CE/BOS/CE 502/0709

K L UNIVERSITY

FINITE ELEMENT ANALYSIS (CE C502)

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SYLLABUS

UNIT – I Basic Principles

Equilibrium equations; Strain-displacement relations; linear constitutive relations; Principle virtual work; Principle of stationary potential energy

UNIT – II Element Properties

Different types of elements; Displacement models; Relation between nodal degrees of freedom and generalized coordinates; Convergence requirements; Compatibility requirement; Geometric invariance; Natural coordinate systems; Shape functions; Element strains and stresses; Element stiffness matrix; Element nodal load vector. Isoparametric elements – Definition, Two-dimensional isoparametric elements – Jacobian transformation, Numerical integration

UNIT – III Direct Stiffness method and Solution Technique

Assemblage of elements–Obtaining Global stiffness matrix and Global load vector; Governing equilibrium equation for static problems; Storage of Global stiffness matrix in banded and skyline form; Incorporation of boundary conditions; Solution to resulting simultaneous equations by Gauss elimination method

UNIT – IV Plane-stress and Plane-strain analysis

Solving plane stress and plane-strain problems using constant strain triangle and four nodded isoparametric element

UNIT – V Analysis of plate bending

Basic theory of plate bending; Shear deformation plates; Plate bending analysis using four noded isoparametric elements

References:

1. Finite Element Analysis by Abel and Desai, New Age Publishers, 2007.
2. Finite Element Analysis: Theory and Programming by C. S. Krishnamoorthy, Tata McGraw- Hill, 1995
3. Finite Element Procedures in Engineering Analysis by K. J. Bathe, Prentice Hall Inc., 1996.
4. The Finite Element Method by O.C. Zienkiewicz, and R.L.Taylor, McGraw – Hill, 1987.
5. Introduction to Finite Elements in Engineering by R.T. Chandrupatla and A.D. Belegundu, Prentice Hall of India, 1997.