

ST5204 FINITE ELEMENT ANALYSIS OF STRUCTURES

DETAILED SYLLABUS

UNIT I INTRODUCTION

Approximate solutions of boundary value problems - Methods of weighted residuals, approximate solution using variational method, Modified Galerkin method, Boundary conditions and general comments-continuity,compatibility,convergence aspects. Basic finite element concepts - Basic ideas in a finite element solution, General finite element solution procedure, Finite element equations using modified Galerkin method.

UNIT II AXIAL DEFORMATION OF BARS, AXIAL SPRING ELEMENT

Natural Coordinates - Triangular Elements -Rectangular Elements - Lagrange and Serendipity Elements -Solid Elements - Isoparametric Formulation - Stiffness Matrix of Isoparametric Elements - Numerical Integration: One, Two and Three Dimensional - Examples.

UNIT III ANALYSIS OF FRAMED STRUCTURES

Stiffness of Truss Member - Analysis of Truss -Stiffness of Beam Member-Finite Element Analysis of Continuous Beam -Plane Frame Analysis -Analysis of Grid and Space Frame – Two Dimensional Solids - Constant Strain Triangle -Linear Strain Triangle -Rectangular Elements - Numerical Evaluation of Element Stiffness - Computation of Stresses, Geometric Nonlinearity and Static Condensation - Axisymmetric Element -Finite Element Formulation of Axisymmetric Element -Finite Element Formulation for 3 Dimensional Elements – Solution for simple frames.

UNIT IV PLATES AND SHELLS

Introduction to Plate Bending Problems - Finite Element Analysis of Thin Plate -Finite Element Analysis of Thick Plate -Finite Element Analysis of Skew Plate - Introduction to Finite Strip Method -Finite Element Analysis of Shell.

For Syllabus, Question Papers, Notes & many More

UNIT V APPLICATIONS

Finite Elements for Elastic Stability - Dynamic Analysis - Nonlinear, Vibration and Thermal Problems - Meshing and Solution Problems - Modelling and analysis using recent softwares.

REFERENCES:

1. Bhavikatti.S.S, "Finite Element Analysis", New Age International Publishers, 2007.
2. Chandrupatla, R.T. and Belegundu, A.D., "Introduction to Finite Elements in Engineering", Prentice Hall of India, 2007.
3. Rao.S.S, "Finite Element Method in Engineering", Butterworth – Heinmann, UK, 2008
4. Logan D. L., A First Course in the Finite Element Method, Thomson Learning, 2007.
5. R.D.Cook, Concepts and Applications of Finite Element Analysis, John Wiley & Sons.
6. David Hutton, "Fundamentals of Finite Element Analysis", Tata McGraw Hill Publishing Company Limited, New Delhi, 2005.

OBJECTIVE :

To study the basics of the Finite Element Technique, a numerical tool for the solution of different classes of problems.