B.E. (Civil Engineering) Fifth Semester (C.B.S.)

Structural Analysis – II

P. Pages : 4 **NRT/KS/19/3403**

Time : Three Hours * 0 1 2 2 * Max. Marks : 80

Notes : 1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Assume suitable data whenever necessary.
9. Use of non programmable calculator is permitted.

1. Analyse the frame shown in fig. (1) by Kani's method and draw BMD. **14**

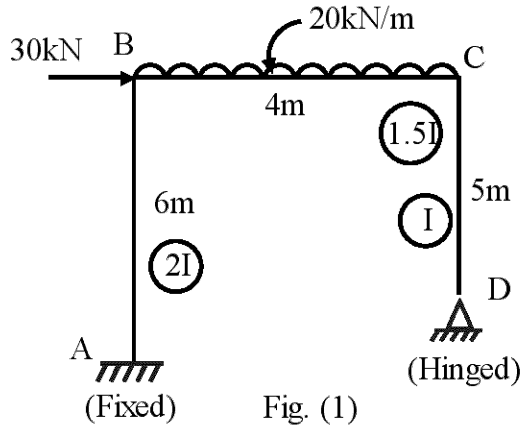

Fig. (1)

OR

2. Analyse the frame shown in fig. (2) by Kani's method and draw BMD. **14**

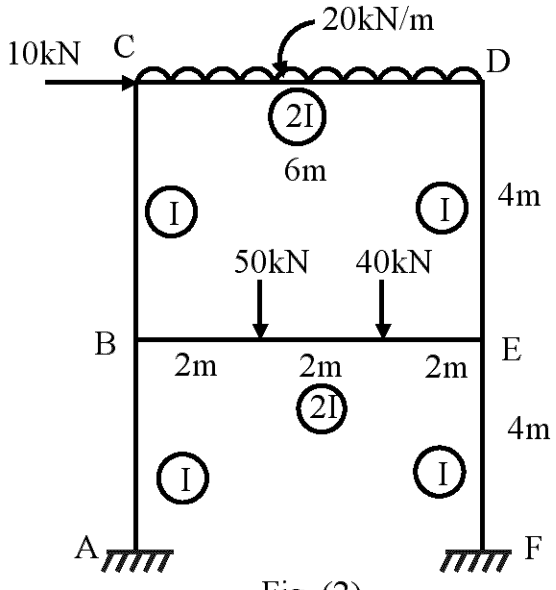

Fig. (2)

3. Analyse the continuous beam by moment distribution method shown in fig. (3) and draw BMD. **13**

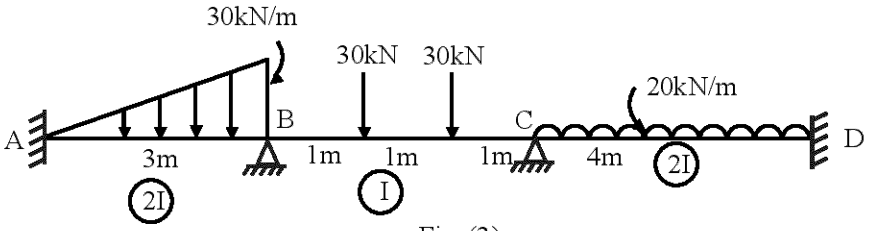

Fig. (3)

OR

4. Analyse the frame shown in fig. (4) and draw BMD by moment distribution method. **13**

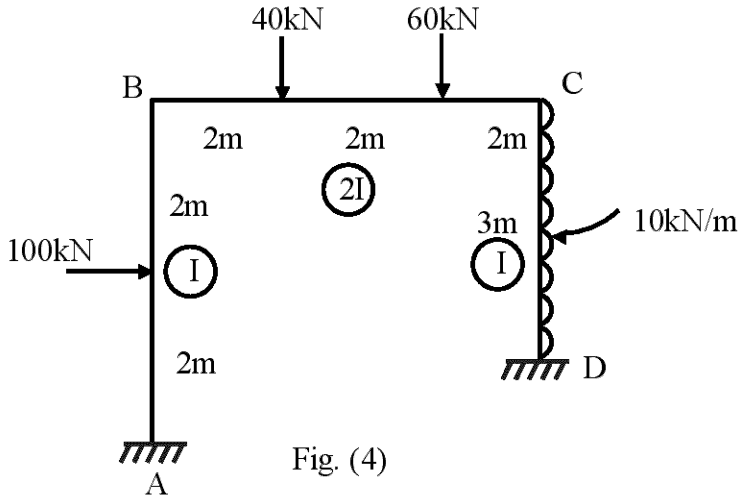

Fig. (4)

5. a) Derive the stiffness matrix and transformation matrix for plane truss element. **5**

b) Calculate forces in member, if truss shown in fig. (5) by stiffness matrix method. Take area of cross section of member as $1000\,mm^2$ and modulus of elasticity $E = 200\,kN/mm^2$. Also find out support reaction. **8**

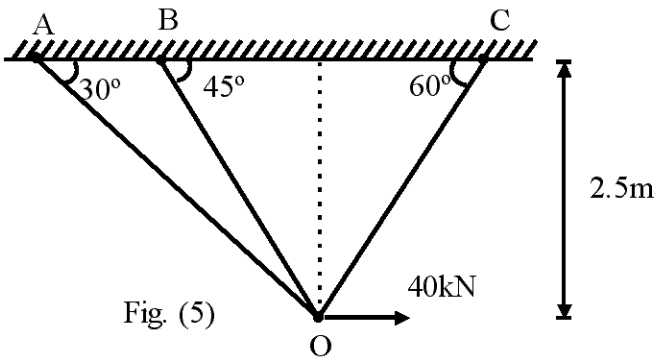

Fig. (5)

OR

6. Assemble global stiffness matrix and load matrix for the plane. Truss shown in fig. (6) if member meeting at joint B are subjected to temp. Rise of 60°C. Assume $E = 210\,kN/mm^2$ **13**

$\alpha = 12 \times 10^{-6}/^{o}C$

C/S Area of all member $600\,mm^2$.

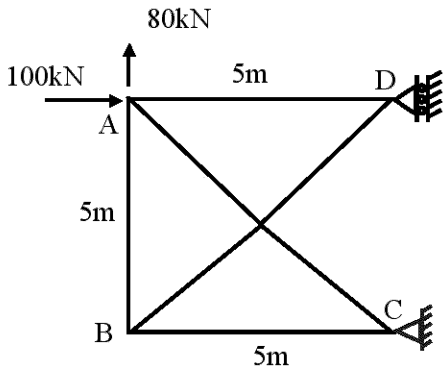

Fig. (6)

7. a) Derive the stiffness matrix for beam element. **4**

b) Analyse the continuous beam shown in fig. (7) and draw BMD & SFD. Assume constant EI. Use stiffness matrix method. **9**

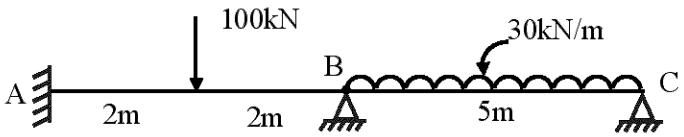

Fig. (7)

OR

8. Analyse the continuous beam shown in fig. (8) & by stiffness matrix method. Draw BMD. Take E is constant. **13**

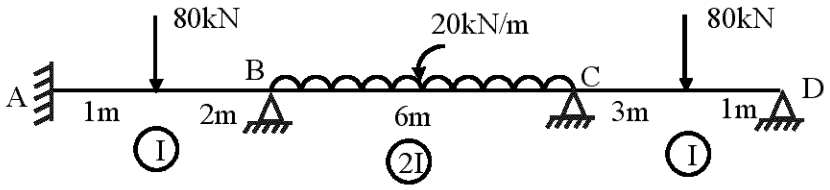

Fig. (8)

9. a) Derive stiffness matrix for plane frame element by basic principle. **5**

b) Assemble global load vector for the frame shown in fig. (9) Neglecting axial deformation. **8**

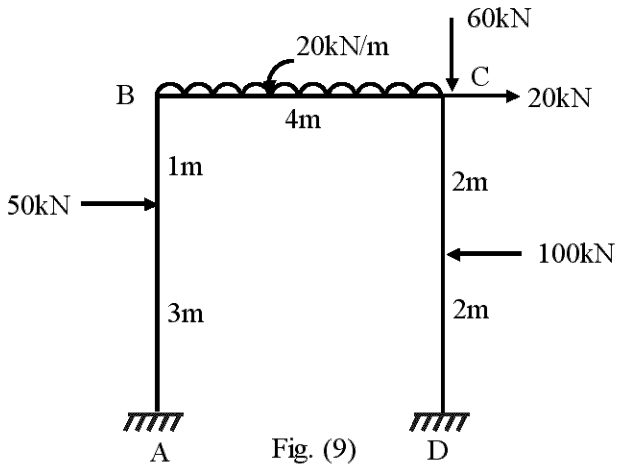

Fig. (9)

OR

10, Analyse the frame shown in fig. (10) by stiffness matrix method. Take size of column $230\,mm \times 500\,mm$ & beam $230\,mm \times 650\,mm$, $E = 2.54 \times 10^7 kN/m^2$. **13**

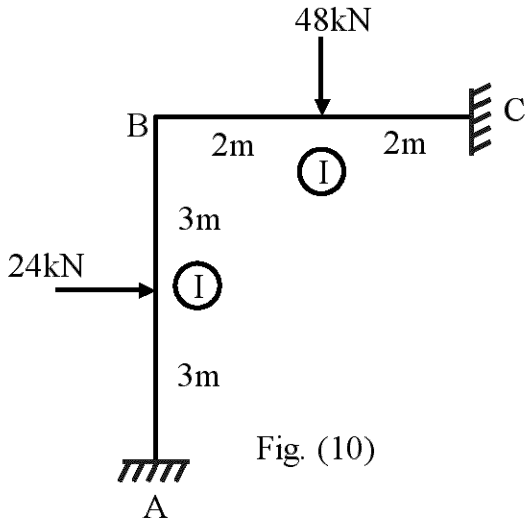

Fig. (10)

11. Using principle of minimum potential energy, find out tip displacement for the tapered bar shown in fig. (11). Cross sectional area of the bar at A_1 is $450\,mm^2$ and at A_2 is $250\,mm^2$ take $E = 2 \times 10^5 N/mm^2$. **14**

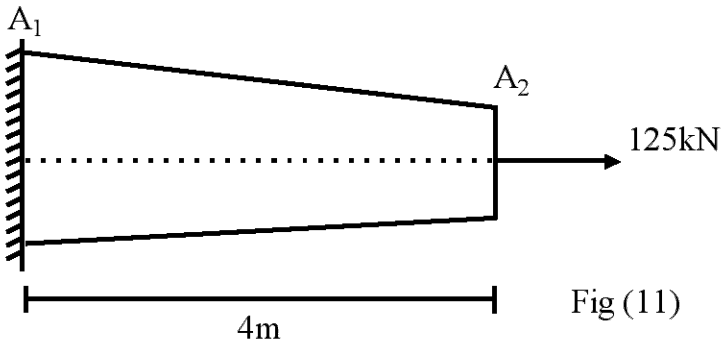

Fig (11)

OR

12. Explain **any three.** **14**

a) Natural Frequency.

b) Single Degree of Freedom.

c) D' Alembert principle.

d) Damping.

****