Faculty of Engineering & Technology
Fifth Semester B.E. (Civil Engg.) (C.B.S.) Examination
STRUCTURAL ANALYSIS—II

Time—Three Hours] [Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.
(2) Due credit will be given to neatness and adequate dimensions.
(3) Assume suitable data wherever necessary.
(4) Illustrate your answers wherever necessary with the help of neat sketches.
(5) Use of non-programmable calculator is permitted.

1. Analyse the portal frame in Fig. 1 by Kani's method. Draw B.M.D. 14

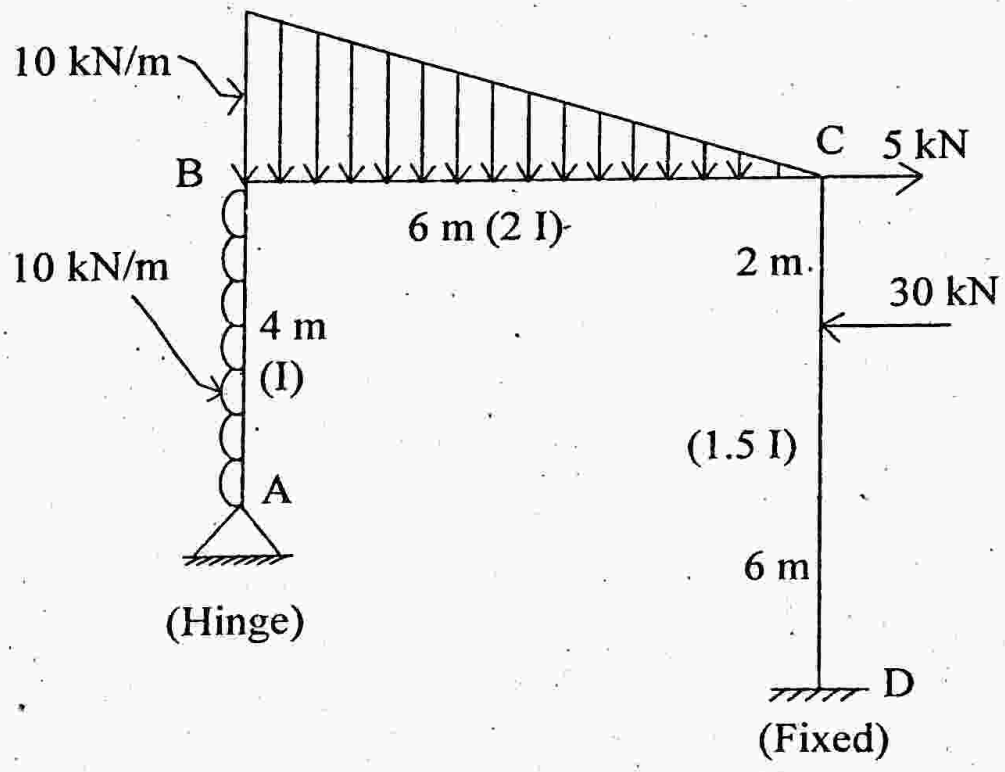


Fig. 1

OR

2. Analyse the portal frame in Fig. 2 by Kani's method. Draw B.M.D. 14

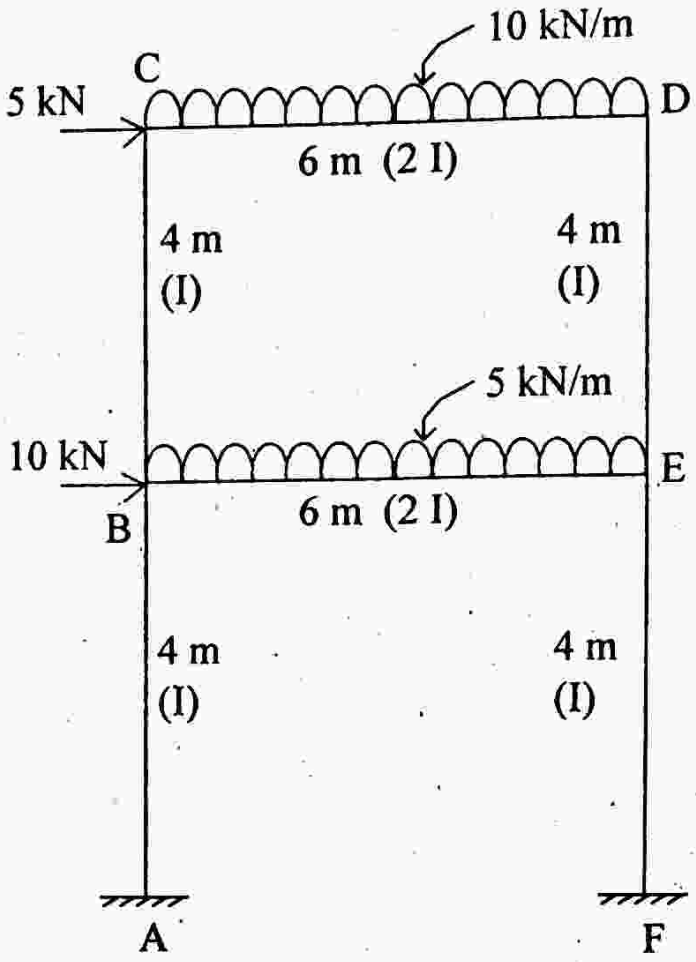


Fig. 2

3. Analyse the continuous beam in Fig. 3 by Moment distribution method. Draw B.M.D. 13

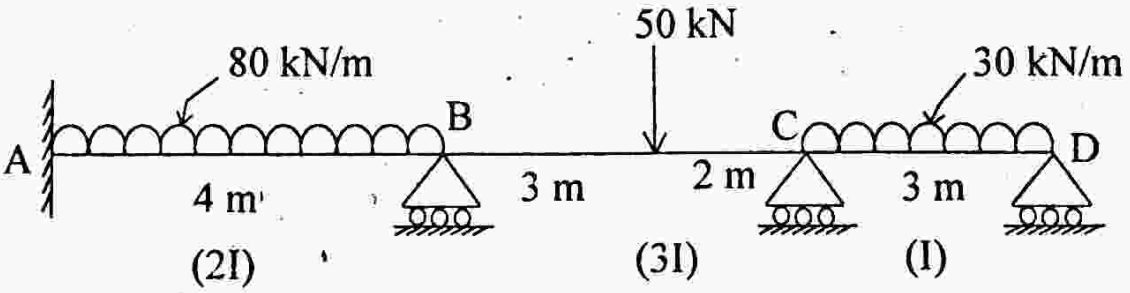


Fig. 3

OR

4. Analyse the portal frame in Fig. 4 by moment distribution method. Draw B.M.D. 13

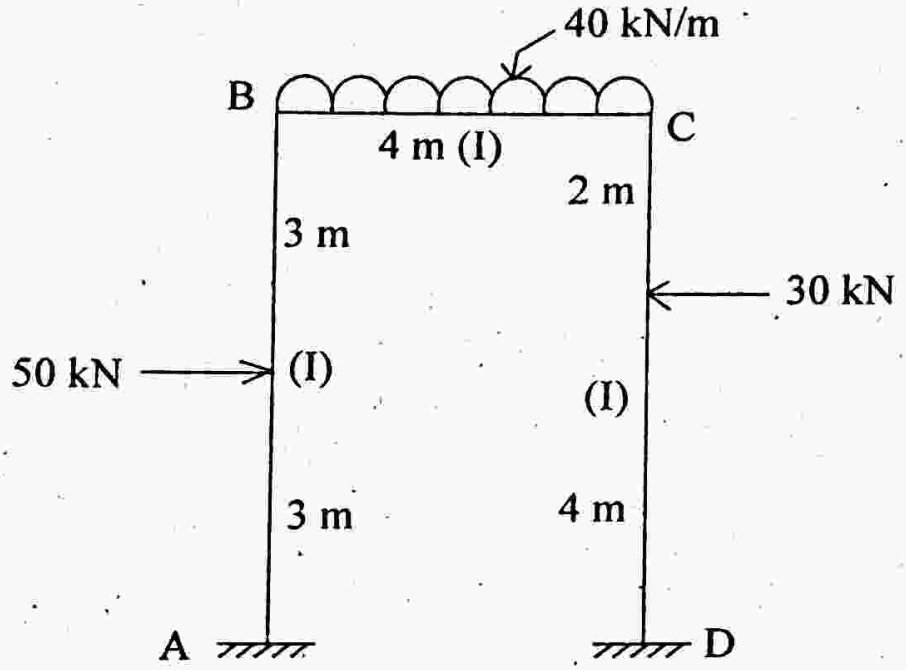


Fig. 4

5. Analyse the pin jointed truss shown in Fig. 5 by Direct Stiffness Method. Take area of cross section of members as 1000 mm^2 and modulus of elasticity E = 200 kN/mm^2. Also find out support reactions. 13

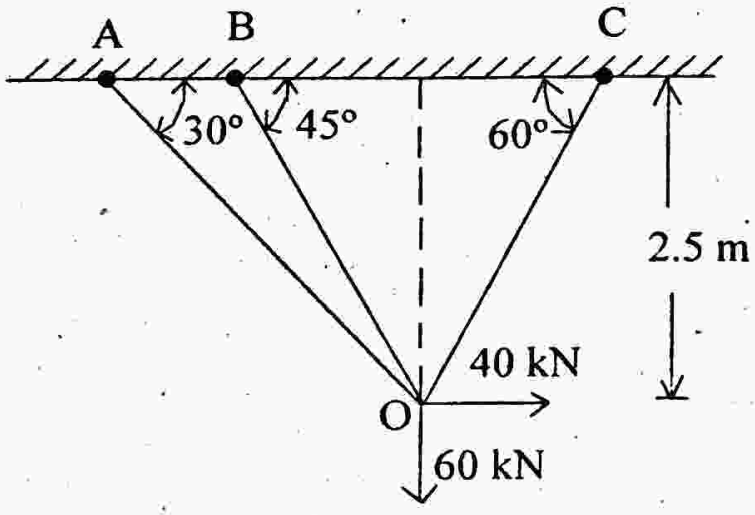


Fig. 5

OR

6. Determine the forces in members of a truss if the member BC is long by 2 mm. Take area of cross section as 800 mm², E = 200 kN/mm² using Direct Stiffness method. Also find out support reactions. Refer Fig. 6. 13

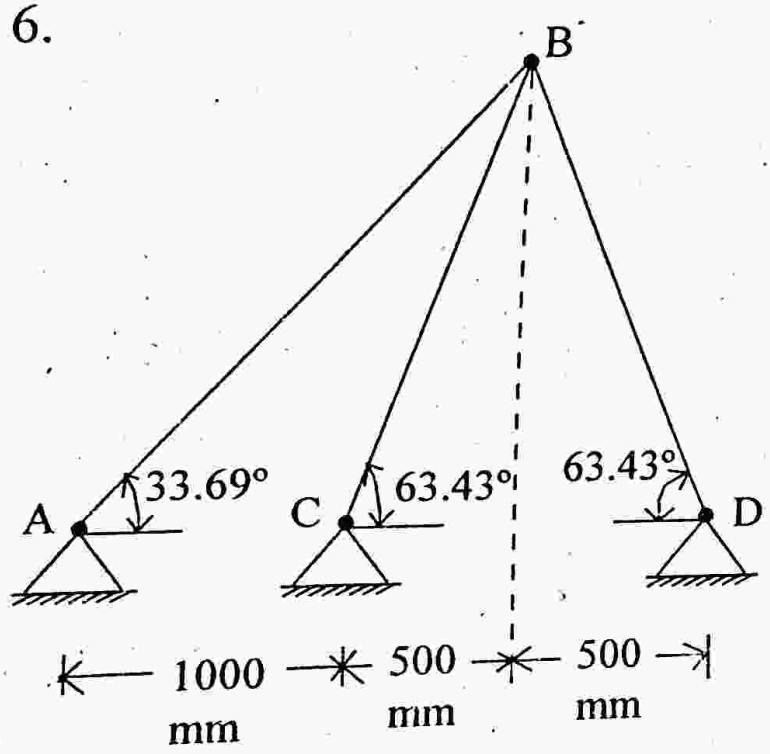
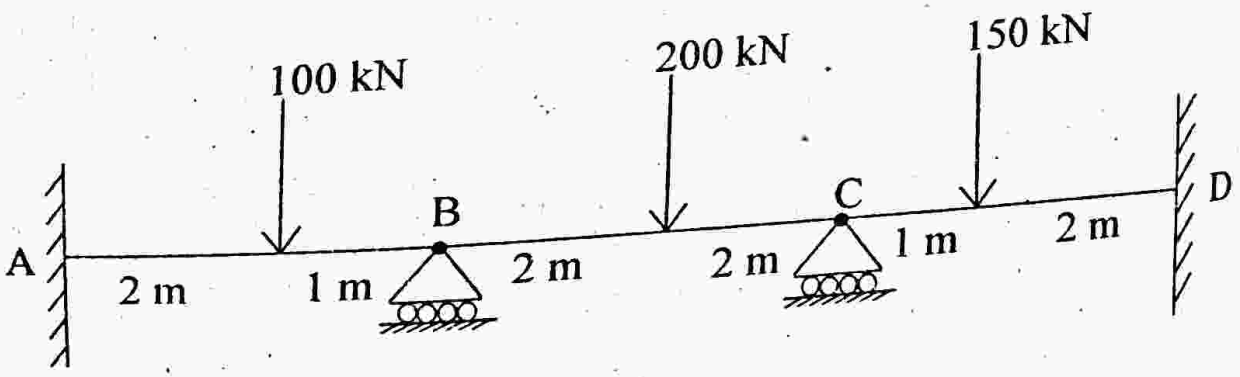


Fig. 6

7. Using Stiffness method, analyse the continuous beam shown in Fig. 7 and draw its B.M.D. 13



Take EI = 1 units.

Fig. 7

OR

8. Analyse the given continuous beam by Stiffness Method and draw BMD. Take EI = 1 units (Refer Fig. 8) 13

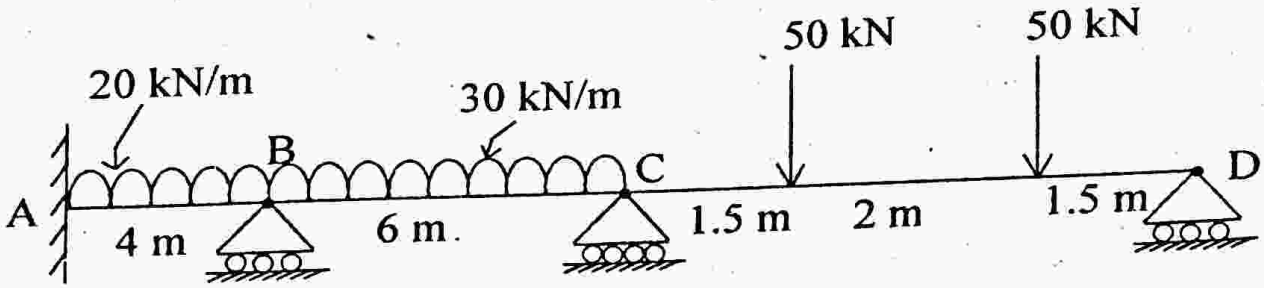


Fig. 8

9. Analyse the plane frame in Fig. 9 by Stiffness method. Draw B.M.D. E = 25.5×10^6 kN/m^2, size of member = 30 cm × 50 cm. Neglecting axial definition. 14

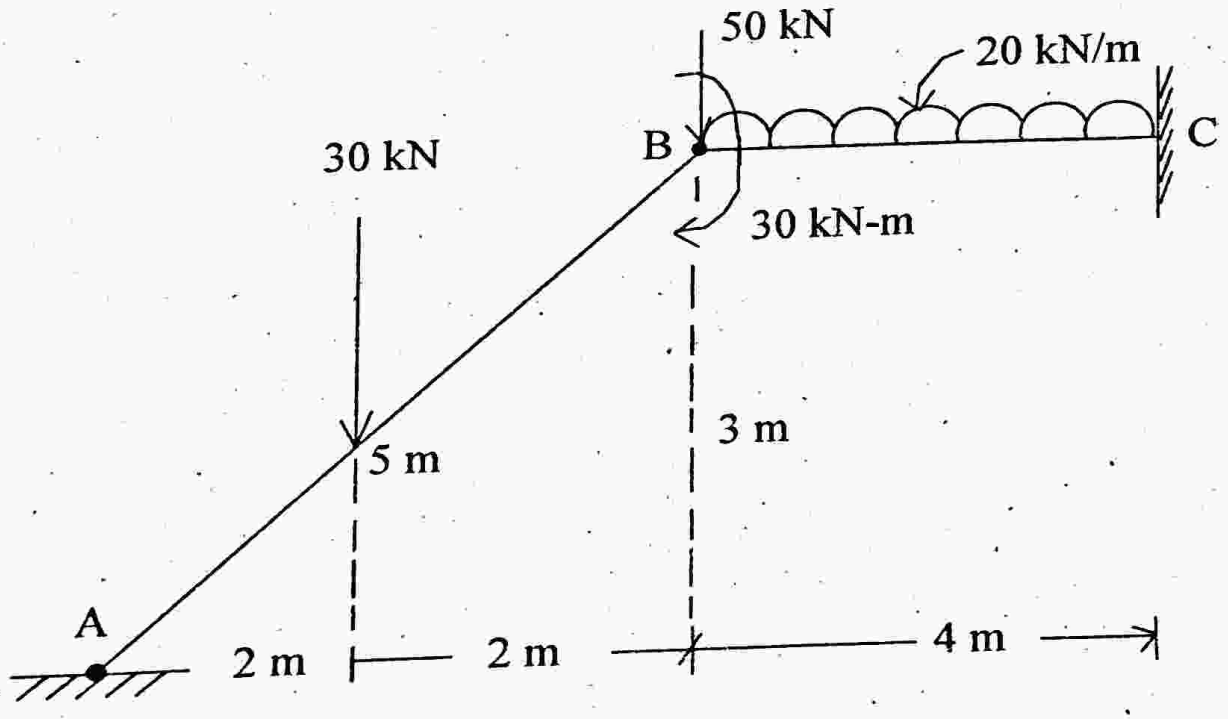


Fig. 9

OR

10. (A) Derive the element/member Stiffness matrix for plane frame member. 7

(B) Frame the global load matrix for the portal frame in Fig. 10 (B) accounting the effect of temperature difference. Take external temperature = 20°C, internal temperature = 50°C, $\alpha = 1 \times 10^{-5}$/°C, size of column = (230 × 500) mm and size of beam = (230 × 650) mm. 7

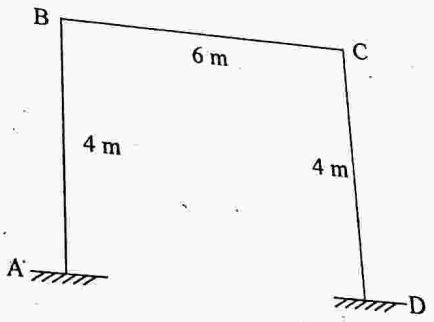


Fig. 10(B)

11. Write short notes on (any **THREE**) : 13

(A) D'Alembert principle

(B) Single degree of freedom system

(C) Damping

(D) Natural Frequency.

OR

12. (A) Write the steps involved in Finite Element Method. 6

(B) Find out the end displacement of the bar shown in Fig. 12(B) using Rayleigh Ritz method. Assume polynomial function for displacement as $u(x) = a_1 + a_2x$. Take A = 100 mm², $E = 2 \times 10^5$ N/mm². 7

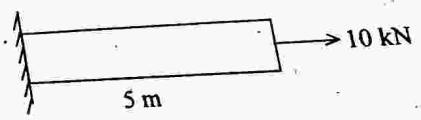


Fig. 12(B)