R15

Code No: 126VE

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, November/December - 2020
FINITE ELEMENT METHODS
(Common to ME, AE)

Time: 2 Hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1. What category and applications fall under Plane strain and Plane stress problems? Illustrate the same. [15]

2. Derive the Quadratic shape function for a bar element. [15]

3. Determine the stresses and reaction for the following truss element. Given (figure 1) E=70GPa and A = 500 mm^2. [15]

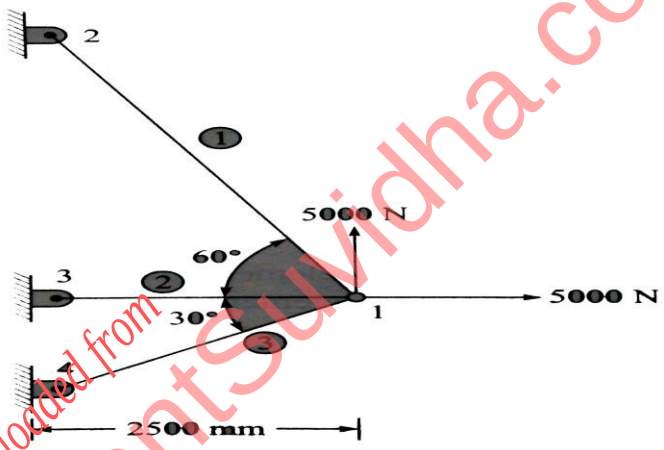

Figure 1

4. Determine the end reactions and deflection at mid span (Figure 2). [15]

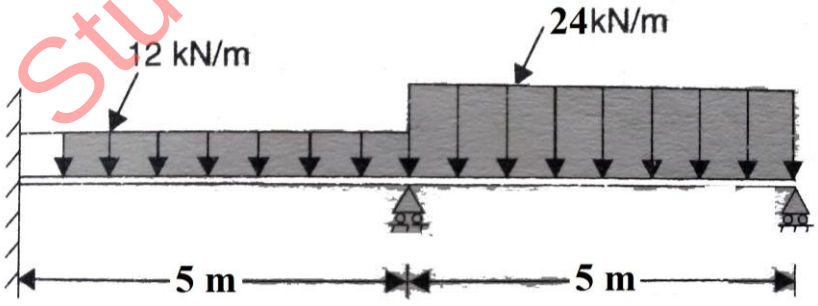

Figure 2

Assume E=200 GPa.

5. For the axisymmetric body rotating with constant angular velocity ω=200 rpm, determine the body force vector. Specific density is 7800 kg/m^3. [15]

6. Derive the jacobian matrix of two dimensional four noded isoparametric element (figure 3). [15]

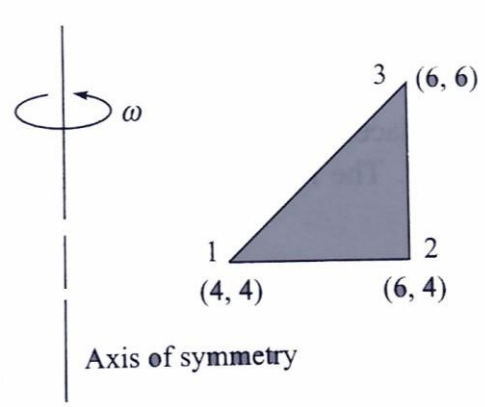

Figure 3

7. A square cross section of a steel shaft is as shown in Figure 4. Evaluate nodal values, if shaft is 8 mm square. Given G= 8×10^6N/cm^2, and $\phi = 0.005$ degree/cm. Use only one fourth of the cross section. [15]

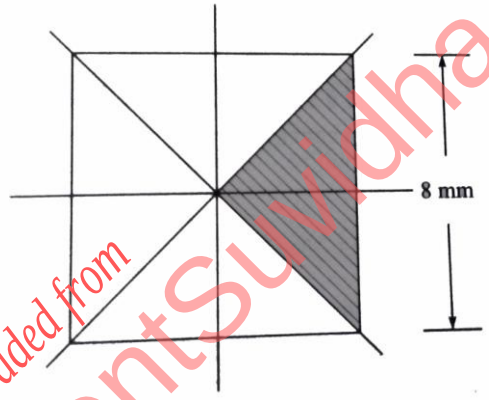

Figure 4

8. Evaluate eigen values and eigen vectors for a cantilever beam of length 1 m free at the other end. Take E= 200GPa, I=40×10^{-10} m^4, A = 2×10^{-4} m^2 and weight density = 7850 kg/m^3. Use one element method. [15]

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