

K L UNIVERSITY
BASICS OF FINETE ELEMENT METHOD (11 - CE 335)

Pre – requisite: NIL
SYLLABUS

L	T	P	Cr
3	0	0	3

UNIT -I

Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation. Principles of Elasticity: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT -II

One Dimensional FEM : Stiffness matrix for bar element - shape functions for one dimensional elements – one dimensional problems. Two Dimensional FEM : Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

UNIT –III

Generation of element stiffness and nodal load matrices for 3-node triangular element and four node rectangular elements. Isoparametric formulation – Concepts of, isoparametric elements for 2D analysis -formulation of CST element.

UNIT-IV

4 –noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.

Axi-symmetric analysis- Basic principles

UNIT-V

Solution Techniques: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

TEXT BOOK:

1. Finite Elements Methods in Engineering by Tirupati.R. Chandrepatla and Ashok D. Belegundu - Pearson Education Publications.

REFERENCES:

1. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers.
2. Finite element analysis by S.S. Bhavakatti-New age international publishers
3. Finite element analysis by David V Hutton, Tata Mcgraw Hill, New Delhi
4. Concepts and Applications of Finite Element Analysis by Robert D.Cook, David S. Malkus and Michael E.Plesha. Jhon Wiley & Sons.
5. Text book of Finite Element analysis by P.Seshu – Prentice Hall of India