ADITYA ENGINEERING COLLEGE

An Autonomous Institution

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Department of Civil Engineering

M.Tech (Structural Engineering) - AR17 - Course Articulation Matrix

Note: Correlation Levels are 1 or 2 or 3. Where 1- Slight (Low), 2 - Moderate (Medium), 3 - Substantial (High).

-	CO Statements	POs												PSOs		
I SEM																
Course Code	**172SE1T01 ADVANCED MATHEMATICS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Solve heat equation and laplace equation in different co-ordinate system.	1	2	1	3	3	2		-			-	-	1		2
CO2	Calculate numerical solutions to the problems on heat and laplace equations using various methods.	2	3	2	3	3	3		-			-	-	3	1	3
CO3	Analyse statistical data using various mathematical techniques.	1	2	1	3	3	2	-	-			-	-	2		3
CO4	Interpret the results of bi-variate regression and correlation analysis for solving engineering problems.	-	1	-	2	2	1	-	-			-		1		2
CO5	Solve linear and non- linear programming problems using different methods.	2	3	2	3	3	3	-	-			-	-	3	1	3
Course Code	**172SE1T02 THEORY OF ELASTICITY**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the theory of elasticity including strain/displacement and hooke's law relationships.		1	-	2	2	1	-	-	-	-	-	-	1	-	2
CO2	Apply fourier series for two dimensional problems for gravity loading.		1	-	2	2	1	-	-	-	-	-	-	1	-	2
CO3	Develop general equations for two dimensional problems in polarcoordinates	1	2	1	3	3	2	-	-	-	-	-	-	2	-	3
CO4	Determine principal stress and shear stress using general theorems.	2	3	2	3	3	3	-	-	-	-	-	-	3	1	3
CO5	Develop Solutions for torsional problems by energy method.		1	-	2	2	1	-	-	-	-	-	-	1	-	2

-	CO Statements	POs												PSOs		
Course Code	**172SE1T03 MATRIX ANALYSIS OF STRUCTURES**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Calculate element stiffness for truss, beam & torsional element.	1	2	1	-	-	-	-	-	-	-	-	-	1	-	
CO2	Analyze simple pin jointed truss, continuous beams & frames	2	3	2	-	-	-	-	-	-	-	-	-	3	-	
CO3	Solve grid element problem, tapered and curved beams.	1	2	1	-	-	-	-	-	-	-	-	-	2	-	
CO4	Illustrate band width, static condensation, sub structuring & support displacement.		1	-	-	-	-	-	-	-	-	-	-	1	-	
CO5	Examine space truss & space frames.	2	3	2	-	-	-	-	-	-	-	-	-	3	-	
Course Code	**172SE1T04 STRUCTURAL DYNAMICS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Illustrate the principles of structural dynamics.	1	2	1	-		-	-	-	-	-	-		2	-	-
CO2	Explain the elements of a vibratory system.		1	-	-		-	-	-	-	-	-		1	-	-
CO3	Determine the SDOF system response subjected to different loadings.	2	3	2	-		-	-	-	-	-	-		3	-	-
CO4	Develop the solution techniques for dynamics of multi-degree freedom systems.	2	3	2	-		-	-	-	-	-	-		3	-	-
CO5	Describe the concepts of damping in structures.	1	3	1	-	-	-	-	-	-	-	-		2	-	-
CO6	Solve the solution techniques for dynamics of continuous systems.	2	3	2										3		
Course Code	**172SE1E01 EXPERIMENTAL STRESS ANALYSIS (ELECTIVE-I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain strain measurement methods.	-	1	-	2		-	-	-	-		-		1	-	1
CO2	Examine strain using electrical resistance strain gauges.	2	1	2	3		-	-	-	-		-		1	-	1
CO3	Experiment with Non destructive testing	1	3	1	3		-	-	-	-		-		2	-	3
CO4	Explain different methods of photo-elasticity for strain measurement.	-	1	-	2		-	-	-	-		-		3	1	3
CO5	Apply photo elasticity concepts on two dimensional problems.	1	2	2	3		-	-	-	-		-		2	-	3

-	CO Statements	POs												PSOs		
Course Code	**172SE1E02 SUB-STRUCTURE DESIGN (ELECTIVE I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Discuss the soil exploration methods.		1	-	2	-	-	-	-		-	-		1	-	-
CO2	Classify soil sampling techniques to be considered for accurate results.	2	3	-	3	-	-	-	-		-	-		3	-	-
CO3	Demonstrate factors that influences the bearing capacity in different soils for shallow foundations.		1	-	2	-	-	-	-		-	-		1	-	-
CO4	Design mat and floating foundations.	2	3	-	3	-	-	-	-		-	-		3	-	-
CO5	Design pile foundations.	2	3	-	3	-	-	1	-		-	-		3	-	-
Course Code	**172SE1E02 STRUCTURAL OPTMIZATION (ELECTIVE I)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain principles of optimization.		1		2	-	-	-	-			-		1	-	**2**
CO2	Apply the classical optimization techniques for the structural engineering problems.	1	2	1	3	-	-	-	-			-		2	-	3
CO3	Analyze the non-linear Programming.	2	3	3	2	-	-	-	-			-		3	1	3
CO4	Analyze the linear programming.	2	3	3	2	-	-	-	-			-		3	1	3
CO5	Analyze the quadratic programming.	2	3	3	2	-	-	-	-			-		3	1	3
CO6	Design beams and frames using dynamic programming technique.	2	3	3	2									3	1	3
Course Code	**172SE1E04 REPAIR AND REHABILITATION OF STRUCTURES (Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Identify the causes of deterioration of concrete structures	1	-	-	-	3			-	-	-	-	-	2	-	**3**
CO2	Illustrate the various materials for repair and rehabilitation techniques	-	-	-	-	2			-	-	-	-	-	1	-	**2**
CO3	Construct the various strengthening and stabilization techniques	1	-	-	-	3			-	-	-	-	-	2	-	3
CO4	Determine various repair techniques of damaged structures	3	-	-	-	3			-	-	-	-	-	3	-	3
CO5	Evaluate the usage of different types of concretes and durability aspects	3	-	-	-	3			-	-	-	-	-	3	-	**3**

-	CO Statements	POs												PSOs		
CO6	Classify the usage of high performance concretes for repairing works.	3				3								3		**3**
Course Code	**172SE1E05 ANALYSIS AND DESIGN OF TALL BUILDINGS (Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain different types of concrete used in construction of tall buildings.	-	1		2	-		-	-	-	-	-	-	1	-	-
CO2	Calculate various loads acting on buildings.	1	2	1	3	-		-	-	-	-	-	-	2	-	-
CO3	Summarize the behaviour of various structural systems.	-	1	-	2	-		-	-	-	-	-	-	1	-	-
CO4	Design various structural systems for tall buildings.	2	3	2	3	-		-	-	-	-	-	-	3	-	-
CO5	Analyze stability of structural systems in tall buildings.	2	3	2	3	-		-	-	-	-	-	-	3	-	-
Course Code	**172SE1E06 PLASTIC ANALYSIS AND DESIGN (Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the fundamentals of plastic analysis.		1											2		3
CO2	Determine collapse load of a given structural model based on limit theorems.	1	2	1										2		3
CO3	Apply different methods for the design of continuous beams and simple frames.	1	2	1										2		3
CO4	Determine the deflection in plastic beams and frames.	1	2	1										1		2
CO5	Discuss minimum weight design functions.		1											1		2
Course Code	**172SE1L01 ADVANCED STRUCTURAL ENGINEERING LABORATORY (Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain Knowledge of design and development of experimenting skills.	1	2	1	3	-		-	-	-	-	-	-	1		
CO2	Describe the principles for the design of experiments.	2	3	2	3	-		-	-	-	-	-	-	3		
CO3	Evaluate the materials for sustainable constructions	1	2	1	3	-		-	-	-	-	-	-	2		
CO4	Summarize the testing methods and equipments.		1		2	-		-	-	-	-	-	-	1		
CO5	Analyze the performance of structural elements.	2	3	2	3	-		-	-	-	-	-	-	3		

-	CO Statements	POs												PSOs		
II SEM																
Course Code	**172SE2T05 FINITE ELEMENT METHOD (Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Summarize direct and formal methods for deriving finite element equations.		1		-	-	-	-	-	-	-	-	-	1	-	-
CO2	Solve truss elements using the finite element method.	1	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO3	Apply finite element methods for analysis of beam and frame elements.	1	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO4	Analyze plane stress, plane strain, axisymmetric problems element method.	2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO5	Analyze isoparametric formulations.	2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
Course Code	**172SE2T06 EARTHQUAKE RESISTANT DESIGN (Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Demonstrate knowledge on seismic effects on various structures.	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	Develop the seismic design concepts for different kinds of building systems.	1	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO3	Examine 3D modelling of building systems	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	Analyze the concepts of elastic behaviour of different materials subjected	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO5	Categorize the Seismic evaluation and retrofitting of structures.	2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
Course Code	**172SE2T07 STABILITY OF STRUCTURES (Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the behaviour of beam columns for different loading conditions.	3	3	2	-	-	-	-	-	-	-	-	3	-	-	-
CO2	Examine the principles of strength, stability, elastic buckling behaviour of bars.	3	3	2	-	-	-	-	-	-	-	-	3	-	-	-
CO3	Design inelastic buckling behaviour of structural members.	3	3	3	-	-	-	-	-	-	-	-	3	-	-	-
CO4	Examine buckling behaviour of thin walled bars of open cross section under torsion.	3	3	3	-	-	-	-	-	-	-	-	3	-	-	-
CO5	Analyze beams subjected to lateral buckling.	3	3	2	-	-	-	-	-	-	-	-	3	-	-	-

-	CO Statements	POs												PSOs		
Course Code	**172SE2T08 THEORY OF PLATES AND SHELLS (Elective – II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the behaviour of rectangular plates under various loading conditions.	1	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO2	Evaluate the internal parameters in circular plates& annular plate	2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	Examine shells using principles of membrane theory & bending theory.	2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO4	Illustrate applications of short and long shells.	1	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO5	Analyze cylindrical shells of different shapes by membrane theory.	2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
Course Code	**172SE2E07 PRE-STRESSED CONCRETE (Elective – III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain methods of prestressing of concrete.	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	Determine various losses in both pre-tension & post-tension sections	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3	Analysis the members for flexure, shear, torsion in prestressed members.	2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO4	Analyze and design for deflection and crack control of prestressed concrete	2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
CO5	Illustrate simple connections of prestressed concrete members.	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-
Course Code	**172SE2E08 MECHANICS OF COMPOSITE MATERIALS (Elective – III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Illustrate the properties of fiber and matrix materials used in commercial	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
CO2	Analyze problems on macro mechanical behavior of lamina.	**2**	3	2	-	-	-	-	-	-	-	-	3	-	-	-
CO3	Determine stresses and strains in composites.	**1**	2	1	-	-	-	-	-	-	-	-	2	-	-	-
CO4	Apply hook's law for a two dimensional angle lamina.	**1**	2	1	-	-	-	-	-	-	-	-	2	-	-	-
CO5	Explain failure criteria and critically evaluate the result.	**1**	2	1	-	-	-	-	-	-	-	-	2	-	-	-

-	CO Statements	POs												PSOs		
Course Code	**172SE2E09 FRACTURE MECHANICS (Elective – III)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain fundamentals of fracture mechanics, yield criteria & flow-rules.	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	Describe the experimental methods to determine the fracture toughness.	2	3	2	-	-	-	-	-	-	-	-	-	2	-	-
CO3	Apply principles of fracture mechanics	1	2	1	-	-	-	-	-	-	-	-	-	3	-	-
CO4	Solve real problems related to plastic fracture mechanics.	1	3	1	-	-	-	-	-	-	-	-	-	2	-	-
CO5	Design structures using fracture mechanics approaches.	2	3	2	-	-	-	-	-	-	-	-	-	3	-	-
Course Code	**172SE2E10 INDUSTRIAL STRUCTURES (Elective - IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Illustrate the planning and functional requirements of industrial building	1	2	1	3	-	-	-	-	-	-	-	-	2	-	-
CO2	Analyze the components of industrial building.	2	3	2	3	-	-	-	-	-	-	-	-	3	1	-
CO3	Design different folded plates of industrial structures and detailing.	2	3	2	3	-	-	-	-	-	-	-	-	3	1	-
CO4	Distinguish the principles of power plant structures- bunkers and silos chimney and cooling towers.	2	3	2	3	-	-	-	-	-	-	-	-	3	1	-
CO5	Summarize the power transmission structures, transmission line towers and	3	3	3	3	-	-	-	-	-	-	-	-	3	2	-
Course Code	**172SE2E11 BRIDGE ENGINEERING (Elective - IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Illustrate principles of designing of bridges.	-	1	-	2	-	-	-	-	-	-	-	-	1	-	-
CO2	To enable the students to know different types of bridge designing methods.	1	2	1	3	-	-	-	-	-	-	-	-	2	-	-
CO3	To impart the knowledge on different methods of inspection of bridges and maintenance.	2	3	2	3	-	-	-	-	-	-	-	-	1	-	-
CO4	To equip the students with necessary knowledge to analyse and design various bridges.	3	3	3	3	-	-	-	-	-	-	-	-	3	-	-
CO5	To make the students to learn the concept of stability analysis of piers and	1	1	1	2	-	-	-	-	-	-	-	-	1	-	-

-	CO Statements	POs												PSOs		
Course Code	**172SE2E12 EARTH RETAINING STRUCTURES (Elective - IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Solve earth pressure on various earth retaining structures such as gravity	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1
CO2	Evaluate the mechanical properties of geo synthetics used for soil reinforcement.	3	3	3	3	-	-	-	-	-	-	-	-	3	3	1
CO3	Constructing of sheet pile with and without anchors.	3	2	1	2	-	-	-	-	-	-	-	-	1	-	3
CO4	Select the most technically appropriate type of retaining wall for the application.	3	3	3	3	-	-	-	-	-	-	-	-	1	3	-
CO5	Design a relevant earth retaining structure for given soil conditions.	3	3	3	3	-	-	-	-	-	-	-	-	1	1	-
CO6	Summarize the current guidelines regarding the design of earth retaining structures	3	1		1	-	-	-	-	-	-	-	-	1	-	1
CO7	Develop retaining structures considering both external and internal stability aspects.	3	3	3	3	-	-	-	-	-	-	-	-	-	1	
Course Code	**172SE2L02 CAD LABORATORY (Elective - IV)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	Illustrate the knowledge of skills for needed for structural engineering.	-	1	-	2	-	-	-	-	-	-	-	-	1	-	2
CO2	Understand the principles of structural analysis and design.	-	1	-	2	-	-	-	-	-	-	-	-	1	-	2
CO3	Analyze the various structural member using advanced softwares like revit, staad etc.	2	3	2	3	-	-	-	-	-	-	-	-	3	1	3
CO4	Evaluate the mode shapes and frequencies of tall buildings	3	3	3	3	-	-	-	-	-	-	-	-	3	2	3
CO5	Summarize the performance of structures for static and dynamic forces.	2	2	3	3	-	-	-	-	-	-	-	-	3	1	3