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

Structural Analysis - II

P. Pages : 4 **TKN/KS/16/7406**

Time : Three Hours * 0 8 5 8 * 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 using Kani's method and draw its BMD. **14**

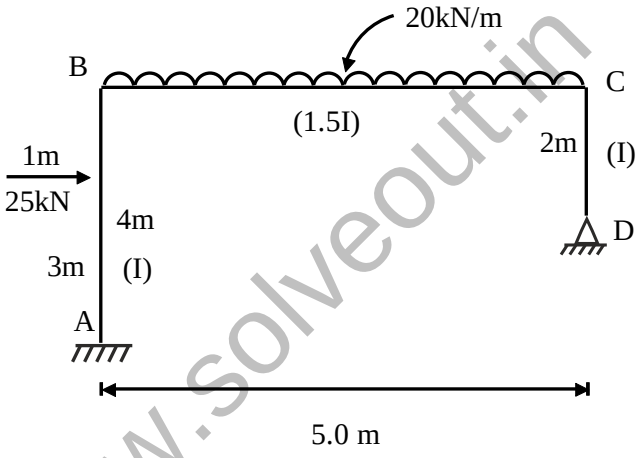

Fig:1

OR

2. Analyse the frame shown in fig : 2 and draw its BMD. Use Kani's method. **14**

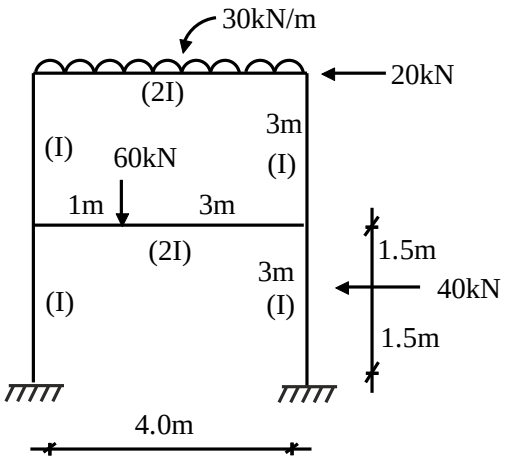

Fig:2

3. A beam is loaded as shown in fig : 3. Plot the bending moment diagram if the support A settles by 10 mm, B settles by 20 mm and C settles by 15 mm. Take $EI = 5100\,kN.m^2$. Use MDM. **13**

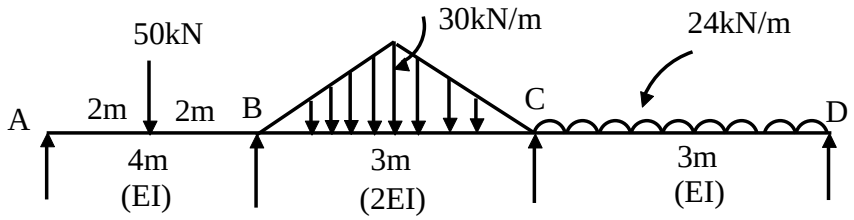

Fig:3

OR

4. Analyse the structure loaded as shown in fig : 4 by the moment distribution method and sketch bending moment. **13**

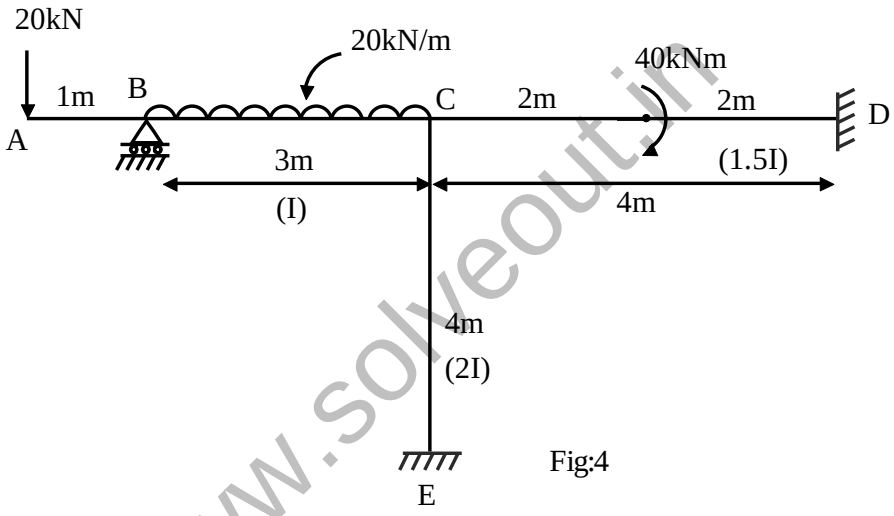

Fig:4

5. Find member forces for the plane truss shown in fig : 5. Member BC is too long by 3 mm. Use stiffness method. c/s area of all members is $600mm^2$. Assume E = 200 GPa. **14**

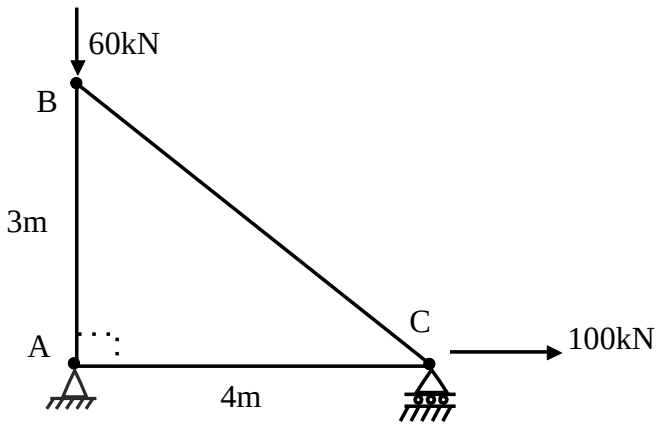

Fig:5

OR

6. Assemble the global stiffness matrix and load matrix for the plane Truss shown in fig : 6 if members meeting at joint B are subjected to temperature rise of 60ºC. Assume $E = 210\,kN/mm^2$. C/S area of members **14**

$AB = BC = CD = 710\,mm^2$ &

$AC = BD = 550\,mm^2$.

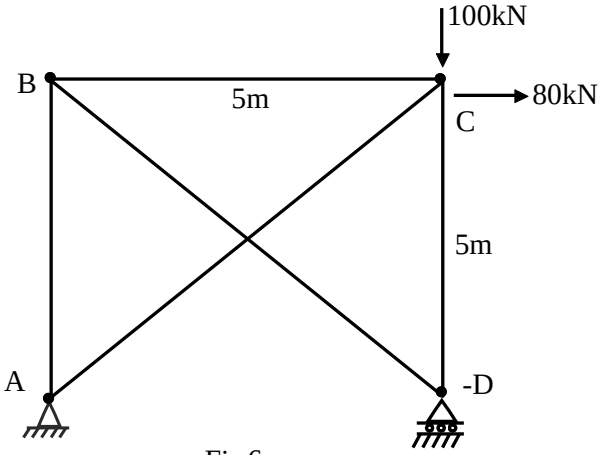

Fig:6

7. a) Derive member stiffness matrix for a prismatic plane beam element. **7**

b) Derive rotation transformation matrix for a plane beam element. **6**

OR

8. Assemble global displacement matrix for the plane beam loaded as shown in fig : 7 using stiffness method. **13**

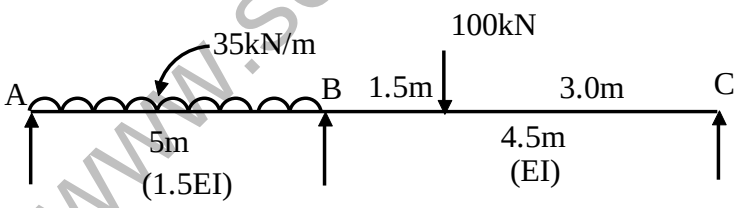

Fig:7

9. Analyse the plane frame shown in fig : 8 and draw its BMD neglecting axial deformations. Use stiffness method. **13**

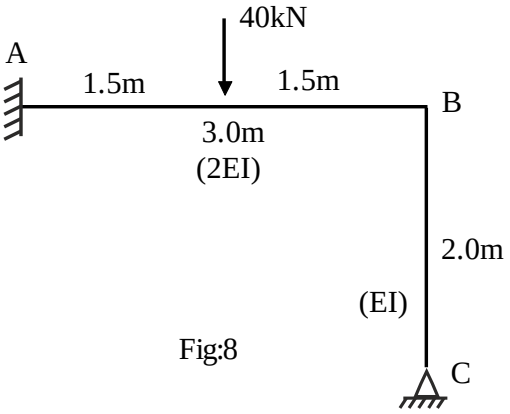

Fig:8

OR

10. Using stiffness method, analyse the rigid jointed plane frame shown in fig : 9. Assume uniform flexural rigidity for all members as EI. Neglect axial deformations. **13**

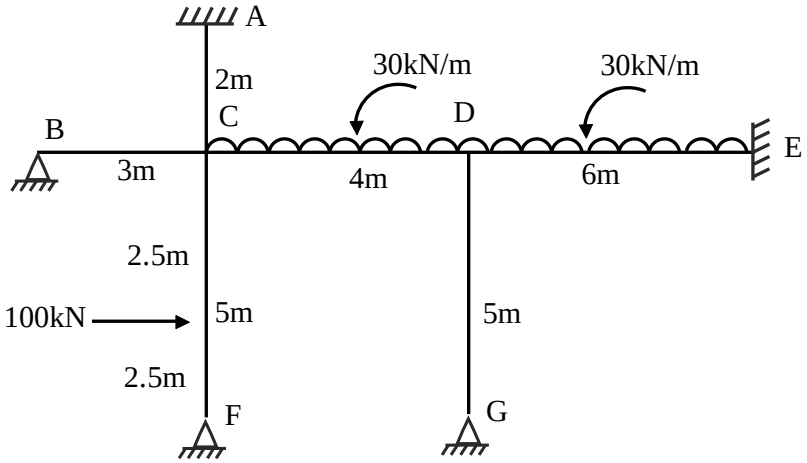

Fig:9

11. a) Derive an equation of motion for an undamped single degree of freedom system for free vibration. **6**

b) A cantilever beam 3 m long supports a mass of 500 kg at its free end find the natural period and natural frequency of vibration. Take $E = 2.1\times10^{6}\,kg/cm^{2}$ and $I = 1300\,cm^{4}$. **7**

OR

12. Using finite element method, derive the displacement matrix. Also find member strain and stress, for the steel specimen shown in fig. 10. **13**

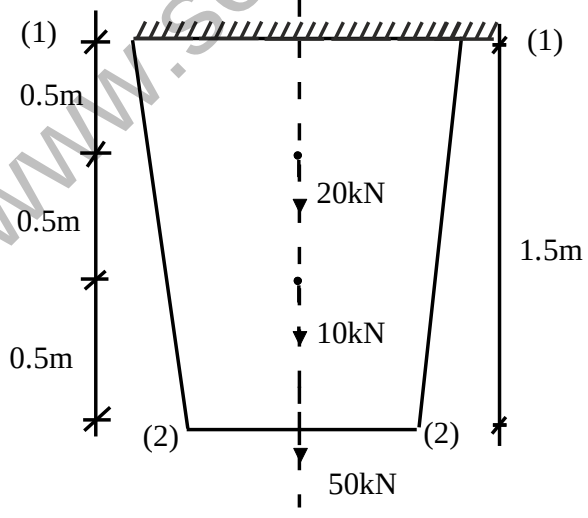

Fig:10

C/S area at (1) – (1) is equal to $= 425\,mm^{2}$

C/S area at (2) – (2) is equal to $= 125\,mm^{2}$.

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