

B. E. CIVIL ENGINEERING Choice Based Credit System (CBCS) and Outcome Based Education (OBE) SEMESTER - VI			
MATRIX METHOD OF STRUCTURAL ANALYSIS			
Course Code	18CV641	CIE Marks	40
Teaching Hours/Week(L:T:P)	(3:0:0)	SEE Marks	60
Credits	03	Exam Hours	03
Course Learning Objectives: This course will enable students to <ol style="list-style-type: none"> 1. Gain basic knowledge of structural systems and application of concepts of flexibility and stiffness matrices for simple elements. 2. Understand flexibility and stiffness matrices to solve problems in beams, frames and trusses. 3. Gain knowledge of direct stiffness method to solve problems in beams, frames and trusses. 4. Gain knowledge of solving problems involving temperature changes and lack of fit. 			
Module -1			
Introduction: Structural systems, geometric and material non-linearity, principle of superposition, equilibrium and compatibility conditions, static and kinematic indeterminacy, principle of minimum potential energy and minimum complementary energy, concepts of stiffness and flexibility, flexibility and stiffness matrices of beam and truss elements.			
Module -2			
Element Flexibility Method: Force transformation matrix, global flexibility matrix, analysis of continuous beams, rigid frames and trusses.			
Module -3			
Element Stiffness Method: Displacement transformation matrix, global stiffness matrix, analysis of continuous beams, rigid frames and trusses.			
Module -4			
Effects of Temperature Changes and Lack of Fit: Related numerical problems by flexibility and stiffness method as in Module 2 and Module 3.			
Module -5			
Direct Stiffness Method: Local and global coordinates systems, principle of contra gradient, global stiffness matrices of beam and truss elements, analysis of continuous beams and trusses.			
Course Outcomes: After studying this course, students will be able to: <ol style="list-style-type: none"> 1. Evaluate the structural systems to application of concepts of flexibility and stiffness matrices for simple problems. 2. Identify, formulate and solve engineering problems with respect to flexibility and stiffness matrices as applied to continuous beams, rigid frames and trusses. 3. Identify, formulate and solve engineering problems by application of concepts of direct stiffness method as applied to continuous beams and trusses. 4. Evaluate secondary stresses. 			
Question paper pattern: Question paper pattern: <ul style="list-style-type: none"> • The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. • There will be two full questions (with a maximum of four sub- questions) from each module. • Each full question will have sub- question covering all the topics under a module. • The students will have to answer five full questions, selecting one full question from each module. 			
Textbooks: <ol style="list-style-type: none"> 1. Weaver W and Gere J H, “Matrix Analysis of Framed Structures”, CBS publications, New Delhi. 2. Rajasekaran S, “Computational Structural Mechanics”, PHI, New Delhi. 3. Madhujit Mukhopadhyay and Abdul Hamid Sheikh, “Matrix and Finite Element Analysis of Structures”, Ane Books Pvt. Ltd. 			
Reference Books:			

1. Godbole P N et.al, "Matrix Method of Structural Analysis", PHI Ltd, New Delhi.
2. Pundit and Gupta, "Theory of Structures Vol II", TMH publications, New Delhi
3. A K Jain, "Advanced Structural Analysis", Nemchand Publications, Roorkee.
4. Manikaselvam, "Elements of Matrix Analysis and Stability of Structures", Khanna Publishers, New Delhi.
5. H C Martin, "Introduction to Matrix Methods in Structural Analysis", International textbook company, McGraw Hill.


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