R05

Set No. 2

III B.Tech II Semester Examinations,APRIL 2011
FEM METHODS
Aeronautical Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. Describe the co-ordinate transformations for the sub parametric element with simple example. [16]

2. (a) Discuss the Gaussian quadrature two point formula along with their weights to be considered.

   (b) Derive the equation for det J in terms of the element area when the linear quadrilateral element is a rectangle. [8+8]

3. Calculate the element stiffness matrix and the thermal force vector for the plane stress element as shown in figure 8. The element experiences a 10^0 c increase in temperature.
   Take
   Thickness, t=0.5 cm
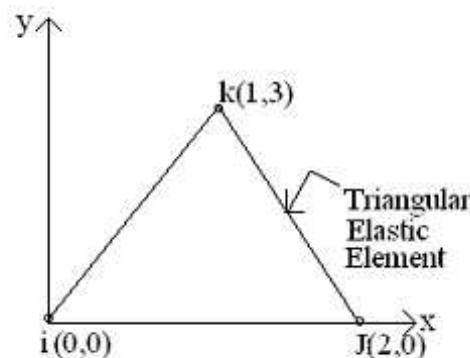   Young's Modulus, E=15×10^6 N/cm²
   Poisson's Ratio = 0.25
   Thermal co-efficient of expansion=6×10^{-6}/^{0}c. [16]

Figure 8

4. How to solve 1-D axi-symmetrical finite element problems? Explain for thin cylindrical shell. [16]

5. (a) Explain how mass is distributed at different nodes and in different degress of freedom in lumped mass matrix of a beam element in space.

   (b) How is consistent mass matrix derived? [8+8]

6. (a) What is the refinement process in mesh generation? Explain.

   (b) Explain the graphical out put facilities available for the display and analysis of results in ANSYS package. [8+8]

7. Explain structural discretization for the following with the help of global discrete coordinate:

   (a) Shear deformations

   (b) Axial problems

   (c) Torsional problems

   (d) Bending problems.   [4+4+4+4]

8. (a) Differentiate the macro and micro modelling system in FEM.

   (b) Explain the terms stiffness and Interia in terms of energy base and equilibrium base.   [8+8]

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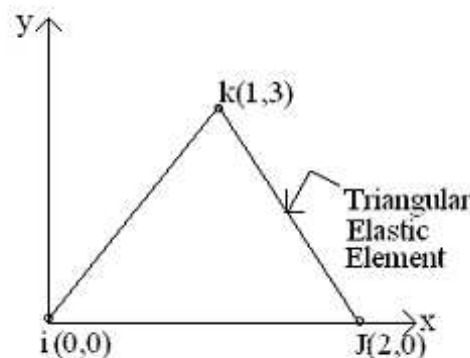   Thermal co-efficient of expansion=6×10^{-6}/^{0}c. [16]

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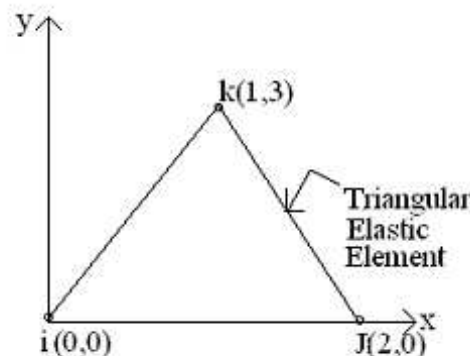
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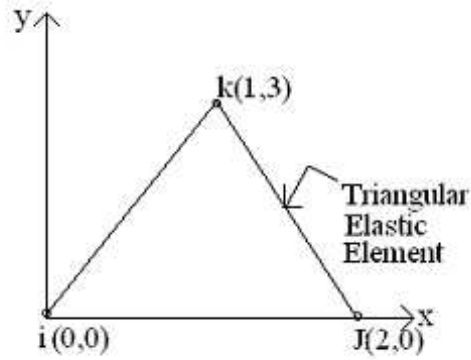Thermal co-efficient of expansion=$6 \times 10^{-6}/^{0}$c.   [16]

Figure 8

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