

Code: 9A01701

R09

B.Tech IV Year I Semester (R09) Regular & Supplementary Examinations December 2014

FINITE ELEMENT METHODS IN CIVIL ENGINEERING

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Explain the basic steps involved in FEM.
(b) Explain the principle of virtual work.
- 2 Explain the constitutive relations for linear, elastic, homogenous:
(a) Anisotropic solid.
(b) Isotropic solid and
(c) Orthotropic solid. And also explain effect of temperature, initial stress and strain on these relations.
- 3 Derive the shape functions, strain displacement matrix and stiffness matrix for a 1-D two noded bar element.
- 4 Derive the shape function matrix, strain displacement matrix and stiffness matrix for a 4-noded rectangular element.
- 5 (a) Explain the different elements used for plane stress and plane strain analysis.
(b) Explain area and volume co-ordinates.
- 6 Derive the Jacobian matrix, strain-displacement matrix and stiffness matrix for a 2D 4-noded iso-parametric quadrilateral element.
- 7 (a) Explain the basic principles involved in axi-symmetric analysis.
(b) Derive the constitutive relations for bodies with axi-symmetric loading with examples.
- 8 Write short notes on:
(a) Numerical integration.
(b) Displacement models in FEM.
