Annexure- XIII CO-PO Mapping Tables

GR18 Regulation: M Tech 2018-20

Course Code	Name of the Course	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
GR18 D5164	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	
GR18 D5165	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	M	M	H	M	M	M

		the yield criteria of materials.						
GR18 D5166	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	
GR18 D5169	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
GR18 D5012	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
GR18 D5207	English for Research Paper	Students will be able to understand how to write a research paper	M	H		H	M	H

	Writing (Audit Course) 1	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
GR18 D5172	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
GR18 D5173	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	H	H			M
		Design high strength concrete and study the parameters affecting its performance	H	H	H	M	M	M
GR18 D5174	FEM Structural	Use minimum potential energy principle in Finite	H				M	M

	engineering	Element Method. Method.						
		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
GR18 D5175	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	H	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		
GR18	Design of	Understand the necessity	M		M	M		M

D5177	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	
GR18 D5180	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
GR18 D5208	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
		Capacity to worh	M	M	M		M	H

		theoretically and practically in the process of disaster management Capacity to manage public health aspects of the disasters	M		M	M	`	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
		Capacity to face disasters Capacity to worh theoretically and practically in the process of disaster management	M		M	M	M	H
		Capacity to manage public health aspects of the disasters	M		M	M	`	M
GR18 D5184	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.	H	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
GR18 D5185	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	M	M	H	M	M	

		different applications.						
		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
GR18 D5190	Mini Project with Seminar	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
GR18 D5186	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
GR18 D5204	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
GR18 D5191	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
GR18 D5192	Dissertation II	Exhibit good communication skill to the engineering community and		M				H

		society.						
		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
GR18 D5209	Sanskrit for Technical Knowledge	1. Understanding basic Sanskrit alphabets and Understand tenses in Sanskrit Language.		M			H	H
		2.Enable students to understand roots of Sanskrit language.		M			M	M
		3. Students learn engineering fundamentals in Sanskrit.	M				M	M
		4. Students can attempt writing sentences in Sanskrit.					M	M
		5. Ancient Sanskrit literature about science & technology can be understood.	H	M	M	M	M	M
GR18 D5210	Value Education	1. Knowledge of self-development.		H			H	H
		2. Learn the importance of Human values.		H			H	H
		3. Developing the overall personality.		H			M	M
		4. Student will be able to realize the significance of ethical human conduct and self-development.		H		M	H	H
		5. Students will be able to inculcate positive thinking,		H		H	M	M

		dignity of labor and religious tolerance.						
GR18 D5211	Indian Constitution	1. Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.		M		H	H	H
		2. Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.		M		H	H	H
		3. Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.		M			H	H
		4. Discuss the passage of the Hindu Code Bill of 1956.	M	M	H	H	H	H
		5. Discuss the significance of Election Commission of India.		H		H		
GR18 D5212	Pedagogy Studies	1. What pedagogical practices are being used by teachers in formal classrooms in developing countries?				M	M	M
		2. What pedagogical practices are being used by teachers in informal classrooms in developing countries?				M	M	M
		3. Synergy from the work force.					H	H
		4. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?					M	M
		5.How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?					M	M

GR18 D5213	Stress Management by Yoga	1. Develop healthy mind in a healthy body thus improving social health also improve efficiently.		H		H		
		2.Develop body awareness. Learn how to use their bodies in a healthy way. Perform well in sports and academics.				H	H	H
		3.Will balance, flexibility, and stamina, strengthen muscles and connective tissues enabling good posture.						
		4. Manage stress through breathing, awareness, meditation and healthy movement.				M	H	H
		5.Build Concentration confidence and positive self-image.	H	H	H	H	H	H
GR18 D5214	Personality Development through Life Enlightenment Skills	1.Study of Shrimad-Bhagwad Gita will help the student in developing his personality and achieve the highest goal in life	H	H		H	H	H
		2.The person who has studied Geeta will lead the nation and mankind to peace and prosperity	H	H			H	H
		3.To develop self-developing attitude towards work without self-aggrandizement	H	H			M	M
		4.To develop tranquil attitude in all favorable and unfavorable situations		M			M	M
		5. To develop high spiritual intelligence					M	M

Table 2.1.4 shows all Courses COs mapping with POs

GR17 Regulation: M Tech 2017-19

Course Code	Name of the Course	Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6
GR17 D5152	**Theory of Elasticity**	Explain the basic concepts of stress-strain		M	H	M		

	and Plasticity	relations in theory of elasticity						
		Analyze and interpret stresses and strains in 2-D and 3-D problems of elasticity in Cartesian coordinate system.			H		H	M
		Analyze and interpret stresses and strains in 2-D and 3-D problems of elasticity in polar coordinate system.			H		H	M
		Apply general theorems to find solutions to problems of elasticity.	M		H		M	M
		Find the solutions to torsional problems using principles of elasticity	M		H		M	M
		Find the solutions to bending problems using soap film method	M		H		M	M
		Explain various theories of failures in plasticity.	M	M	M	M	M	M
GR17 D5153	**Theory and Analysis of Plates**	Analyze bending of plates.	M	M	H	M		
		Explain small deflection theory and Analyze plates using Navier method.	M	M	H		M	
		Analyze plates using Levi's method.	M	M	H		M	
		Analyze Circular plates.	M	M	H		M	
		Analyze Orthotropic plates	M	M	H		M	
		Analyze plates on elastic foundation.	M	M	H	M	M	M
		Analyze buckling of plates	M	M	H	M	M	M
GR17 D5154	**Advanced Reinforced Concrete Design**	Design the reinforced concrete structures with an acceptable probability and performing satisfactorily during their intended life by using Limit state method of design & IS 456:2000.	M		H	M		M

		Design the reinforced concrete structures which sustain all loads and deform within the limits.	M		H	M		M
		Design the reinforced concrete structures which are durable by properly detailing the reinforcement	M	H	H	M	M	M
		Design the reinforced concrete BEAMS including DEEP BEAMS for the given loads and moments	M	M	H	M	M	M
		Design the reinforced concrete columns & combined footings for the given loads and moments	M	M	H	M	M	M
		Design the reinforced concrete FLAT SLABS & RIBBED SLABS for the given loads.	M	M	H	M	M	M
		Design the reinforced concrete CORBELS for the given loads and moments	M	M	H	M	M	M
GR17 D5155	**Advanced Concrete Technology**	List out the types of cement, admixture and decide the suitable cement and admixture for specific purpose.	M		H	M		M
		Determine the properties of ingredients of concrete (cement, fine aggregate and coarse aggregate) by conducting different tests.	M		H	M		M
		Recognize the effects of the rheology and early age properties of concrete on its long-term behavior	M		H	M		M
		Conduct the different workability tests on conventional and self compacted concrete (fresh concrete) and recognize the importance of durability of hardened	M		H	M		M

		concrete.						
		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	M
		Decide suitable concrete for different structures considering the prevailing weathering conditions and design economic concrete mix proportions for different exposure conditions.	M	M	H	M	M	M
		Design the forms for a specific work and decide the time of removal of forms for the different elements in different situations.	M	H	M	M	M	M
GR17 D5156	**Experimental Stress Analysis**	Explain on theory of elasticity for planes and principles of experimental approach to analyse stress and strain.,	M	M	H	M		
		Examine with the physical processes enabling strain to be measured by use of electrical resistance strain gauges and photo elasticity	M	M	H	M	M	M
		Obtain useful strain measurement data using strain gages and photo elasticity	M	M	H	M	M	M

		Find the strain gauge characteristics that enter into gage selection and performance and familiarity with photo elastic material properties, including 2D photo elasticity.	M	M	H	M	M	M
		Calculate stress from strain measurements	M		H		M	M
		Describe brittle coating methods	M		H		M	
		Clarify the basic ideas in optimization to make the structures.	**M**		H	M		
		Apply the linear programming techniques in engineering optimization.	**M**		H		M	M
		Solve the unconstrained and constrained optimization problems in structural design.	**M**		H		M	M
		Discuss the methods in solving the problems related to geometric and dynamic Programming	**M**		H		M	M
		Relate the advanced techniques of optimization graph theory and network analysis.	**M**	M	H		M	
		Discuss in non-linear programming	**M**		H		M	
		Validate optimization techniques to basic structural elements.	**M**	M	H	M	M	M
		Determine the static in determinacy and kinematic in determinacy of structures	**M**	M	H	M		
		Develop a flexibility and stiffness matrices according to SID and KID's	**M**	M	H	M		

		Develop a flexibility and stiffness matrices according to for truss and beam elements	**H**	M	H	M		
		Analyse statically in determinate structures using Flexibility matrix method	**M**	M	H	M	M	M
		Analyse statically in determinate structures using stiffness matrix method	**M**	M	H	M	M	M
		Apply the matrix methods in indeterminate structure and how to prepare a computer algorithm	**M**	H	M		M	
		Analyse the usage of shear walls in multi storied constructions	**H**	M	M	M	M	M
		Identify and outline the fundamentals of soil dynamics.	**M**		H	M		
		Distinguish between different types of dynamic soil properties and their experimental determination.	**M**		H		M	
		Discuss various concepts of soil dynamics for vibration analysis	**M**		H		M	
		Differentiate various types of machine foundations.	**M**	M	H	M	M	
		Express the design criteria for machine foundations.	**M**	M	H	M	M	M
		Assess principles of design of foundation for reciprocating and impact type of machines.	**M**	M	H		M	M
		Ability to find methods of isolating materials and their properties	**M**		H		M	M

		Explain the GRP in detail.	**M**		H	M		
		Aplly the GRP properties relevant to Structural design.	**M**	M	H	M	M	M
		Asess the stress strain relationship in continuous and discontinuous fibrelaminae.	**M**		H		M	
		Examine Stiffness & Strength properties of fibre reinforced Concrete	**M**		H	M	M	M
		Identify formulate & design of GRP box beams.	**M**	M	H		M	M
		Interprete Short term & long term Strength & Stiffness properties	**M**		H		M	M
		Investigate Long term loading, buckling failures of GRP box beams.	**M**		H		M	M
		Identify the suitable materials used for concrete for particular purpose.	**M**		H	M		M
		Gauge the quality control of concrete.	**M**	M	H	M		M
		Carry out the main laboratory tests relevant to the use of concrete on site	**M**	M	H	M,	M	M
		Review theoretical concepts learned in the courses concrete technology and building materials and construction planning.	**M**	M	M	M		M
		Design concrete mix for particular grade of concrete	**M**	M	H	M	M	M
		Test the concrete for various loading conditions	**M**	M	H	M	M	M

		Conduct non-destructive testing.	**M**	M	H	M	M	M
		Prepare a technical report.	**M**	H	M	M	M	M
		Demonstrate the fundamentals.	**M**			M	M	M
		Develop technical skills.	**M**			M	M	M
		Prepare for technical presentation in the conferences.	**M**	H		M	M	M
		Develop presentation skills including preparation of audio visual aids.	**M**	H	M	M	M	M
		Improve communication.		M				M
		Find public speaking skills and listening comprehension.		M				M
		Develop mathematical model for solutions in common engineering problems using Rayeligh Ritz method	**M**	M	H	M		
		Formulate simple problems into finite elements in 1-D and 2-D problems		M	H		M	
		Develop shape functions in 1-D and 2-D problems using area and volume co-ordinates		M	H		M	
		Analyse structures using Iso-parametric formulation for 4 noded and 8 noded quadrilateral elements	**M**	M	H		H	M
		Analyse structures using Axisymmetric elements	**M**	M	H		M	M
		Develop a finite element for plate and shells	**M**	M	H	M	M	M
		Differentiate linear and non-linear analysis in finite element modelling	**M**		H		M	

		Illustrate the fundamental concepts of free /forced and damped/un-damped vibratory systems.	**M**	M	H	M		
		Distinguish single DOF systems and their responses to various types of dynamic loadings.	**M**	M	H	M		
		Analyse Multiple DOF systems and their dynamic responses in terms of modes and mode shapes	**M**	M	H	M	H	M
		Analyze the dynamics response in terms of geometric and normal coordinates.	**M**		H		M	
		Perform practical vibration analysis using numerical methods	**M**	M	H		M	
		Analyze the flexural behavior of continuous systems.	**M**	M	H		M	
		Develop fundamentals in earthquake analysis.	**M**		M	M		M
		Identify and compute the design loads on a typical steel building.	**M**	M	H	M		
		Identify the different failure modes of bolted and welded connections, and determine their design strengths.	**M**	M	H	M	M	

		Design bolted and welded connections for tension and compression members and beams.	**M**	M	H	M	M	
		Analyze and design of beam-columns connection	**M**	M	H	M	M	M
		Calculate forces on the various members of the truss and design -them analyze the behaviour of bolted connections and design them design welded connections for both axial and eccentric forces	**M**	M	H	M	M	M
		To analyse various industrial steel buildings and components such as purlins, girts	**M**	M	H	M	M	M
		Designing of steel bunkers and silos.	**M**	M	H	M	M	M
		Identify evolution of process of prestressing.	**M**		H	M		
		Classify various prestressing techniques.	**M**		H	M		
		Analyse and design of prestressed concrete beams, and slabs.	**M**	M	H	M	M	M
		Clarify the terminology related to pre-stressing and pre-tensioning systems	**M**			M		M
		Analyse and Design of pre-tensioned as well as post-tensioned concrete beams and slabs using working stress as well as limit state methods	**M**	M	H		M	M
		Analyze and design the anchorage systems for pre-stressing at the construction site to design various pre-stressed structures and	**M**	M	H		M	M

		retaining elements.						
		Analyse continuous beams and simple portal frames (single bay and single story)	**M**	M	H		M	M
		Discuss about computer as a design medium	**M**	M	H	M	M	M
		Write programs using C language	**M**	M	H	M	M	M
		Write programs using C graphics and generate display of geometries	**M**	M	H		M	M
		Analyse problems of structural analysis using C and computer graphics	**M**	M	H		M	M
		Apply computer graphics to design various structural elements.	**M**	M	H		M	M
		Demonstrate the operations of Data Base Management System	**M**		H			M
		Recognise the development in Knowledge based expert systems in structural engineering	**M**	M	H		M	M
		Design the reinforced concrete structures with an acceptable probability and performing satisfactorily during their intended life by using Limit state method of design & IS 456:2000	**M**		H	M		M
		Design the reinforced concrete structures which sustain all loads and deform within the limits.	**M**		H	M		M
		Design the reinforced concrete structures	**M**	M	H	M	M	M

		which are durable by properly detailing the reinforcement						
		Design the reinforced concrete GL & OH Water Tanks & Staging	**M**	M	H	M	M	M
		Design the reinforced concrete RAFT & PILE FOUNDATIONS for the given loads and moments	**M**	M	H	M	M	M
		Design the reinforced concrete Retaining walls & Plain concrete walls for the given loads	**M**	M	H	M	M	M
		Design the reinforced concrete Deck Slab Bridge for IRC loadings for the given loads and moments	**M**	M	H	M	M	M
		Asess the principles of mathematics, Science & Engineering.	**M**		H	M		
		Differentiate the Structural behaviour of different longitudinal and transverse bridge types.	**M**	M	H	M	M	M
		Discuss about the Stresses in expansion bearings.	**M**	M	H		M	M
		Design the reinforcement in prestressed Concrete members and propped Composite Sections.	**M**	M	H		M	M
		Design the bearings, joints & piers & abutments.	**M**	M	H		M	M
		Select the appropriate design method.	**M**		H			
		Identify, formulate & Solve different load conditions.	**M**		H		M	M
		Use appropriate theory to analyze the shell structures	**H**					M

		Differentiate a shell structure based on its properties	**H**			M		
		Design shell structures of singly curved.	**H**	H				H
		Explain the structural importance of shells.	**H**	H		M		H
		Design shell structures of doubly curved.	**M**	M				H
		Describe about the structural importance of folded plates	**H**					
		Analyze Folded plates using Whitney's method/Simpsons method.	**H**	H		M		H
		Identify the ground motion and its relationship of seismic design of structures.	**M**		H	M		
		Calculate earthquake induced lateral force on the structure by using different methods.	**M**	M	H	M	M	M
		Predict damage to un-reinforced masonry buildings and identify the vulnerable features.	**M**	M	H	M	M	M
		Apply the basic principles of conceptual design for earthquake resistant RC Buildings and carry out the detailed design of earthquake resistant RC Buildings.	**M**	M	H	M	M	M
		Analyse the non structural elements so as to prevent the structural damage.	**M**		H	M	M	M
		Assess existing building structures and suggest suitable method for their effective retrofitting	**M**	M	M	M	M	M
		Demonstrate the detailing of	**M**	M	H	M	M	M

		reinforcement and ductility considerations in earthquake resistant structures.						
		Use Computer Aided Structural Analysis using popular structural analysis and design software	**M**	M	H	M	M	
		Apply recent advances in the development and use of computer methods for the solution of scientific and engineering problems related to structures.	**M**	M	H		M	M
		Develop programs for numerical methods	**M**		H		M	M
		Solve numerical techniques in computer.	**M**		H		M	M
		Apply Spreadsheet calculations for design of structural elements.	**M**	M	H		M	M
		Write, compile and debug programs in C language.	**M**	M	H		M	M
		Solve structural design problem using software.	**M**	M	H		M	M
		Prepare a technical report.	**M**	H	M	M	M	M
		Demonstrate the fundamentals.	**M**			M	M	M
		Develop technical skills.	**M**			M	M	M
		Prepare for technical presentation in the conferences.	**M**	H		M	M	M
		Develop presentation skills including preparation of audio visual aids.	**M**	H	M	M	M	M
		Improve communication.		M				M
		Find public speaking skills and listening comprehension.		M				M

		Assess knowledge in the subject and the project.	**M**		M	M	M	M
		Practice technically.	**M**		M	M	M	M
		Integrate technical question through all the years of study.	**M**		M	M	M	M
		Express and communicate.	**M**		M	M		M
		Evaluate technical confidence.	**M**	M	M	M	M	M
		Improve communication.	**M**		M	M		M
		Validate the knowledge gained through years of study.	**M**		M	M	M	M
		Interpret ideas and thoughts into practice in a project.	**M**		H	M		
		Analyze the gap between theoretical and practical knowledge.	**M**		H	M		
		Compose technical presentation in the conferences.	**M**	H	M		M	M
		Develop organizational skills and team work.	**M**		M		M	M
		Debate for technical discussions.	**M**		M		M	M
		Prepare for publishing papers in journals.	**M**	M	M	M	M	M
		Propose for the patent rights for the projects.	**M**	M	M	M	M	M
		Perform the Project Management functions effectively.	**M**			M		
		Plan the projects.	**M**	M		M	H	M
		Schedule the various activities of Projects.	**M**	M		M	H	M
		Monitor the actual progress with planned progress.	**M**	M	M	M	H	M
		Draw the CPM & PERT Networks	**M**	M	M	M	H	M

		Handle Resources planning including levelling & smoothing.	**M**	M	M	M	H	M
		Interpret the Indian Contract Act and understand the litigations involved for better Contract Management	**M**			H	M	M
		Understand the trends in e-commerce and the use of the internet. (level 2)	**H**	M		M		M
		Analyze, understand and compare the principles of E-commerce and basics of world wide web. (level 2&4)	**M**	M				M
		Analyze, Understand concept of electronic data interchange and its legal, social and technical aspects. (level 2&4)	**H**		M	H		
		Understand and evaluate the security issues over the web, the available solutions and future aspects. (level 2&5)	**H**			H		H
		Understanding and validating the concept of E-banking, electronic payments in structural engineering. (level 2&5)	**H**			M	M	H
		Understand, Analyze and compare the capabilities and limitation of agents, web based marketing and various security issues. (level 2&4)	**H**	H	H	H		H
		Understanding and evaluation of online advertisements, website design issues and creating a business transaction using an e-commerce website.	**H**	H	M	H		H

		(level 2,5&6)						
		Understanding of the basic concepts of ERP by structural engineers for manufacturing or service companies, and the differences among MRP, MRP II, and ERP by structural engineers.	**H**		M	M		
		Thinking in ERP by structural engineers: the principles of ERP by Structural engineers, their major components, and the relationships among these components.	**M**		M	M	M	M
		Capability to adapt in-depth knowledge of major ERP components, including material requirements planning, structural engineering production scheduling, and capacity requirement planning.	**M**		H	M	M	M
		Understanding knowledge of typical ERP by structural engineers and the advantage and limitations of implementing such by structural engineers			M		H	
		Understanding the business process of an enterprise	**M**			M		M
		Grasp the activities of ERP project management cycle.	**M**	M		M	M	M
		Understanding the emerging trends in ERP developments	**M**			M	M	M
		Ability to obtain the mathematical model of any structural engineering.	**M**	M	H			

		Ability to obtain the state model for dynamic by structural engineering.	**M**		H		M	
		Ability to analyse the controllability and Observability for various types of controls by structural engineers.	**M**		H		M	M
		Ability to understand the various types of nonlinearity.	**M**		H		M	M
		Ability to analyse the stability of the nonlinear by structural engineers.	**M**		H	M		
		Ability to synthesize the nonlinear by structural engineers.	**M**		H	M		
		Solve linear algebraic system by direct and iteration methods.	**M**		H		M	M
		Apply the knowledge of Eigen values and Eigen vectors to some contents in engineering.	**M**		H		M	M
		Develop the skill of working with symmetric matrices in the study of Engineering problems.	**M**	M	H	M	M	M
		Apply the knowledge of interpolation and extrapolation of uniform and non-uniform data to certain contents of Civil Engineering.	**M**	M	H	M	M	M
		Apply the knowledge of numerical differentiation and integration to some contents of Civil Engineering	**M**	M	H	M	M	M
		Learn grid based methods to solve Initial and Boundary value problems that arise in engineering problems.	**M**	M	H		M	M

		Develop the skill of solving computational problems using software.	**H**	M	H	M	M	M
		Discuss the organization of computer-based systems and how a range of design choices are influenced by applications.	**H**	M	M	M	H	M
		Design the components and operation of a memory hierarchy and the range of performance issues influencing its design.	**M**		M	M	H	
		Interpret the organization and operation of current generation parallel computer systems, including multiprocessor and multicore systems.	**M**		M		M	
		Enhance a processors ability to exploit instruction-level parallelism (ILP), and its challenges.				H	M	M
		Distinguish the architectures of computers	**M**		H			
		Develop the applications for high performance computing systems.	**M**		M	M		M
		Compare performances of modern and high performance computers.			M		M	M
		Apply various linear programming techniques for optimal allocation of limited resources such as machine, materials and money.	**H**	M			M	
		Solve transportation problems to minimize	**H**	M			M	

		cost and understand the principles of assignment of jobs and recruitment policies.						
		Solve game theory problems.	**H**	M			M	
		Solve problems of inventory and develop proper inventory policies.	**H**	M			M	
		Apply PERT/CPM: [project scheduling and allocation of resources] to schedule and control construction of dams, bridges, roads etc in a optimal way.	**H**	M			M	
		Solve sequencing problems.	**H**	M			M	
		Develop optimum replacement policy.	**H**	M			M	
		Describe What Interaction Design is and how it relates to human computer interaction and other fields.	**M**		M	M		
		Describe the social mechanisms that are used by people to communicate and collaborate.	**M**		H	M	M	
		Describe how technologies can be designed to change people's attitudes and behavior.	**M**	M	H	M		
		Discuss how to plan and run a successful data gathering program.	**M**			M	M	M
		Discuss the difference between qualitative and quantitative data and analysis.	**M**			M	M	M
		Discuss the conceptual, practical, and ethical issues involved in evaluation.	**M**			M	M	M

		Analyze the Big Data Analytic techniques for useful Business Applications.	**H**			M		
		List the capabilities of Hadoop and HDFS.	**M**					
		Describe the use of Map Reduce.						M
		Manage Job Execution in Hadoop Environment.		M				
		Explore Big Data Eco sy Structural Engineeringms pig, Hive and HBAse in IBM environment.					H	
		Analyze IBM Info sphere Big Insights Big Data solutions.					H	M
		Explore Big Insights Big SQL, BigR, Big Sheets.						
		Define the advances in neural networks.	**H**		M		M	
		Evaluate the design and control of fuzzy sy Structural Engineeringms.	**H**		M		M	
		Articulate the applications of fuzzy control block sets.	**H**		M		M	
		Evaluate the design of various models in neural networks.	**H**		M		M	
		To analyze the techniques of various types of neural networks.	**H**		M		M	
		Evaluate the design and control of associative memories.	**H**		M		M	
		Techniques to Design fuzzy logic sy Structural Engineeringms.	**H**		M		M	
		Interpret Hardware software synthesis algorithms.	**M**	M	M	H	H	H

		Learn prototyping and emulation techniques.				M	M	
		Demonstrate practical skills in the construction of prototypes.	**H**	M			M	
		Choose and use suitable target architectures.	**H**	M			H	H
		Apply embedded software techniques to satisfy functional and response time requirements.	**M**		H	M	H	H
		Apply verification tools.	**M**	H	H		H	H
		Learn two levels of design representation for system level specification, synthesis and languages.	**M**	H	M	M	M	