acquire knowledge about panel systems, slabs, connections used in precast construction and they will be in a position to design the elements.							✓		✓	
19155E82D	Bridge engineering	Identify loads on bridges and selection of type of bridge for the site condition.				✓	✓		✓		✓	
		Analyze the super structure by various methods.							✓		✓	
		Design the trussed bridge and plate girder bridges.										
		Design reinforced concrete slab and T beam bridges and prestressed concrete bridges.				✓			✓		✓	
		Decide the appropriate sub structural systems , bearings and expansion joints for the bridges.				✓				✓		✓
19155E82E	High Rise Structures	To learn analysis and design of buildings for wind loads					✓	✓		✓		✓
		To study design criteria for tall structures.								✓		✓
		To study behaviour of various structural systems under wind loads.										
		To familiarize the students about stability analysis of tall structures.					✓			✓		✓
19155E82F	Remote Sensing	Gain knowledge on GIS and its applications	✓	✓	✓		✓			✓		
		Develop knowledge of map making and cartography						✓	✓			
		Understand digitization and data editing.						✓				

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19155E82G	Tall Structures	To understand the various structural systems for high rise structures.	✓			✓			✓				
		To evaluate the behavior of structure under dynamic loading.	✓				✓	✓					
		To analyse and design of advanced structures.					✓						
19155P83	Project Work	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.	✓	✓	✓		✓			✓			

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Sem	Course Code	Title of the Course	COs	POS									
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
I	19148S11P	Transforms and Partial Differential Equations	Understand how to solve the given standard partial differential equations.	✓									
			Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.	✓									
			Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.	✓									
			Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.	✓									
			Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems	✓									
	19155H12P	Mechanicsof solids I	Understand the concepts of stress and strain, principal stresses and principal planes.	✓	✓	✓	✓					✓	
			Determine Shear force and bending moment in beams and understand concept of theory of simple bending.		✓	✓							
			Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.	✓			✓					✓	
			Apply basic equation of torsion in design of circular shafts and helical springs, .										
			Analyze the pin jointed plane and space trusses										

	19155H13P	Fluid Mechanics-I	Get a basic knowledge of fluids in static, kinematic and dynamic equilibrium.	✓		✓			✓			✓	
			Understand and solve the problems related to equation of motion.			✓							
			Gain knowledge about dimensional and model analysis.	✓					✓			✓	
			Learn types of flow and losses of flow in pipes.										
			Understand and solve the boundary layer problems.										
	19155H14P	Surveying	The use of various surveying instruments and mapping	✓	✓		✓		✓			✓	
			Measuring Horizontal angle and vertical angle using different instruments						✓			✓	
			Methods of Levelling and setting Levels with different instruments										
			Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth	✓	✓		✓						
			Concept and principle of modern surveying.										
	19155H15P	Irrigation Engineering	Have knowledge and skills on crop water requirements.	✓	✓		✓						
			Understand the methods and management of irrigation.				✓						
			Gain knowledge on types of Impounding structures	✓	✓								
			Understand methods of irrigation including canal irrigation.										
			Get knowledge on water management on optimization of water use.				✓						
II	19148S21P	Numerical Methods	Understand the basic concepts and techniques of solving algebraic and transcendental equations.	✓									
			Appreciate the numerical techniques of interpolation and error approximations in various intervals in real life situations.	✓									
			Apply the numerical techniques of differentiation and integration for engineering problems.	✓									

		Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.	✓									
		Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.	✓									
19155H22P	Strength of Materials	Classify the soil and assess the engineering properties, based on index properties.	✓	✓	✓	✓	✓					✓
		Analyze propped cantilever, fixed beams and continuous beams using theorem of three moment equation for external loadings and support settlements.	✓	✓	✓							
		find the load carrying capacity of columns and stresses induced in columns and cylinders										
		Determine principal stresses and planes for an element in three dimensional state of stress and study various theories of failure				✓	✓					
		Determine the stresses due to Unsymmetrical bending of beams, locate the shear center, and find the stresses in curved beams.										✓
19155H23P	Fluid Mechanics-II	Classify the soil and assess the engineering properties, based on index properties.	✓	✓		✓			✓	✓	✓	✓
		Able to identify a effective section for flow in different cross sections.							✓	✓		
		To solve problems in uniform, gradually and rapidly varied flows in steady state conditions.	✓	✓								
		Understand the principles, working and application of turbines.				✓					✓	✓
		Understand the principles, working and application of pumps.										
19155H24P	Concrete Technology	The various requirements of cement, aggregates and water for making concrete	✓	✓		✓			✓	✓	✓	✓
		The effect of admixtures on properties of concrete				✓						✓
		The concept and procedure of mix design as per IS method	✓	✓					✓	✓		
		The properties of concrete at fresh and hardened state									✓	
		The importance and application of special concretes.										

	19155H25P	Soil Mechanics	Classify the soil and assess the engineering properties, based on index properties.	✓	✓					✓	✓	✓	✓
			Understand the stress concepts in soils							✓	✓		
			Understand and identify the settlement in soils.	✓	✓							✓	
			Determine the shear strength of soil										✓
			Analyze both finite and infinite slopes.			✓					✓		
	19155H32P	Design of reinforced concrete structures-I	The student shall be in a position to design the basic elements of reinforced concrete structures.	✓	✓					✓	✓		
	19155H33P	Structural Analysis I	Students will be able to analysis trusses, frames and arches	✓	✓	✓	✓	✓				✓	✓
			Students will be able to analyse structures for moving loads and		✓	✓	✓	✓					
			Students will be able to will be conversant with classical methods of analysis.	✓	✓	✓	✓					✓	✓
	19155H34P	Construction Materials and Practices	Compare the properties of most common and advanced building materials.	✓			✓		✓			✓	
			understand the typical and potential applications of lime, cement and aggregates				✓		✓			✓	
			Know the production of concrete and also the method of placing and making of concrete elements.	✓	✓								
			understand the applications of timbers and other materials	✓			✓						
			Understand the importance of modern material for construction.				✓			✓			
	19155L35P	Soil Mechanics Lab	Students are able to conduct tests to determine both the index and engineering properties of soils and to characterize the soil based on their properties.			✓		✓	✓				
IV	19155H41P	Design of reinforced concrete structures-II	The student shall have a comprehensive design knowledge related to various structural systems.	✓		✓		✓			✓		
	19155H42P	Structural Analysis II	The student will have the knowledge on advanced methods of analysis of structures including space and cable structures.		✓	✓	✓	✓					
	19155H43P	Environmental Engineering	an insight into the structure of drinking water supply systems, including water transport, treatment and distribution			✓	✓	✓	✓			✓	
			the knowledge in various unit operations and processes in water					✓					

			treatment										
			an ability to design the various functional units in water treatment										
			an understanding of water quality criteria and standards, and their relation to public health						✓			✓	
			the ability to design and evaluate water supply project alternatives on basis of chosen criteria			✓	✓					✓	
	19155E44AP	Hydrology	an understanding of the key drivers on water resources, hydrological processes and their integrated behaviour in catchments			✓		✓					✓
			ability to construct and apply a range of hydrological models to surface water and groundwater problems including Hydrograph, Flood/Drought management, artificial recharge	✓			✓	✓					
	19155E44BP	Water resources Engineering	ability to conduct Spatial analysis of rainfall data and design water storage reservoirs		✓	✓	✓						
			Understand the concept and methods of ground water management.					✓		✓	✓		
	19155E44CP	Building Technology	understand the typical and potential applications of lime, cement and aggregates		✓	✓	✓						
			Know the production of concrete and also the method of placing and making of concrete elements.	✓	✓	✓							
			understand the applications of timbers and other materials							✓	✓	✓	
	19155E44DP	Contract laws and regulations	understand the applications of timbers and other materials								✓	✓	✓
	19155L45P	Environmental Engineering Lab	Quantify the pollutant concentration in water and wastewater		✓		✓			✓			✓
			Suggest the type of treatment required and amount of dosage required for the treatment							✓			
			Examine the conditions for the growth of micro-organisms		✓		✓						✓
V	19155H51P	Design of Steel Structural Elements	Understand the concepts of various design philosophies	✓	✓	✓	✓	✓					✓
			Design common bolted and welded connections for steel structures			✓	✓						
			Design tension members and understand the effect of shear lag.		✓								✓
			Understand the design concept of axially loaded columns and column base connections.										✓

			Understand specific problems related to the design of laterally restrained and unrestrained steel beams.	✓									
	19155H52P	Foundation Engineering	Understand the site investigation, methods and sampling.		✓		✓			✓		✓	✓
			Get knowledge on bearing capacity and testing methods.									✓	
			Design shallow footings.		✓					✓			
			Determine the load carrying capacity, settlement of pile foundation.				✓						
			Determine the earth pressure on retaining walls and analysis for stability.							✓			✓
	19155H53P	Industrial Waste Management	understanding of the nature and characteristics of municipal solid wastes and the regulatory requirements regarding municipal solid waste management.	✓			✓			✓			
			Reduction, reuse and recycling of waste.										
			ability to plan and design systems for storage, collection, transport, processing and disposal of municipal solid waste.							✓			✓
			knowledge on the issues on solid waste management from an integrated and holistic perspective, as well as in the local and international context.			✓			✓				
			Design and operation of sanitary landfill.					✓			✓		
	19155H54AP	Computer Aided Analysis And Design	At the end of the course the student acquires hands on experience in design and preparation of structural drawings for concrete / steel structures normally encountered in Civil Engineering practice.	✓			✓			✓			
	19155E54BP	Transportation Engineering	Design flexible and rigid pavements.		✓			✓					
			Understand the concept of pavement management system, evaluation of distress and maintenance of pavements.				✓			✓			
			Analyze and design the elements for orientation of runways and passenger facility systems.			✓			✓		✓		
			Understand the various features in Harbours and Ports, their construction, coastal protection works and coastal Regulations to be adopted.				✓			✓			✓
	19155E54CP	Geology	Will be able to understand the importance of geological knowledge such as earth, earthquake, volcanism and the action of various geological agencies.			✓			✓				✓
			Will get basics knowledge on properties of minerals.	✓			✓					✓	

			Gain knowledge about types of rocks, their distribution and uses.			✓			✓				
			Will understand the methods of study on geological structure.		✓			✓		✓			✓
			Will understand the application of geological investigation in projects such as dams, tunnels, bridges, roads, airport and harbour			✓			✓			✓	
	19155E54DP	Highway Engineering	Get knowledge on planning and aligning of highway.			✓			✓				✓
			Geometric design of highways	✓			✓					✓	
			Design flexible and rigid pavements.			✓			✓				
			Gain knowledge on Highway construction materials, properties, testing methods		✓			✓		✓			✓
			Understand the concept of pavement management system, evaluation of distress and maintenance of pavements.			✓			✓			✓	
	19155L55P	Computer Aided Building Drawing Laboratory	The students will be able to draft the plan, elevation and sectional views of the buildings,industrial structures, framed buildings using computer softwares.	✓		✓		✓			✓		✓
VI	19155H61P	Estimation & Cost Evaluation	Estimate the quantities for buildings,	✓	✓				✓	✓			
			Rate Analysis for all Building works, canals, and Roads and Cost Estimate.										
			Understand types of specifications, principles for report preparation, tender notices types.	✓	✓								
			Gain knowledge on types of contracts						✓	✓			
			Evaluate valuation for building and land.										
	19155H62P	Ground Water Hydrology	The students gain the knowledge needed on hydrologic cycle, hydrometeorology and formation of precipitation.	✓	✓	✓	✓				✓	✓	
			The students are able to apply the various methods of field measurements and empirical formulae for estimating the various losses of precipitation, stream flow, flood and Flood routing.					✓	✓				
			The students will know the basics of groundwater and hydraulics of subsurface flows.	✓	✓								

	19155H63P	Construction Project Management	The student should be able to plan construction projects, schedule the activities using network diagrams, determine the cost of the project, control the cost of the project by creating cash flows and budgeting and to use the project information as decision making tool.	✓	✓	✓	✓				✓	✓	
	19155E64AP	Remote Sensing And GIS	Principles of Remote Sensing and GIS	✓	✓								✓
			Analysis of RS and GIS data and interpreting the data for modeling applications	✓	✓	✓	✓					✓	
	19155E64BP	Railway Engineering	Understand the methods of route alignment and design elements in Railway Planning and Constructions.	✓	✓	✓		✓	✓	✓	✓	✓	
			Understand the Construction techniques and Maintenance of Track laying and Railway stations.				✓						✓
	19155E64CP	Airport & Harbours	Gain an insight on the planning and site selection of Airport Planning and design.	✓	✓								✓
			Analyze and design the elements for orientation of runways and passenger facility systems.	✓	✓	✓	✓					✓	
			Understand the various features in Harbours and Ports, their construction, coastal protection works and coastal Regulations to be adopted.	✓	✓	✓		✓	✓	✓	✓	✓	
	19155E64DP	Electronic Surveying	Understand the advantages of electronic surveying over conventional surveying methods	✓	✓								✓
			Understand the working principle of GPS, its components, signal structure, and error sources	✓	✓	✓	✓					✓	
			Understand various GPS surveying methods and processing techniques used in GPS	✓	✓	✓		✓	✓	✓	✓	✓	
	19155L65P	Concrete &Transportation Engineering Laboratory	Student knows the techniques to characterize various pavement materials through relevant tests.	✓	✓	✓	✓					✓	
VII	19160S71P	Total Quality Management	The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.	✓			✓	✓			✓		✓
	19155C72P	Housing, Planning & Management	The students should have a comprehensive knowledge of planning, design, evaluation,construction and financing of housing projects.		✓			✓	✓			✓	✓

	19155C73P	Repair And Rehabilitation of Structures	Students must gained knowledge on quality of concrete, durability aspects, causes of deterioration, assessment of distressed structures, repairing of structures and demolition procedures.	✓			✓	✓			✓	✓	
	19155E74AP	Air Pollution Management	an understanding of the nature and characteristics of air pollutants, noise pollution and basic concepts of air quality management	✓			✓	✓			✓		✓
			ability to identify, formulate and solve air and noise pollution problems		✓			✓	✓			✓	✓
			ability to design stacks and particulate air pollution control devices to meet applicable standards.	✓			✓	✓			✓	✓	
	19155E74BP	Pre Fabricated Structures	The student shall be able to design some of the prefabricated elements and also have the knowledge of the construction methods in using these elements.	✓			✓	✓			✓		✓
	19155E74CP	Bridge Structures	To develop an understanding of an appreciation for basic concepts in proportioning and design of bridges in terms of aesthetics, geographical location and functionality.	✓			✓	✓			✓	✓	
			To help the student develop an intuitive feeling about the sizing of bridge elements,ie., develop a clear understanding of conceptual design	✓			✓	✓			✓		✓
			To understand the load flow mechanism and identify loads on bridges.		✓			✓	✓			✓	✓
			To carry out a design of bridge starting from conceptual design, selecting suitable bridge,geometry to sizing of its elements.			✓			✓	✓			✓
	19155E74DP	Prestressed Concrete Structures	Student shall have a knowledge on methods of prestressing and able to design various prestressed concrete structural elements.		✓			✓	✓			✓	✓
	19155P75P	Project Work	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.	✓			✓	✓			✓	✓	

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DEPARTMENT OF CIVIL ENGINEERING
1.1.1 -CO-PO-PSO MAPPING

M.TECH STRUCTURAL ENGINEERING (P.T)- 2019R

Sem	Course Code	Title of the Course	COs	POS									
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
I	19248S11EP	Advanced Engineering Mathematics	The course aim to develop the skills of the students in the areas of boundary value problems and transform techniques. The course will also serve as a prerequisite for post Graduate and specialized studies and research.						✓			✓	
			Be capable of mathematically formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results.	✓							✓		✓
			Have learnt the basics of Z – transform in its applicability to discretely varying functions, gained the skill to formulate certain problems in terms of differences equations.					✓		✓		✓	
	19255H12P	Quality Control &Assurance in Construction	To understand the elements of quality planning and the implication			✓			✓				
			To become aware of objectives and advantage of quality assurance						✓		✓		✓
			To be exposed to means of quality control				✓		✓				
	19255H13P	Theory of Plasticity and Elasticity	To study the relationship between quality control and assurance	✓					✓		✓		✓
	19255L14P	Core Practical (Computer Programming Lab)	To learn design and preparation of structural drawing of concrete and steel structures (STADD-PRO).			✓				✓		✓	

	19255CRSP	Research Led Seminar	To impart knowledge to analyze solve, design and Civil Engineering drawings using AutoCAD.				✓		✓		✓			
			Exposure to various research domains						✓	✓		✓		
			Acquaintance with languages of research							✓				
II	19255H21P	Management Information System	Development of research aptitude			✓			✓		✓			
			To bring about an exposure to information systems in a formal manner				✓			✓		✓		
			To study the development of information systems					✓			✓			✓
			To study the means of applying information systems models to project management			✓			✓		✓			
	19255H22P	Finite Element Analysis	To introduce system audit and to study its features				✓			✓		✓		
	19255E23AP	Failure Analysis of Structures	Ability to design structure to prevent failure from the internal defect that unit within the structure					✓		✓		✓		
			Ability to design structure to prevent fatigue and creep			✓			✓		✓			
			Ability to define different deformation and related theories				✓							
	19255E23BP	Advanced Concrete Technology	To impart knowledge about the performance of concrete as structural material and the behavior, elastic and inelastic, of reinforced – concrete members and structures, designing structures safely, economically and efficiently**.**				✓							
	19255E23CP	Steel,Concrete Composite Structures	To learn the Performance of concrete as structural material and advanced technologies used in construction by using concrete.		✓					✓				
	19255L24P	Core practical(Software Lab – Finite Element Analysis- ANSYS)	This course covers the theory and applications related to Earthquake Engineering. The broad subjects discussed in this course include earthquake response of linearly elastic and inelastic buildings, structural dynamics in building codes.			✓				✓		✓		
	192TECWRP	Technical writing / Seminars	To impart knowledge to analyze solve, design and Civil Engineering drawings using FEA - ANSYS					✓	✓		✓			

	19255CRMP	Research Methodology	Understanding research questions and tools		✓									
			Experience in scientific writings		✓					✓		✓		
			Practice in various aspects of scientific publications	✓				✓						
	19255CBRP	Participation in Bounded Research	Inculcation of research ethics						✓					
			Hands on exposure to problem solving tools in contemporary research		✓					✓		✓		
			Evolution of research intuitiveness and orientation							✓		✓		
III	19255H31P	Structural Dynamics	Emphasis is placed on static problems with linear material and small deformation. Many basic 2-D problems (such as plane strain and plane stress) and 3-D problems.					✓		✓		✓		
	19255H32P	Maintenance and Rehabilitation of Structures	This course covers the methods for analyzing the stresses and deflections developed in any given type of structures when it is subjected to an arbitrary dynamic loading.						✓					
	19255E33AP	Prestressed Concrete Structures	Introduction to the governmental quality assurance regulations for public works. Application of quality control concepts, statistical experimental design principles to the construction process to minimize project costs and improve quality.		✓			✓		✓		✓		
	19255E33BP	High Rise Structures	This course introduces students to the fundamental principles of pre-stressed concrete behavior and design, So that they can act effectively to optimize existing forms of construction and apply fundamental concepts with confidence in unusual and challenging situations**.**	✓				✓		✓				
	19255E33CP	Computer Aided Structural Design	This course covers the design criteria and loading pattern on high rise structures, behavior of structural systems and stability, design and analysis of tall buildings.	✓					✓		✓			
	19255CSR	Design / Socio - Technical Project	Development of critical thinking and synergistic research approach.	✓					✓	✓		✓		

IV	19255H41P	Advanced Concrete Structural Design	The finite element method is the most powerful structural analysis tool for the Civil Engineers. The basic formulation and programming technique are introduced. According to the same procedures, the different elements such as truss, beam, plate and shell are easily formulated.	✓					✓		✓		
	19255H42P	Advanced Steel Structures	Familiarity with cutting edge research trends		✓					✓		✓	
	19255E43AP	Optimization in Structural Design	This course emphasize about steel & concrete composite member, design concepts of composite box girder bridges and case studies.	✓	✓								
	19255E43BP	Design of industrial structures	At the end of this course the student shall be able to design someof the strctures used in industries.			✓	✓		✓		✓		
	19255E43CP	Elements of earthquake Engineering	Students will be trained to identify, formulate and solve complicated problem.	✓	✓								
			Students will be able to understand the role of natural calamity in the damage of structures.			✓	✓						
			Students will be able to develop the skill to analyse data and to apply the same in the practical problems.		✓	✓			✓		✓		
			Students will be able to apply the developed methodologies for the safe and stable design of structures.				✓	✓					
	19255P44P	Project Work Phase-I	This course introduces the properties of materials, strength and elastic behavior of composite lamina and design of composite structures.		✓								
			Sensitization of social needs for innovation		✓			✓					
			Team work towards interdisciplinary synchronous research strategy							✓			
V	19255E51AP	Experimental Stress Analysis	Introduction to steel structure, tensioned member, compressed member, beam, design of beam and column, bolt jointing, welding jointing and other joint design.	✓									
	19255E51BP	Soil Structure Interaction	At the end of the semester students can learn about the strain gauges, strain rosetters, model analysis, calibration of photo elastic materials.	✓			✓						
	19255E51CP	Aseismic Design of structures							✓		✓		

	19255E52AP	Prefabricated Structures	This course explains about design principles of Prefabricated Structures, components, application of prefabricated structures. Students can learn the usage of prefabricated structures in wall panels, industrial buildings and shell roofs.					✓						
	19255E52BP	Disaster Resistant Structures	This course explains about design principles of Prefabricated Structures, components, application of prefabricated structures. Students can learn the usage of prefabricated structures in wall panels, industrial buildings and shell roofs.			✓			✓		✓			
	19255E52CP	Non Linear Analysis of Structures	This course deals the philosophy of the design of disaster resistant structures such as dams , bridges and emphasize about the rehabilitation , retrofitting and damage assessment of structures.	✓			✓			✓		✓		
	19255E53AP	Offshore Structures	This course deals about the non –linearities, non-linear equations and non linear static analysis of plates, columns, trusses and frames						✓					
	19255E53BP	Stability of Structures	This course includes the details of wave theories, forces in offshore structures and design and analysis of offshore structures .	✓										
	19255E53CP	Mechanics of Composite Materials	This course deals with the concept and characteristics of stability problems and behavior of torsional buckling and lateral buckling in beams and columns.			✓				✓		✓		
VI	19255P61P	Project Work Phase-II	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.	✓		✓			✓	✓		✓		

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M.TECH STRUCTURAL ENGINEERING(F.T)- 2019R

Sem	Course Code	Title of the Course	COs	POS									
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
I	19248S11E	Advanced Engineering Mathematics	The course aim to develop the skills of the students in the areas of boundary value problems and transform techniques. The course will also serve as a prerequisite for post Graduate and specialized studies and research.							✓	✓		
			Be capable of mathematically formulating certain practical problems in terms of partial differential equations, solve them and physically interpret the results.	✓									
			Have learnt the basics of Z – transform in its applicability to discretely varying functions, gained the skill to formulate certain problems in terms of differences equations.					✓		✓			✓
	19255H12	Quality Control &Assurance in Construction	To understand the elements of quality planning and the implication			✓			✓				
			To become aware of objectives and advantage of quality assurance			✓			✓		✓		
			To be exposed to means of quality control										
			To study the relationship between quality control and assurance				✓		✓		✓		
	19255H13	Theory of Plasticity and Elasticity	Emphasis is placed on static problems with linear material and small deformation. Many basic 2-D problems (such as plane strain and plane stress) and 3-D problems.	✓						✓			✓
	19255H14	Structural Dynamics	This course covers the methods for analyzing the stresses and deflections developed in any given type of structures when it is subjected to an arbitrary dynamic loading.					✓		✓			✓

	19255H15	Maintenance and Rehabilitation of Structures	Introduction to the governmental quality assurance regulations for public works. Application of quality control concepts, statistical experimental design principles to the construction process to minimize project costs and improve quality.						✓		✓		
	19255E1A	Prestressed Concrete Structures	This course introduces students to the fundamental principles of pre-stressed concrete behavior and design, So that they can act effectively to optimize existing forms of construction and apply fundamental concepts with confidence in unusual and challenging situations.		✓			✓		✓			✓
	19255E16B	High Rise Structures	This course covers the design criteria and loading pattern on high rise structures, behavior of structural systems and stability, design and analysis of tall buildings.	✓					✓			✓	
	19255E16C	Computer Aided Structural Design	To learn design and preparation of structural drawing of concrete and steel structures (STADD-PRO).	✓					✓	✓			✓
	19255L19	Core Practical (Computer Programming Lab)	To impart knowledge to analyze solve, design and Civil Engineering drawings using AutoCAD.			✓				✓			✓
	19255CRS	Research Led Seminar	Exposure to various research domains				✓			✓			✓
			Acquaintance with languages of research						✓				
			Development of research aptitude						✓			✓	
II	19255H21	Management Information System	To bring about an exposure to information systems in a formal manner			✓					✓		
			To study the development of information systems				✓						
			To study the means of applying information systems models to project management					✓			✓		
			To introduce system audit and to study its features			✓				✓			✓
	19255H22	Finite Element Analysis	The finite element method is the most powerful structural analysis tool for the Civil Engineers. The basic formulation and programming technique are introduced. According to the same procedures, the different elements such as truss, beam, plate and shell are easily formulated.				✓				✓		
	19255H23	Advanced Concrete Structural Design	To impart knowledge about the performance of concrete as structural material and the behavior, elastic and inelastic, of reinforced – concrete members and structures, designing	✓					✓			✓	

			structures safely, economically and efficiently**.**											
	19255E2B	Advanced Concrete Technology	To learn the Performance of concrete as structural material and advanced technologies used in construction by using concrete.				✓							
	19255E2C	Steel,Concrete Composite Structures	This course emphasize about steel & concrete composite member, design concepts of composite box girder bridges and case studies.		✓					✓	✓		
	19255E2A	Optimization in Structural Design	The structural analysis is formulated through the principle of optimization. Both the manual calculation and application of the computer are introduced for the analysis of truss and frame structures using optimization techniques.	✓	✓					✓			✓
	19255E2C	Elements of Earthquake Engineering	This course covers the theory and applications related to Earthquake Engineering. The broad subjects discussed in this course include earthquake response of linearly elastic and inelastic buildings, structural dynamics in building codes.		✓								
	19255L26	Core practical(Soft ware Lab – Finite Element Analysis-ANSYS)	To impart knowledge to analyze solve, design and Civil Engineering drawings using FEA - ANSYS			✓				✓			✓
	192TECWR	Technical writing / Seminars						✓					
	19255CRM	Research Methodology	Understanding research questions and tools							✓			
			Experience in scientific writings		✓								
			Practice in various aspects of scientific publications		✓					✓			✓
			Inculcation of research ethics	✓				✓		✓			✓
	19255CBR	Participation in Bounded Research	Hands on exposure to problem solving tools in contemporary research						✓				
			Evolution of research intuitiveness and orientation		✓				✓			✓	
			Familiarity with cutting edge research trends										
III	19255H31	Advanced Steel Structures	Introduction to steel structure, tensioned member, compressed member, beam, design of beam and column, bolt jointing, welding jointing and other joint design.		✓					✓			✓
	19255E32A	Experimental Stress Analysis	At the end of the semester students can learn about the strain gauges,	✓									

			strain rosetters, model analysis, calibration of photo elastic materials.											
	19255E32B	Soil Structure Interaction	This course deals with the soil-foundation interaction, analysis of beams and finite plates, elastic analysis of pile, load deflection for laterally loaded pile.	✓			✓			✓			✓
	19255E33 A	Prefabricated Structures	This course explains about design principles of Prefabricated Structures, components, application of prefabricated structures. Students can learn the usage of prefabricated structures in wall panels, industrial buildings and shell roofs.					✓	✓			✓	
	19255E33B	Disaster Resistant Structures	This course deals the philosophy of the design of disaster resistant structures such as dams , bridges and emphasize about the rehabilitation , retrofitting and damage assessment of structures.			✓				✓			
	19255E33C	Non Linear Analysis of Structures	This course deals about the non – linearities, non-linear equations and non linear static analysis of plates, columns, trusses and frames	✓			✓						
	19255E34 A	Offshore Structures	This course includes the details of wave theories, forces in offshore structures and design and analysis of offshore structures .						✓				
	19255E34B	Stability of Structures	This course deals with the concept and characteristics of stability problems and behavior of torsional buckling and lateral buckling in beams and columns.	✓						✓			✓
	19255E34C	Mechanics of Composite Materials	This course introduces the properties of materials, strength and elastic behavior of composite lamina and design of composite structures.			✓							
	19255P35	Project Work Phase-I	Sensitization of social needs for innovation		✓			✓		✓			✓
			Team work towards interdisciplinary synchronous research strategy							✓			
	19255CSR	Design / Socio - Technical Project	Development of critical thinking and synergistic research approach.	✓					✓	✓			✓
IV	19255P41	Project Work Phase-II	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.	✓		✓			✓	✓			✓