

Course Title: Matrix Method of Structural Analysis As per Choice Based Credit System (CBCS) scheme] SEMESTER:VI			
Subject Code	15CV652	IA Marks	20
Number of Lecture Hours/Week	03	Exam Marks	80
Total Number of Lecture Hours	40	Exam Hours	03
CREDITS –03		Total Marks- 100	
Course 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. 			
Modules		Teaching Hours	Revised Bloom's Taxonomy (RBT) Level
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		08 hours	L2, L4,L5
Module -2			
Element Flexibility Method: Force transformation matrix, global flexibility matrix, analysis of continuous beams, rigid frames and trusses.		08 Hours	L2, L4,L5
Module -3			
Element Stiffness Method: Displacement transformation matrix, global stiffness matrix, analysis of continuous beams, rigid frames and trusses.		08 Hours	L2, L4,L5
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.		08 Hours	L2, L4,L5
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		08 Hours	L2, L4,L5
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. 			
Program Objectives: <ul style="list-style-type: none"> • Engineering knowledge • Problem analysis • Interpretation of data 			
Question Paper Pattern: <ul style="list-style-type: none"> • The question paper will have 5 modules comprising of ten questions. Each full question carrying 16 marks • There will be two full questions (with a maximum of three subdivisions, if necessary) from each module. • Each full question shall cover the topics as a module • The students shall answer five full questions, selecting one full question from each module. If more than one question is answered in modules, best answer will be considered for the award of marks limiting one full question answer in each module. 			
Text Books: <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.