

**M Tech. Cos ( Structural Engineering)**

<b>Sem</b>	<b>Name of Subject</b>	<b>COs</b>
I	<b>PGST101T Matrix Analysis of Structures</b>	<p>After studying this course, the post-graduates will be able to:</p> <ol style="list-style-type: none"> <li>1. Apply the Matrix Approach for the analysis of the Planar structure like Trusses, Beams and Frames.</li> <li>2. Apply the Matrix Approach for the analysis of the grid and space structures.</li> <li>3. Create the combination of different loadings like self, temp, imposed, lack of fit, etc. and Analyze various structures for the same.</li> <li>4. Evaluate the effect of shear deformation and end conditions on the structures.</li> <li>5. Create the solutions to the structural engineering problems using various techniques such as frontal, skyline, band minimization, etc.</li> </ol>
	<b>Core Subject -II PGST102T Theory of Elasticity &amp; Elastics Stability</b>	<ol style="list-style-type: none"> <li>1. Analyze the 2-dimentional structure for various plane stresses and strains and derive the differential equations for various boundary and compatible conditions.</li> <li>2. Analyze the 2-dimentional structure for various principle stresses and shear stress and derive the differential equations for various boundary and compatible conditions.</li> <li>3. Compute the bending of beams of different section property for various types of loadings and conditions.</li> <li>4. Evaluate the buckling of beams, and plates for different loadings and end conditions using differential equation.</li> <li>5. Evaluate the buckling of columns and built-up columns for different loadings and end conditions using various methods.</li> </ol>
	<b>Core Subject -III PGST103T Structural Dynamics</b>	<ol style="list-style-type: none"> <li>1. Analyze the undamped and viscously damped structural component with single degree of freedom using fundamentals of rigid/defomed body dunamics.</li> <li>2. Evaluate the response of SDF to support motion under harmonic loading and transmissibility.</li> <li>3. Remember and appy the codal provisions of IS 1893-1984 to the building component and storage structures under earthquake loading.</li> <li>4. Understand the concept of Free Vibrations under Multi-degree freedom and buildings orthogonality criteria.</li> <li>5. Perform the dynamic analysis of the system with distributed properties and design the transformation factors using approximate methods.</li> </ol>

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I	Elective –I: Discipline Specific	
	Advanced Steel Design	<ol style="list-style-type: none"> <li>1. Perform the design of eccentric connections</li> <li>2. Design the steel chimneys.</li> <li>3. Evaluate the sizes of components of industrial shed, gantry/crane girders by performing the design.</li> <li>4. Perform the design of bridges for railway &amp; highways.</li> <li>5. Design of different Storage vessels.</li> </ol>
	Design of Earthquake Resistant Structures	<ol style="list-style-type: none"> <li>1. Understand the basic terminology related to earthquake and able to analyze and interpret the earthquake data for the application in structural engineering.</li> <li>2. Acquire the knowledge of damage, Ground vibration due to earthquake, response spectra, etc and evaluate the seismic risk.</li> <li>3. Apply the codal provisions and assess the strength and ductility behavior of various RC members and their joints subjected to different types of loading and stresses.</li> <li>4. Understand the concept of seismic resistant design for multi-storied buildings and evaluate various parameters related to it.</li> <li>5. Understand and remember the codal provision of IS 1893-1984 &amp; IS 13920 to analyze and design RC members for earthquake.</li> </ol>
	Design of Environmental Structures	<ol style="list-style-type: none"> <li>1. Analyze and design environmental structures like Elevated Service Reservoir</li> <li>2. Perform the design of environmental structure like underground storage structure.</li> <li>3. Design the water component of water intake structures like pump house, jack well, etc.</li> <li>4. Design the components of Water Treatment Plant.</li> <li>5. Design various CD work and appurtenances for different loading conditions.</li> </ol>

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I	Elective –II (Open) PGOPEN105T Elective –II (Open)	
	Global Warming and Climate Change	<ol style="list-style-type: none"> <li>1. Acquire the knowledge of earth's climatic system, global warming, hydrological cycle, role of ozone layers and their effects on environment.</li> <li>2. Understand the importance of atmosphere and its characteristics, structure, and composition.</li> <li>3. Acquire the knowledge of climate change and its impacts on various sectors like agriculture, forest, human, monsoon, etc.</li> <li>4. Recognize the efforts taken by different world agencies and countries to fight the climate change, various protocols, agreements on climate change.</li> <li>5. Abstracting the mitigation measures for climate change and categorising various techniques such as CDM, Carbon trading, future technology to fight with climate change.</li> </ol>
	Road Safety Engineering	<ol style="list-style-type: none"> <li>1. Demonstrate the fundamentals of Traffic Characteristics and studies and interpret the results using appropriate method.</li> <li>2. Explain the causes and effects of an accidents and make use of the knowledge to arrive the solutions and risk management.</li> <li>3. Examine the requirements of road geometrics, vehicle &amp; human characteristics for preparing the safety plan for road transportation.</li> <li>4. Analyze the requirements of geometric designs for the urban roads to prepare the road safety plan and suggests sustainable modes of urban transport.</li> <li>5. Undertake road safety audits and design suitable alternatives.</li> </ol>
	Laboratory -I PGST101P Matrix Analysis of Structure Lab	<ol style="list-style-type: none"> <li>1. Outline the latest computational techniques used in structural analysis.</li> <li>2. Analyze the structural component beams, plane frame, etc using stiffness matrix.</li> <li>3. Analyze the trusses, space frame with the help of stiffness matrix.</li> </ol>
	Laboratory -II PGST103P Structural Dynamics Lab	<ol style="list-style-type: none"> <li>1. Demonstrate the knowledge of rigid/deformable body dynamics and explain the concepts of damping, degree of freedom.</li> <li>2. Summarise the codal provisions of relevant IS Codes for dynamic analysis of structures.</li> <li>3. Extend the knowledge of fundamentals of earthquake and vibrations in structural dynamics.</li> </ol>

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2	PGST201T Finite Element Method	<ol style="list-style-type: none"> <li>1. Illustrate the principles of Finite Element Techniques and formulate the elements using different methods.</li> <li>2. Formulate the different functions for various structural geometry elements in cartesian coordinates and apply the knowledge acquired in 2-Dimensional stress analysis.</li> <li>3. Demonstrate the understanding of isoparametric elements to solve the 1-Dimensional structural problems.</li> <li>4. Evaluate isoparametric elements for 2-Dimensional problems and perform the axisymmetric stress analysis for plain stress/strain problems.</li> <li>5. Formulate the isoparametric elements for thin and thick plates and shells and able to model the structure.</li> </ol>
	Core Subject -V PGST202T Theory of Plates & Shell	<ol style="list-style-type: none"> <li>1. Exhibit the knowledge of symmetric bending and pure bending in relation to moment curvature for different shapes of plates and shells with different support and edge condition and formulate the differential equation for thin plates with different boundary conditions.</li> <li>2. Derive the Lagrange's and Navier's equation for plates with different support and boundary conditions and explain the finite difference method.</li> <li>3. Illustrate the understanding of shell geometry and explain the concept of membrane theory for shells.</li> <li>4. Exhibit the knowledge of different theories put forth for cylindrical shells.</li> <li>5. Perform the approximate analysis of cylindrical shells using beam arch method.</li> </ol>
	Core Subject -IV PGST203T Foundation Design	<ol style="list-style-type: none"> <li>1. Design isolated and combined footings and examine the settlement criteria.</li> <li>2. Exhibit the knowledge of theory of subgrade reaction of foundation on elastic medium and design the foundation for eccentric loadings.</li> <li>3. Extend the provisions of relevant IS Code for the design of Raft Foundation and compare other methods of design.</li> <li>4. Design the pile foundation and its element.</li> <li>5. Apply the IS Code method for the design of Simple Machine Foundation.</li> </ol>
	Elective –III: Discipline Specific	
II	High Rise Structures	<ol style="list-style-type: none"> <li>1. Illustrate the understanding of behavior tall buildings under earthquake and analyze its modes of failure.</li> <li>2. Able to model the buildings with shear wall and performs the analysis.</li> <li>3. Evaluate the multi-storied building for various special conditions.</li> <li>4. Performs the ductile design of building elements and the joints using IS Code provisions.</li> <li>5. Performs the design of multi-storied buildings with bracings and infills.</li> </ol>
	Design of Composite Construction	<ol style="list-style-type: none"> <li>1. Explain the concept of analysis of steel concrete composite structure and performs the analysis of composite beams.</li> <li>2. Design the composite floors and different types of shear connectors.</li> <li>3. Design the composite column subjected to different loadings.</li> <li>4. Apply the concept to design the encased composite structure.</li> <li>5. Acquire the knowledge of the provisions of IS Code 11382 &amp; IRC 22 for the design of composite structures.</li> </ol>

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	New Engineering Materials and Technology	<ol style="list-style-type: none"> <li>1. Exhibit the knowledge of Fibre Reinforced Concrete and its applications.</li> <li>2. Evaluate the properties of lightweight, ferro cement concrete and apply the same in real life problems.</li> <li>3. Assess the properties of flyas blended concrete and examine the effect of replacement, admixture.</li> <li>4. Exhibit the knowledge of high performance, high grade concrete.</li> <li>5. Acquire the understanding of admixtures and NDT testing of the concrete element.</li> </ol>
	PGFD205T: Foundation Course - I:	
	Research Methodology	<ol style="list-style-type: none"> <li>1. Knowledge on various kinds of research questions and research designs</li> <li>2. Formulate research problems (task) and develop a sufficiently coherent research design</li> <li>3. Assess the appropriateness of different kinds of research designs</li> <li>4. Knowledge on qualitative, quantitative and mixed methods of research, as well as relevant ethical and philosophical considerations</li> <li>5. Develop independent thinking for critically analyzing research reports</li> </ol>
	Laboratory -III PGST206P RCC Design Lab	<ol style="list-style-type: none"> <li>1. Summerize the codal provisions of IS 456, IS 962 for the Limit State Design of Multi-storied Buildings.</li> <li>2. Evaluate the effects of axial force, flexure, shear and combination thereof on RC members.</li> <li>3. Demonstrate the modeling of RC structure and design of one-way &amp; two - way slabs.</li> </ol>
	Laboratory -IV PGST207P Steel Design Lab	<ol style="list-style-type: none"> <li>1. Summerize the codal provisions of IS 800 for the design of steel structures.</li> <li>2. Performs the elementary designs of beams with open web section, various types of trusses and plate girders.</li> <li>3. Design different types fastners and connections in steel structures.</li> </ol>

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III	PGOPEN301T Elective –IV (Open)	
	Disaster Management and Mitigation	<ol style="list-style-type: none"> <li>1. Acquire the knowledge of types of disasters and management frame work.</li> <li>2. Understand the types of natural disasters and its impacts.</li> <li>3. Outline the man-made disaster and its impacts.</li> <li>4. Make use of the knowledge of disasters in preparing pre, post disaster planning and preparedness on various aspects.</li> <li>5. Acquire the knowledge of various technologies in preparing the mitigation plan for the disasters.</li> </ol>
	Water Resources Management	<ol style="list-style-type: none"> <li>1. Acquire the knowledge of water resources in the world and India and related laws, policy for water use and protection with its economics and principles of planning.</li> <li>2. Exhibit the knowledge of optimization techniques, probability &amp; statistical methods in water resource planning and management.</li> <li>3. Asses the status of flood and drought and evaluate their impacts and prepare the mitigation plans using geoinformatics.</li> <li>4. Estimate the quantity of surface and ground water, inter-basin transport of water, etc and asses the water demands in various sectors.</li> <li>5. Evaluate the water requirement for environment and ecosystem management and assess the tangible and intangible impacts of water resource development.</li> </ol>
	Foundation Course-II	
	PGFD302T Project Planning & Management	<ol style="list-style-type: none"> <li>1. Exhibit the knowledge of principles and philosophy of project management and project life cycle.</li> <li>2. Able to identify the project, its initiation and undertake its planning and pre-feasibility study with the understanding the role of organization, team and individual.</li> <li>3. Demonstrate the knowledge of resource allocation schedulling, project cost estimation and risk management.</li> <li>4. Make use of the concept of quality in the project and understand the application of project management information system in planning and construction of the project.</li> <li>5. Able to undertake execution of the project and evaluate the performance using project management software.</li> </ol>
	PGST303P Project Seminar	<ol style="list-style-type: none"> <li>1. Undertake the real life problem of structural engineering and follow the professional ethics.</li> <li>2. Apply the knowledge of modern tools and techniques.</li> <li>3. Prepare the presentation and deliver the content.</li> </ol>

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IV	PGST401P Project	<ol style="list-style-type: none"><li>1. Solve the real life problem in structural engineering using modern tools and techniques with an approach of professional ethics and draw a suitable conclusion.</li><li>2. Prepare the presentation of the work and deliver the content.</li><li>3. Write the thesis, interpret the result and present the same.</li></ol>