Total No. of Questions :6]

SEAT No. :

P201

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Oct./ BE/ Insem. - 517

B.E. (Mechanical)

FINITE ELEMENT ANALYSIS

(2015 Pattern) (Semester - I) (402044A) (Elective - I)

Time : 1 Hour] *[Max. Marks :30*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.***
2) ***Figures to the right indicate full marks.***
3) ***Assume suitable data, if necessary.***

Q1) a) Discuss the advantages and disadvantages of FEM over classical method. **[4]**

b) Explain 'principle of minimum potential energy approach' to formulate FEM equations. **[6]**

OR

Q2) a) Describe the general steps of the FEM. Element Method. **[4]**

b) Explain the terms. **[6]**

i) Linear Static Analysis.

ii) Non - Linear Analysis.

Q3) a) Analyse the truss as shown in fig. For axial forces using finite element method. Find the displacement at node 2, Where area of cross section of element 1 is 50 mm^2 and element 2 is 40 mm^2. **[6]**

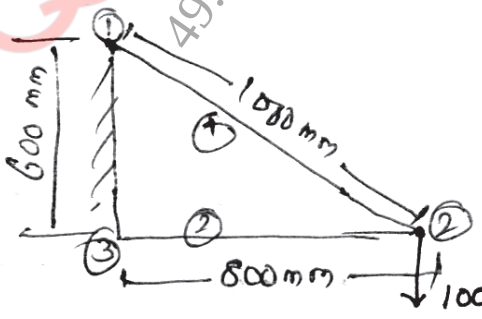

Fig.1

b) Derive shape function in natural coordinate system of Bar. **[4]**

OR

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Q4) a) Consider the bar element as shown in fig 2, with cross sectional area $A=7.75\times10^{-4}\ M^2$ and youngs modulas $E=2.07\times10^{11}\ N/M^2$. If deflection at node 1 is 0.500 mm and node 2 is 0.635 mm. determine. **[6]**

i) Displacement at point P.

ii) Strain E and stress σ .

iii) Element stiffness matrix.

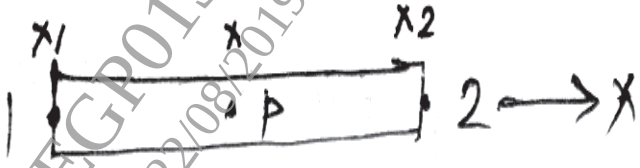

Fig.2

x_1= 380 mm

x = 508 mm

x_2= 585 mm

b) Write short note on beam element. **[4]**

Q5) a) The triangular element has nodal coordinates (10,10), (40,20) and (30,50) for nodes 1,2 & 3 Resp. for a point P inside the determine the X and Y coordinates if shape function N_1 and x_2 are 0.15 and 0.25 respectively. **[6]**

b) Explain plane stress with example. **[4]**

OR

Q6) a) Write short note on polynomial shape functions. **[4]**

b) The nodal coordinate of triangular element are as shown in fig 3. The X coordinate, of interior point is 3.3 and shape function N_1 =0.3 determine N_2 , N_3 and Y cood of point P. **[6]**

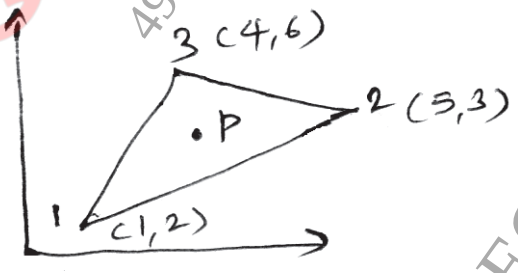

Fig.3

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