Course Code	Course Name	L-T-P-Credits	Year of Introduction
CE403	STRUCTURL ANALYSIS - III	3-0-0-3	2016

Prerequisite :CE303 Structural Analysis - II

Course objectives:

- To enable the students to have a comprehensive idea of matrix structural analysis with emphasis on the relative advantages of the flexibility method and the stiffness method
- To enable the students to visualize structural dynamics problems with a proper blend of structural analysis and vibration theory

Syllabus :

Approximate Methods of Analysis of Multistoried Frames, Matrix analysis of structures, Flexibility method, Stiffness method, Introduction to direct stiffness method, Structural dynamics

Expected Outcomes:

The students will be able to

i. analyse structures using approximate method
ii. analyse trusses, continuous beams and rigid frames using flexibility method
iii. analyse trusses, continuous beams and rigid frames by stiffness method
iv. conceive Finite element procedures by direct stiffness method
v. use the basics of structural dynamics and analyse the response of SDOF systems

Text Books :

1. G S Pandit and S P Gupta, Structural analysis a Matrix approach, McGraw Hill Education (India), 2e, 2008
2. Gere, J.M. and William Weaver, Matrix Analysis of framed structures, CBS Publishers, 1990
3. Kenneth M Leet, Chia Ming Uang, Anne M Gilbert, Fundamentals of structural analysis, Tata McGraw Hill Pvt Ltd., 4e, 2010
4. Reddy C.S., Basic structural analysis, Tata McGraw Hill, third edition, 3e, 2012

References :

1. Anil. K. Chopra, Dynamics of structures, Pearson Education/ Prentice Hall India, 5e, 2016
2. Clough R.W. and Penzein, J., Dynamics of structures, Tata McGraw Hill, 1995
3. Madhujith Mukhopadhyay and Abdul Hamid Sheikh, Matrix and Finite Element Analysis of Structures, Ane Books India, 2009
4. Mario Paz , Structural Dynamics: Theory & Computation, 2e, CBS Publishers, 2004
5. Rajasekharan. S. and Sankarasubramanian G., Computational structural Mechanics, PHI, 2009
6. Wang C.K., Matrix method of structural analysis, International Text book company, 1970

COURSE PLAN

Module	Contents	Hours	Sem. Exam Marks %
I	Approximate Methods of Analysis of Multistoried Frames: Analysis for vertical loads-substitute frames-loading condition for maximum hogging and sagging moments in beams and maximum bending moment in columns- wind load analysis of multistoried frames – portal method and cantilever method for lateral load analysis.	6	15

II	Matrix analysis of structures: static and kinematic indeterminacy-force and displacement method of analysis-definition of flexibility and stiffness influence coefficients Concepts of physical approach	6	15
FIRST INTERNAL EXAMINATION			
III	Flexibility method: flexibility matrices for truss and frame elements-load transformation matrix-development of total flexibility matrix of the structure-analysis of simple structures-plane truss and plane frame-nodal loads and element loads-lack of fit and temperature effects	7	15
IV	Stiffness method: Development of stiffness matrices by physical approach-stiffness matrices for truss and frame elements-displacement transformation matrix-analysis of simple structures-plane truss and plane frame-nodal loads and element loads-lack of fit and temperature effects	7	15
SECOND INTERNAL EXAMINATION			
V	Introduction to direct stiffness method-Rotation of axes in two dimensions, stiffness matrix of elements in global co- ordinates from element co-ordinates- assembly of load vector and stiffness matrix, solution of two span continuous beam-single bay single storey portal frame.	8	20
VI	Structural dynamics-introduction-degrees of freedom-single degree of freedom subjected to harmonic load -linear systems- equation of motion, D'Alembert's principle-damping- free response of damped and undamped systems- logarithmic decrement- transient and steady state responses, Dynamic magnification factor – Vibration isolation –Concept of two degree of freedom systems (No derivation and numerical problems)	8	20
END SEMESTER EXAMINATION			

QUESTION PAPER PATTERN (End semester examination)

Maximum Marks :100 **Exam Duration: 3 Hrs**

Part A -Module I & II : 2 questions out of 3 questions carrying 15 marks each

Part B - Module III & IV: 2 questions out of 3 questions carrying 15 marks each

Part C - Module V & VI : 2 questions out of 3 questions carrying 20 marks each

Note : 1.Each part should have at least one question from each module

2. Each question can have a maximum of 4 subdivisions (a, b, c, d)