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

Structural Analysis - II

P. Pages : 4 **NKT/KS/17/7318**

Time : Three Hours * 0 0 0 1 * 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. Illustrate your answers whenever necessary with the help of neat sketches.
10. Use of non programmable calculator is permitted.

1. Analyse the frame shown in fig. 1 by Kani's method and draw B.M.D. **14**

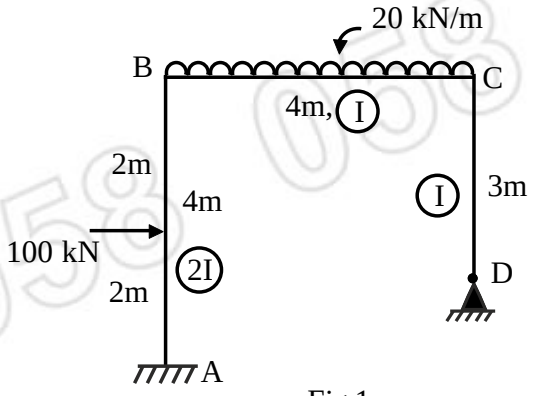

Fig.1

OR

2. Using Kani's method, analyse the portal frame shown in fig. 2. **14**

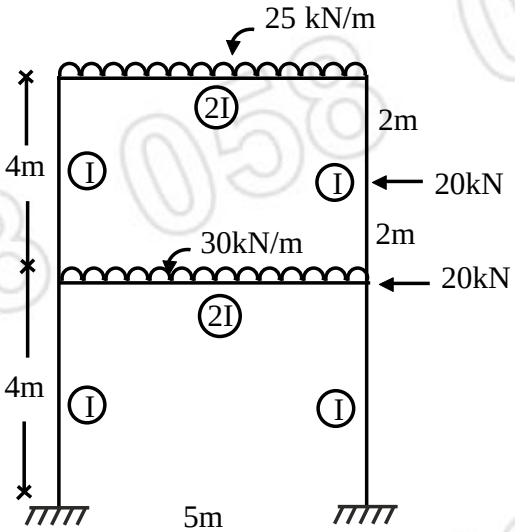

Fig.2

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

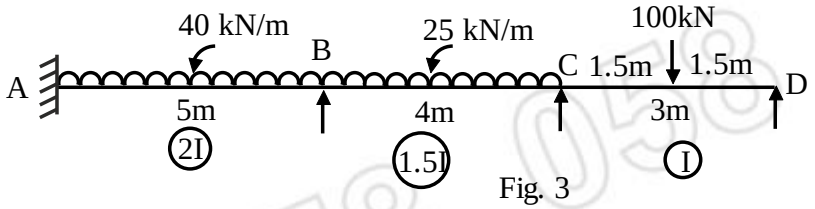

Fig. 3

OR

4. Using moment distribution method, analyse the frame shown in fig. 4. **13**

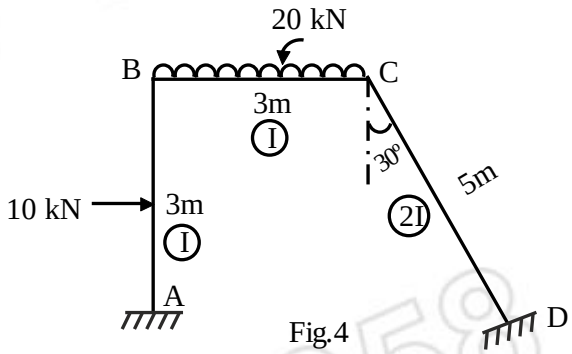

Fig.4

5. Determine the nodal displacement matrix for the plane truss shown in Fig. 5. Use direct stiffness method. Take area of members as $800\,mm^2$ and $E = 200\ {}^{kN}/_{mm^2}$ **13**

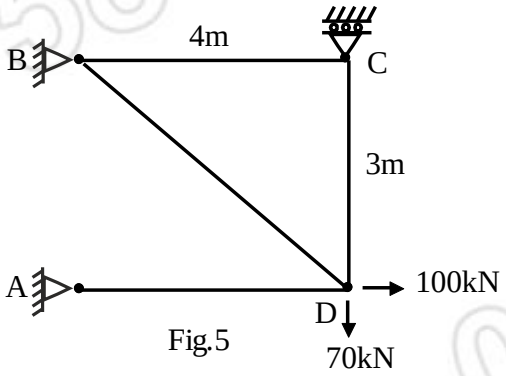

Fig.5

OR

6. Assemble the global stiffness matrix for the plane truss shown in fig. 6 Also assemble the load vector if c/s area for all members in 1000 mm^2 and E = 210 GPa. **13**

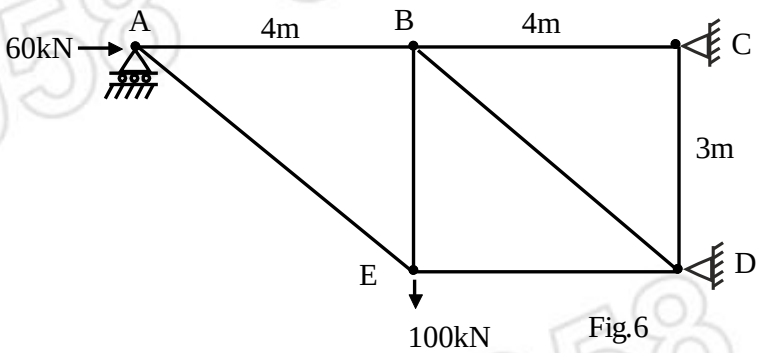

Fig.6

7. Using stiffness method, analyse the continuous beam shown in fig. 7 and draw its BMD. **13**

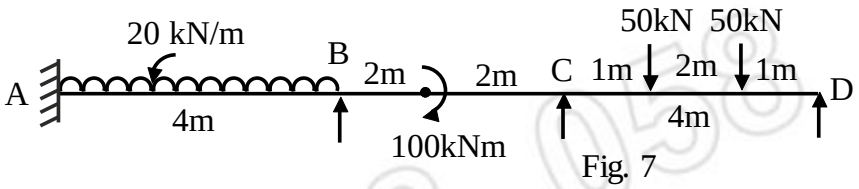

Fig. 7

Take flexural rigidity uniform.

OR

8. Derive an elemental stiffness matrix and rotational transformation matrix for plane beam element. **13**

9. Analyse the plane frame shown in fig. 8 by stiffness method. Take $E = 25.5 \times 10^{6}\ kN/m^2$, size of member 230 x 450mm. **14**

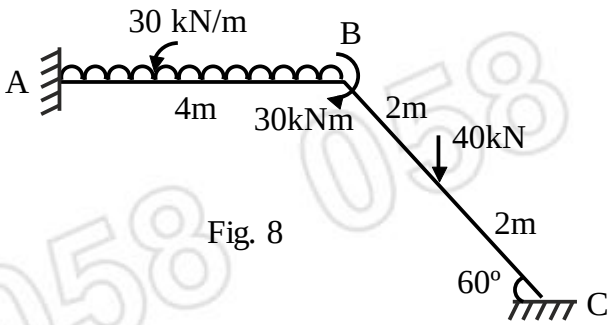

Fig. 8

OR

10. Derive the member force vectors for the plane frame shown in fig. 9. Take $E = 25 \times 10^{3}\ \frac{N}{mm^2}$ and member cross-section as 200 x 400 mm. Use stiffness method and neglect axial deformaton. **14**

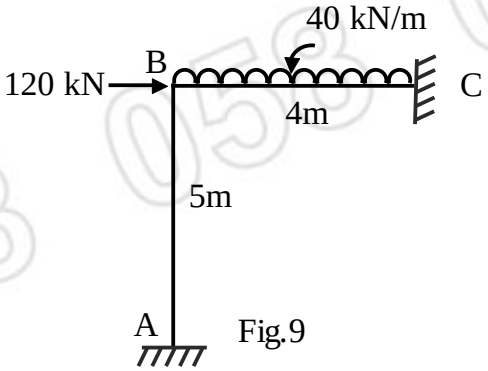

Fig.9

11. Using principle of minimum potential energy find out tip displacement for the tapered bar shown in fig. 10. Cross sectional area of the bar at A is $400mm^2$ and at B is $200mm^2$. Take $E = 2 \times 10^5 \, N/mm^2$ **13**

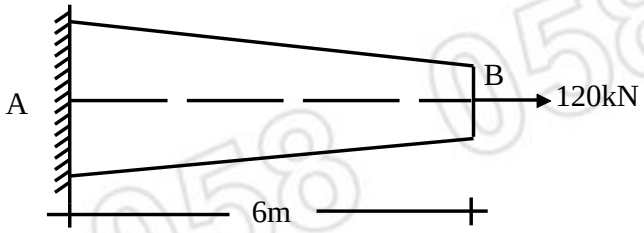

Fig.10

OR

12. a) Define **any three.** **6**

i) Free vibration, ii) Forced vibration,

iii) Natural frequency, iv) Period of vibration

b) A 0.5 kg mass attached at the end of a light spring elongates it by 1.5mm. Find the stiffness and natural frequency of the system. **7**

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