I Year II Semester   **L   P   C**

Code: 17CC204   **4   0   3**

FINITE ELEMENT METHODS

UNIT - I
Formulation Techniques: Methodology, Engineering problems and governing differential equations, finite elements., Variational methods-potential energy method, Raleigh Ritz method, strong and weak forms, Galerkin and weighted residual methods, calculus of variations, Essential and natural boundary conditions.

UNIT – II
One-dimensional elements: Bar, trusses, beams and frames, displacements, stresses and temperature effects.

UNIT – III
Two dimensional problems: CST, LST, four noded and eight nodded rectangular elements, Lagrange basis for triangles and rectangles, serendipity interpolation functions. Axisymmetric Problems: Axisymmetric formulations, Element matrices, boundary conditions. Heat Transfer problems: Conduction and convection, examples: - two-dimensional fin.

UNIT – IV
Isoparametric formulation: Concepts, sub parametric, super parametric elements, numerical integration, Requirements for convergence, h-refinement and p-refinement, complete and incomplete interpolation functions, Pascal's triangle, Patch test.

UNIT – V
Finite elements in Structural Analysis: Static and dynamic analysis, eigen value problems, and their solution methods, case studies using commercial finite element packages.

TEXT BOOK:
1. 1.Finite element methods by Chandrupatla & Belagundu.

REFERENCES:
1. J.N. Reddy, Finite element method in Heat transfer and fluid dynamics, CRC press,1994
2. Zienckiwicz O.C. & R. L. Taylor, Finite Element Method, McGraw-Hill,1983.
3. K. J. Bathe, Finite element procedures, Prentice-Hall, 1996