Total No. of Questions : 12]

SEAT No. :

P3939

[Total No. of Pages : 3

[4959]-24

B.E. (Civil Engineering)

FINITE ELEMENT METHOD IN CIVIL ENGINEERING

(Open Elective) (2008 Course) (Semester - II) (401008)(Elective - IV)

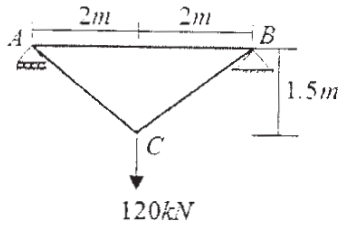
Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answer to the two sections should be written in separate answer books.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Use of non programmable calculator is allowed.***
5) ***Assume suitable data, if necessary.***

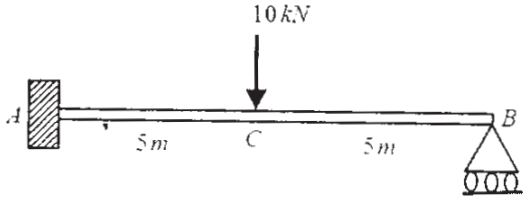
SECTION - I

Q1) Analyze the truss and find member forces. Cross-sectional area of members are AB = 1000 mm^2, BC = 800 mm^2, CA = 800 mm^2. take E = 2×10^5 MPa. **[18]**

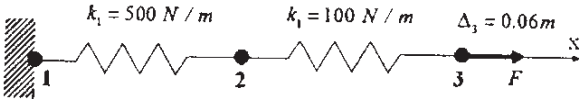


OR

Q2) a) Obtain rotation at B for the beam shown below using finite element method. Consider given beam as one element. Take E = 2×10^8 kN/m^2 and I = 4×10^{-6} m^4. **[10]**

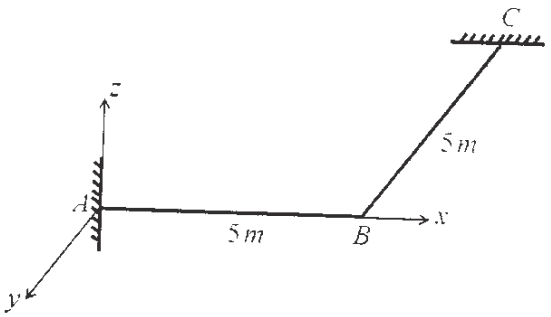


b) Determine elongation at node 2 and pulling force 'F' at node 3 for the spring assembly given below. Take pull at node 3 is 0.06m. **[8]**



P.T.O.

Q3) a) Derive the stiffness matrix for the grid elements as shown in Figure. Take flexural rigidity EI and torsional rigidity GJ same for both the elements. **[10]**



b) Derive the transformation matrix for the two noded grid element. **[6]**

OR

Q4) Develop stiffness matrix for two noded frame element with three degrees of freedom at each node. Take EI constant. **[16]**

Q5) a) Explain in brief state of stress and state of strain at a point in 3D elasticity problem. **[8]**

b) Derive Saint Venant's strain compatibility conditions. **[8]**

OR

Q6) a) Derive the stress compatibility conditions for 2D plane stress elasticity problem. **[8]**

b) Write short note on plane stress, plane strain and axisymmetric problems. **[8]**

SECTION - II

Q7) a) Explain in brief 2D and 3D pascal's triangle with example. **[8]**

b) Derive stiffness matrix for the two noded bar element using finite element formulation. **[10]**

OR