

Code :R7410303

**R7**

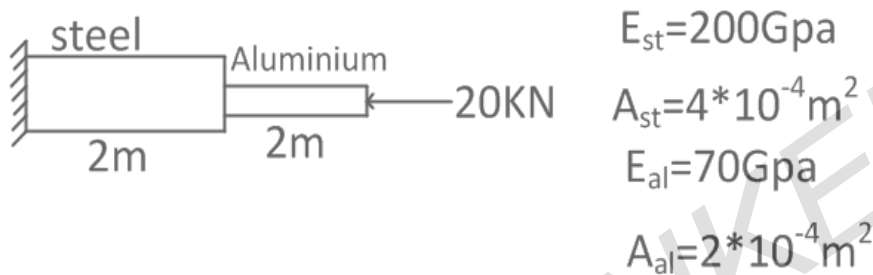
**IV B.Tech I Semester(R07) Supplementary Examinations, May/June 2011**  
**FINITE ELEMENT METHODS**  
**(Mechanical Engineering)**

Time: 3 hours

Max Marks: 80

Answer any FIVE questions  
 All questions carry equal marks  
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1. (a) Write and explain the basic steps involved in FEM.  
 (b) Explain the strain- displacement relations and write them in matrix form.
2. (a) Discuss the finite element modeling of 1-D problems.  
 (b) For the bar assemblages shown in figure, determine the nodal displacements.



3. For the beam shown in figure calculate the deflection under the load and construct the shear force and bending moment diagrams for the beam.



4. Derive the element shiftness matrix and the nodal load matrices for a B-nodal triangular element.
5. Discuss the finite element modeling of Axi-symmetric solids subjected to Axi-symmetric loading with triangular elements.
6. Numerically evaluate the following integrals.

(a)  $\int_{-1}^{+1} (4x + x^4) dx$

(b)  $\int_{-1}^{+1} (2 + 5x + 8x^3) dx$

(c)  $\int_{-1}^{+1} \int_{-1}^{+1} 7x^2 y^4 dx dy$

(d)  $\int_{-1}^{+1} \int_{-1}^{+1} (3x^2 + 4y^2) dx dy$

7. Discuss the two dimensional analysis of thin plate in steady state heat transfer analysis.
8. Write short notes on:
  - (a) Formulation of finite element modeling dynamic analysis.
  - (b) Eigen vectors for a stepped bar and also discuss the eigen values.

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