

GUJARAT TECHNOLOGICAL UNIVERSITY

CIVIL ENGINEERING ADVANCE STRUCTURAL ANALYSIS SUBJECT CODE: 2150610 B.E. 5th SEMESTER

Type of course: Applied Mechanics

Pre-requisites: Mechanics of Solids, Structural Analysis-I & II

Rationale: This subject is conceptual applications of principles of mechanics of rigid and deformable bodies in Engineering.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks						Total Marks
L	T	P		Theory Marks			Practical Marks			
			ESE (E)	PA (M)		ESE (V)		PA (I)		
PA	ALA	ESE		OEP						
4	2	0	6	70	20	10	30	0	20	150

Content:

Sr. No.	Topics	Total hours	Module Weightage
1	Matrix Methods: Types of skeletal structures, Internal forces and deformations. Introduction and applications of flexibility method and stiffness method to analyze beams, Trusses and plane frames.	16	40
2	Domes: Uses of domes, Types of domes, Nature of stresses in conical and spherical domes, Analysis of conical and spherical domes subjected to uniformly distributed load, concentrated load at crown, Analysis of domes with opening.	14	30
3	Plastic Method: Concept, Assumptions, Shape factor for different cross section, Collapse load, Load factor, Plastic modulus of section, Plastic moment of resistance, Computation of collapse load for fixed beam, Continuous beam and plane frame subjected to various load cases.	12	30

Suggested Specification table with Marks (Theory):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	20	20	25	15	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

1. William Weaver, Jr & James M. Gere, Matrix Analysis of Framed Structures, CBS Publishers & Distributors, Delhi.
2. Wang C.K., Matrix methods of Structural Analysis Mc Graw Hill book Company, New Delhi.
3. Elements of Matrix and Stability Analysis of Structures by Manicka Selvam
4. Junnarkar S. B. & Shah H.J, Mechanics of Structures Vol-II, Charotar publishing house, Anand.
5. Meghre & Deshmukh; Matrix Analysis of Structures, Charotar Publication
6. Reddy C.S., Basic Structural Analysis, Tata Mc Graw Hill Publishing Company Ltd, New Delhi.
7. Neal B G, Plastic Analysis, Mc Graw hill Publication.

Course Outcome:

After learning the course the students should be able to:

1. Determine displacements and internal forces of statically indeterminate structures by matrix methods.
2. Determine stresses in domes.
3. Determine collapse load for indeterminate structures.

Term-Work:

The students will have to solve at least seven examples and related theory from each topic as an assignment/tutorial. Practical examinations shall consist of oral based on term-work and above course.

ACTIVE LEARNING ASSIGNMENTS: Preparation of power-point slides, which include videos, animations, pictures, graphics for better understanding theory and practical work – The faculty will allocate chapters/ parts of chapters to groups of students so that the entire syllabus to be covered. The power-point slides should be put up on the web-site of the College/ Institute, along with the names of the students of the group, the name of the faculty, Department and College on the first slide. The best three works should submit to GTU.