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Code No: C3ME06

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech (CCC) III Year Examinations February - 2011
FINITE ELEMENT METHODS
(Mechanical Engineering)

Time: 3 Hours **Max.Marks:100**

Answer Any Five Questions
All Questions Carry Equal Marks

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1.a) Define Geometric Variance.
b) What is meant by displacement function?
c) Give the importance of Pascal Triangle. [6+7+7]

2. Derive the shape functions for a one dimensional linear line element in global Co-ordinate system. [20]

3.a) Compare the characteristics of beam element with the truss element.
b) Derive the load vector for the specified uniform distributed load over the plane truss element. [8+12]

4. A cantilever beam of 1 m length carries a single point vertical load at the end of the beam of 10 kN. Calculate the deflection at the end of the beam using FEM, if E = 70 Gpa, A = 500 mm^2 and I = 2500 mm^4. [20]

5.a) Explain about Local Co-ordinate system.
b) The nodal coordinates and its functional value of a triangular linear element are given below. Calculate the value at (20, 6). [8+12]

Co-ordinates		**Value**
Node 1	(13,1)	190
Node 2	(25,6)	160
Node 3	(13,13)	185

6. Derive the conductivity matrix for 1-D fin element? And also derive the load vector if the lateral surface and tip is exposed to a heat transfer coefficient of h and ambient temperature T_α? [20]

7.a) From first principles, derive the general equation for elemental mass matrix.
b) Derive the elemental mass matrix for 2-D triangular element. [10+10]

8. Write short notes on:
a) Convergence requirements.
b) Mesh preparation for tetrahedral element.
c) Shape Function for tetrahedral element. [8+6+6]

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