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SET-4

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
III B.TECH II SEM-REGULAR/SUPPLEMENTARY EXAMINATIONS MAY - 2010
FINITE ELEMENT AND MODELLING METHODS
(AERONUTICAL ENGINEERING)

Time: 3hours

Max.Marks:80

Answer any FIVE questions
All questions carry equal marks

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- 1.a) What are the various steps in solving a problem by finite element method with suitable example?
- b) What are the sources of error in different phases of solving a physical problem by FEM? [8+8]
- 2.a) Explain the shape functions and non-dimensional coordinates for a triangular plane stress element.
- b) Plot a general triangular element and a quadrilateral element in Cartesian coordinate system and non-dimensional coordinate system. [8+8]
- 3.a) A tapered bar of 100 mm diameter at the larger end and 50 mm at the smaller end is clamped at larger end and it is hanging. The bar is subjected to a pull of 100 KN at the free end, Length of the bar is 200 mm. Find the displacements in the bar for 3 elements using FEM technique?
- b) What are the various forces that can be considered in FEM approach? [10+6]
- 4.a) What is meant by principle of minimum potential energy? Explain for a simple spring mass system
- b) Derive the stiffness property of a 1-Dimensional line element on the energy basis. [6+10]
- 5.a) What are the assumptions made in solving the fracture mechanics problems in finite element methods?
- b) Explain the significance of sub-parametric elements in solving the fracture mechanics problems. [8+8]
- 6.a) Explain the importance of band width of a banded stiffness matrix in storage space.
- b) Suggest the methods to reduce band width of a stiffness matrix to half. [8+8]
7. Derive the equivalent point loads acting on the axi-symmetric triangular element with uniformly distributed body force in the element and variable traction force along the surface of the element. [16]
- 8.a) Discuss the limitations of NASRTRAN package with some examples.
- b) How to estimate the percentage error in automatic mesh generation technique? Explain. [8+8]

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