Code: R7410303

R07

B.Tech IV Year I Semester (R07) Supplementary Examinations, May 2013

FINITE ELEMENT METHODS

(Mechanical Engineering)

Time: 3 hours Max. Marks: 80

Answer any FIVE questions
All questions carry equal marks

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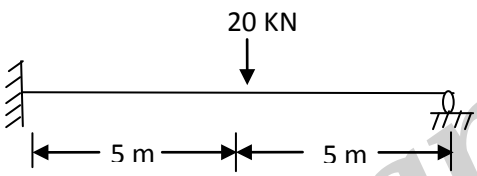
1. Explain the constitutive relations for, anisotropic, isotropic and orthotropic materials.

2. Derive the element stiffness matrix and nodal load vectors for 2- noded I-D element.

3. A beam fixed at one end and supported by a roller at the other end, has a 20 KN concentrated load applied at the centre of the span. Calculate the nodal displacements



$E=20 \times 10^6$ N/cm^2

$I=2500$ cm^4

4. Derive the shape functions, strain displacement matrix and stiffness matrix for a CST element.

5. For a long cylinder of inside diameter 8 cm and outside diameter 12 cm snugly fits in a hole over its full length. The cylinder is subjected to an internal pressure of 5 Mpa. Using two element model over a length of 1 cm, evaluate nodal displacements and element stresses. Take E=20 x 10^6 N/cm^2 and $\nu = 0.3$.

6. Derive the strain displacement and stiffness matrix for 2-D four noded isoparametric element.

7. Explain in the one dimensional analysis of a fin.

8. Write short notes on:
   (a) Strain-displacement relations.
   (b) Eigen vectors for a stepped beam.

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