Course Code	Name of the Course	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
GR20D 5001	Matrix Methods of Structural Analysis	Evaluate the static and kinematic indeterminacy and generate stiffness and flexibility matrices	M		M	M	H	M
		Analyse the skeleton structures using stiffness method	M	M	M	M	M	M
		Use stiffness method to analyse different structures	M		H		M	M
		Analyse various types of structural members using special analysis procedures	M	M	H		M	
		Know the usage of shear walls in multi storied constructions		M	M	M	M	
GR20D 5002	Advanced Solid Mechanics	Have a good understanding of the theory, concepts, principles and governing equations of Elasticity principles.		M	H	M		
		Develop equations of equilibrium and draw relations among stress, strain and displacement and utilize the equilibrium equations, compatibility equations and various boundary conditions to analyze elastic problems.			H		H	M
		Gain the understating of three-dimensional problems of elasticity in Cartesian coordinates system ad able to determine principal stresses and planes of 3D problems.	M		H		H	M
		Apply the principles of elasticity to solve torsional problems in prismatic bars and tubes.	M		H		M	M
		Use the concepts of stresses and strains for plastic deformation to comprehend the yield criteria of materials.	M	M	H	M	M	M

GR20D 5004	Advanced Concrete Technology	List out the types of cement, admixture and decide the suitable cement and admixture for specific purpose.	M	H		H	M	
		Determine the properties of concrete ingredients i.e. cement, fine aggregate and coarse aggregate by conducting different tests such as workability etc.,	H	H	M	M	H	M
		Design the mix proportion of ordinary, standard and high strength concrete by using different methods and how the strength of concrete can be modified by changing the proportions.	M	H	H	M	M	
		Decide suitable concrete for different structures considering the prevailing weathering conditions and Design economic concrete mix proportion for different exposure conditions and intended purposes with special concrete.	M	H	H	M	M	M
		List out the types of cement, admixture and decide the suitable cement and admixture for specific purpose.	M	H		H	M	
GR20D 5003	THEORY AND APPLICATIONS OF CEMENT COMPOSITES	Classify and recognize an importance of the composite materials.	M	H		H	M	
		Identify the type of special concrete	H	H	M	M	H	M

		Design the mix proportion of ordinary, standard and high strength concrete by different methods	M	H	H	M	M	
		Determine the mechanical properties of cement composites.	M	H	H	M	M	M
		Recommend the cement composites for various applications	M	H		H	M	
GR20D 5005	THEORY OF STRUCTURAL STABILITY	Comprehend the basics in the theory of structural stability of discrete and continuous Systems.	M		M	M	M	M
		Analyze for stability of columns with axial, flexural, torsional and combined buckling and also investigate for stability of columns with lateral bracing.	M		M	M	M	M
		Evaluate for stability of member buckling and global buckling in frames.	M		M	M	M	M
		Analyze the lateral torsion buckling in beams and for the axial flexural buckling, shear flexural buckling, buckling under combined loads in plates.	M		M	M	M	M
		Explain the concepts of inelastic buckling and dynamic stability	M		M	M	M	M
GR20D 5006	Analytical and Numerical Methods for Structural Engineering	To analyse the performance of various interpolation technique and perform error analysis	M	M	H	M		
		Solve linear algebraic system by direct and iteration methods and apply the knowledge of Eigen values and Eigen vectors to some contents in	M	M	H	M	M	

		engineering						
		Apply the knowledge of interpolation and extrapolation of uniform and non-uniform data to certain contents of Civil Engineering.	M	M	H	M	M	
		Apply the knowledge of numerical differentiation and integration to some contents of Civil Engineering	M	M	H	M	M	M
		Solve ordinary and partial differential equations in structural mechanics using numerical methods.	M	M	H	M	M	M
GR20D 5007	Structural Health Monitoring	Understand the Health of the structure		M	M	H	M	M
		Diagonise the distress due to various causes & Faults	M		M	H	M	M
		Identify the distress and document	M		M	H	M	M
		Assess the health of structure using static & dynamic field methods	M		M	H	M	M
		Suggest Repairs, Rehabilitation & Retrofitting of the structure.	M		M	H	M	M
GR20D 5008	Structural Optimizatio n	Formulate mathematical models for the problems in structural components to study Failures	H		M	H	M	M
		Use variational principle for optimization	H		M	H	M	M
		Analyse problems using linear and nonlinear programming	H		M	H	M	M

		Analyse problems using geometric, stochastic programming	H		M	H	M	M
		Apply optimization techniques to structural steel and concrete members.	H		M	H	M	M
GR20D 5011	Research Methodology and IPR	Understand Research Formulation	H	M		H	M	M
		Analyze Research related information and follow research ethics	M	M		M	M	M
		Understand that today's world is controlled by computer , Information Technology , but tomorrow world will be ruled by ideas, concept and creativity	H	H		H	H	H
		Understand that IPR is to be promoted among students in general and engineering as it takes important place in the growth of individuals and nations	M	M		M	M	M
		Understand the nature of Intellectual Property and IPR in international scenario.	H	H		M	M	H
GR20D 5152	English for Research Paper Writing (Audit Course) 1	Students will be able to understand how to write a research paper	M	H		H	M	H
		Students will be able to outline the drafting of an abstract	M	M	M	M	M	H
		Students will be able to acquire the skills of various elements of research	H	M	M		H	H
		Students will be in a position to write a good paper	M	M	M	M	M	H
		It will result in increasing the chance of publication	H	H	M	H	H	H
GR20D 5009	Lab-I (Structural Design Lab)	Understand the concept of structural design.	H				M	H

		Estimate the loads including loads given in IS 875.	M		H	M	M	M
		Analyze & Design the framed structure.	H	M	M		M	M
		Design a complete Multi-Story Frame Building.	H		M	M	`	M
		Have full clarity in reinforcement, curtailment, lapping etc.	M	M	M	M	M	M
GR20D 5010	Lab-II (Advanced Concrete Lab)	Design high strength concrete and study the parameters affecting its performance	H	H	H	M	M	M
		Determine the mechanical properties and analyze the stress-strain curve of high strength concrete	H	H	H	M	M	M
		Develop correlation between cube and cylinder of high strength concrete	H	H	H	M	M	M
		Assess the quality of existing concrete members by Non-Destructive testing methods	M M	H M	H M			M M
		Design high strength concrete and study the parameters affecting its performance	H	H	H	M	M	M
GR20D 5012	FEM Structural engineering	Use minimum potential energy principle in Finite Element Method. Method.	H				M	M
		Analyse one dimensional elements like beam element using FEM approach.	M		M	M	M	M
		Formulate interpolation functions and evaluation of structural deformation using Galerkin approach	H	M	M		M	M
		Evaluation of stress and strains in 2D, 3D elements using iso-parametric and axi-symmetric element approach.	M		M	M	`	M

		Predict the error using Gauss quadrature method	M	M	M	M	M	M
GR20D 5013	Structural Dynamics	Comprehend and model the systems subjected to vibrations and dynamic loads Analyze and obtain dynamics response of single degree freedom system using fundamental Theory and equations of motion.	M M	M M	H H	M M		
		Analyze and obtain dynamics response of Multi degree of freedom system idealized as lumped mass systems. Analyze and obtain dynamics response of Multi degree of freedom system idealized as distributed mass systems.	M	M	H	M	H	M
		Obtain dynamics response of systems using numerical methods	M		H		M	
		To explain the dynamic effects of Wind Loads, Moving Loads and Vibrations caused by Traffic, Blasting and Pile Driving.	M	M	H		M	
		Comprehend and model the systems subjected to vibrations and dynamic loads	M	M	H	M		
GR20D 5014	Advanced Steel Design	Describe the mechanical properties of Steel and different failure modes of structural steel and determine their design strengths	H	M	M	H	M	M
		Analyse and design beams and columns for stability.	H	M	M	H	M	M
		Analyse and design for strength and drift	H	M	M	H	M	M
		Design steel structures/ components by different design processes	H	M	M	H	M	M
		Design welded and bolted connections.	H	M	M	H	M	M
GR20D	Design of	Understand the necessity	M		M	M		M

5015	Formwork	and types of form work for various structures of civil Engineering and select proper type of form work, accessories and materials required.						
		Design the form work for various structural elements like beam, slab, column, wall and foundation.	M	M		M	M	
		Design the form work for special structures like shells, retaining walls, bridges, Sylos, bunkers & water tank.	M					M
		Understand the working of flying form work like tunnel forms, slip forms and table forms.		M	H			
		Judge the form work failures from case studies.		M		M	M	
GR20D 5016	Principles of Bridge Engineering	Identify the load transfer mechanism of different types of bridge sand loads acting on the super and sub structure.	H	M	M	H	M	M
		Analyze and design of solid slab bridges and Box culvers	H	M	M	H	M	M
		Analyze and design of T Beam bridges	H	M	M	H	M	M
		Analyze and design of Plate girder bridges and understand the design concepts of various other types of bridges	H	M	M	H	M	M
		Analyse and design of piers, abutments and bearings. Also able to apply various types of inspections and maintenance techniques	H	M	M	H	M	M
GR20D 5017	Design of Advanced Concrete Structures	Structural design of columns including slender columns.	H				M	M
		Design and detailing of pile foundations with pile caps and simply supported and continuous deep beams.	M		M	M	M	M

		Design and detailing of plain concrete walls, shear walls.	H	M	M		M	M
		Design and detailing of Intze type Over Head Tank, understand stability requirements of retaining walls	M		M	M	`	M
		Knowledge of IRC loading and design of Deck Slab Bridge.	M	M	M	M	M	M
GR20D 5018	Advanced Design Of Foundations	Decide the suitability of soil strata for different projects.	M		M	M	M	M
		Design shallow foundations deciding the bearing capacity of soil	M		H	M	M	M
		Analyze and design the pile and well foundation.	M		H	M	M	M
		Soil arching and estimation of tunnel support pressures.	M		H	M	M	M
		Analysis and design of coffer dams with soil structure interaction.	M		H	M	M	M
GR20D 5019	Earthquake Resistant Design of Buildings	To understand the fundamentals of earthquake engineering and seismicity conditions of the country and world.	M	M	H	M	M	M
		To perform site specific deterministic seismic hazard analysis.	M		H	M	M	M
		To understand the concepts of dynamic equations of motion and perform analysis for dynamic systems in civil engineering applications	M		H	M	M	M
		Capable to correlate information from various engineering and scientific discipline to understand complex behavior of RC structure subjected to seismic forces	M	M	H	M	M	M
		Capable to design RC structures in accordance with the provisions of Indian and International Building Codes considering seismic forces	M		H	M	M	M
GR20D 5147	Industrial Safety	Understanding of Safety principles..	H	M	M	H	M	M
		Analyze different types of exposure and biological effects, exposure guidelines and basic workplace monitoring Ability to do Hazard analysis	H	M	M	H	M	M
		Demonstrate an understanding of workplace injury prevention, risk	H	M	M	H	M	M

		management, and incident investigations.						
		Understand the acute and chronic health effects of exposures to chemical, physical and biological agents in the workplace.	H	M	M	H	M	M
		Demonstrate knowledge of the types of hazards, planning, organization and training needed to work safely with hazardous materials	H	M	M	H	M	M
GR20D 5153	Disaster Management (Audit Course 2)	To evaluate and manage the different public health aspects of disaster management Capacity to face disasters	M M		M	M	M M	M M
		Capacity to worh theoretically and practically in the process of disaster management Capacity to manage public health aspects of the disasters	M M	M	M M	M	M `	H M
		Capacity to formulte strategies for mitigation To evaluate and manage the different public health aspects of disaster management	M M	M	M	M	M M	M M
		Capacity to face disasters Capacity to worh theoretically and practically in the process of disaster management	M M	M	M M	M	M M	M H
		Capacity to manage public health aspects of the disasters	M		M	M	`	M
GR20D 5020	Lab-III (Model Testing Lab)	Evaluate the response of structure under Static and Dynamic loading.	H	H			M	H
		Generate and analyze the various structure for free and forced vibrations against prepared models using appropriate software's.	M	H				M
		Develop models and test for Static and Dynamic loading. Develop models and test for force and free vibrations.	M H	M	M H	M	M	H
		Check the stability of shear walls against lateral loading	H	M	H	M	M	M

		Evaluate the response of structure under Static and Dynamic loading.	H	H			M	H
GR20D 5021	Lab-IV (Numerical Analysis Lab)	Express algorithms in a language independent manner (as pseudo codes).	M	M	H	M		
		Analyze the efficiency of the algorithms.	M	M	H	M	M	
		Apply various searching and sorting algorithms for different applications.	M	M	H	M	M	
		Illustrate various techniques like divide and conquer, greedy and dynamic approach in solving problems.	M	M	H	M	M	M
		Identify the appropriate algorithm design techniques for real world problems.	M	M	H	M	M	M
GR20D 5143	Mini Project	Identify structural engineering problems reviewing available literature	H	H	H	H	H	H
		Demonstrate the project results with real application for sustainable constructions sustainable environment techniques	H	H	H	H	H	H
		Study different techniques used to analyse complex structural systems	H	H	H	H	H	H
		Describe about solutionshighlighting individuals' contribution and present solution by using his/her technique applying engineering principles.	H	H	H	H	H	H
		Justify the results of selected project at the end of semester	H	H	H	H	H	H
GR20D 5022	Design of Prestressed Concrete Structures	Find out the losses in prestressed concrete and enhance its concepts, which include pre and post tensioning processes	M		M	M	H	H

		Analyze and Design the statically determinate prestressed concrete members.		M	H	M	M	H
		Design the end blocks of prestressed concrete members		M	H	M	M	H
		Analyze and Design the statically indeterminate prestressed concrete members		M	H	M	M	H
		Design the composite structures using prestressed concrete techniques		M	H	M	M	H
GR20D 5023	Analysis Of Laminated Composite Plates	Analyse the Displacement Field Approximations for CLPT and FSDT.	M		M	H	M	M
		Analyse the Solutions for Bending of Rectangular Laminated Plates using CLPT.	M		M	H	M	M
		Analyse the Naiver Solutions of Cross-Ply and Angle-Ply Laminated SimplySupported Plates.	M		M	H	M	M
		Understand the Finite Element Solutions for Bending of Rectangular Laminated Plates using CLPT and FSDT	M		M	H	M	M
		Develop the computer programs for the analysis of composite plates.	M		M	H	M	M
GR20D 5024	Analysis and Design of Shells and Folded Plates	Analyse bending of plates and understand small deflection theory	M		M	H	M	M
		Analyse plates using Navier's and Levi's method.	M		M	H	M	M
		Analyse Circular plates.	M		M	H	M	M
		Use appropriate theory to analyse the shell structure.	M		M	H	M	M

		Design shell structures of singly curved and doubly curved.	M		M	H	M	M
GR20D 5146	Cost Management of Engineering Projects	Discuss various construction costs to manage a construction project.		H		M	H	H
		Summarize different construction activities and its application related to cost based on the field requirements.		M		M	M	M
		Identify Cost Behaviour of various types of cost and Quality Management	M	M		M	M	M
		Identifying various construction Budgets involved Cost Management process.					M	H
		Discussing various types of Techniques and Problem-solving techniques involved in Construction	H	M		M	M	H
GR20D 5144	Dissertation -I /Industrial Project	Identify topics in thrust areas of Structural engineering and use appropriate techniques to analyze complex structural systems	H		H	H	H	H
		Take up critical review of literature on the chosen topic	H		M	M	M	H
		Carryout independent research work on the topic by experimental / analytical approaches for structural engineering problems reviewing available literature.	H		H	H	H	H
		Apply engineering and management principles through efficient handling of project.	H		M	M	M	H
		Documentation and presentation of the research work		H				H
GR20D 5145	Dissertation II	Exhibit good communication skill to the engineering community and society.		M				H

		Demonstrate professional ethics and work culture	M			H		M
		Carryout independent research work on the topic by experimental or analytical approaches with engineering and management principles through efficient handling of project.	H		H	H	H	H
		Identify structural engineering problems and apply the principles, tools and techniques to analyze complex structural systems using appropriate techniques.	H		H	H	H	H
		Apply Prepare document and critical analysis of the results of research work and presentation.		H				H