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## Question Paper Code : 40308

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Fifth Semester

Civil Engineering

CE 8502 — STRUCTURAL ANALYSIS I

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define strain energy.
2. Define the term statically indeterminacy.
3. Write the general slope deflection equation .
4. State the assumptions made in the slope deflection method.
5. Explain about moment distribution factor.
6. State the advantages of the moment distribution method over the slope deflection method.
7. What do you mean by translation?
8. Define the term rigid frame.
9. Define the term rigidity of a structure.
10. Define the perfect frame with an example.

PART B — (5 × 13 = 65 marks)

11. (a) Determine the force on the members of the curve by the strain energy method as shown in the Figure 11(a). All members have the same cross-sectional area.

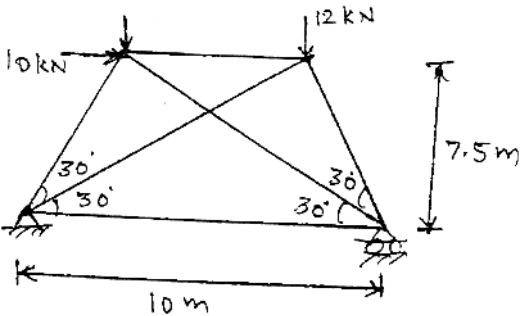


Figure 11(a)  
Or

- (b) A pin-connected rectangular frame with two diagonals as shown in Figure 11(b). Find the forces of member when Beam BC is to be added last with 5 mm. The cross-sectional area of each side bar is  $1000 \text{ mm}^2$  and  $500 \text{ mm}^2$  at each diagonal. Take  $E = 2.1 \times 10^5 \text{ MPa}$ .

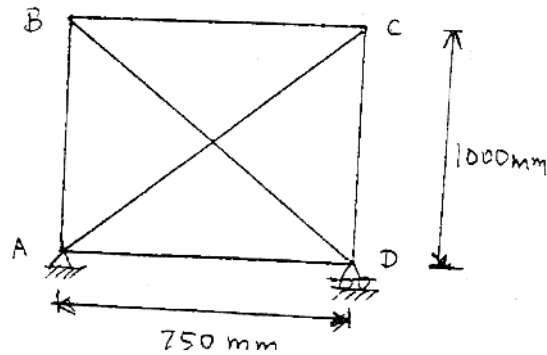


Figure 11(b)

12. (a) Analyse the two-spaced continuous beam shown in the Figure 12(a) by the slope deflection method and draw the bending moment and shear force diagram. Take the value of the constant Young's modulus.

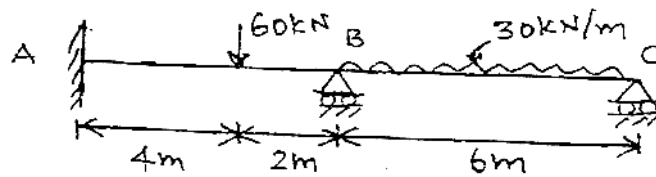


Figure 12(a)

Or

- (b) Analyse a rigid frame by the slope deflection method as shown in the Figure 12(b) and draw the graph of the bending moment.  $E = 2 \times 10^5 \text{ MPa}$  and  $I = 8 \times 10^4 \text{ mm}^4$ .

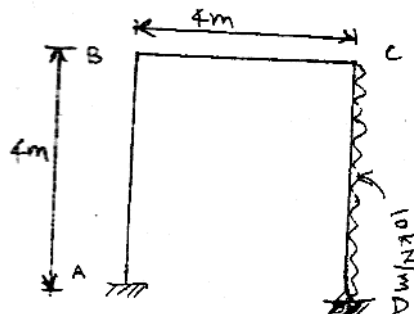


Figure 12(b)

13. (a) Analyze the three-spaced continuous beam supported as shown in the Figure 13(a) by the moment distribution method and draw the bending moment diagram.

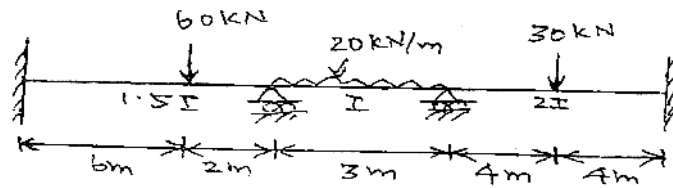


Figure 13(a)

Or

- (b) Analyze a portal frame structure by the moment distribution system as shown in the Figure 13(b) and draw a bending moment diagram.

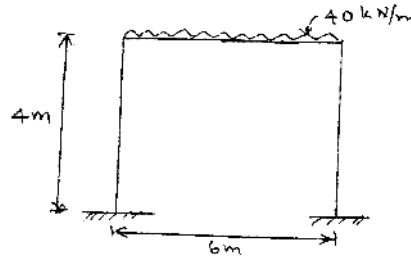


Figure 13(b)

14. (a) Analyze the continuous beam ABC as shown in the following Figure 14(a) by the flexible matrix method and draw the bending moment diagram.

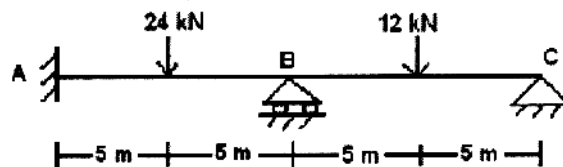


Figure 14(a)

Or

- (b) Analyze the continuous beam shown in the following Figure 14(b) by the flexible matrix method and draw the bending moment diagram.

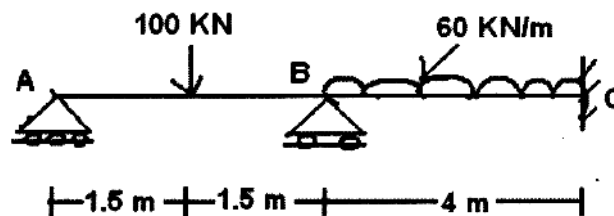


Figure 14(b)

15. (a) Analyze the portal frame ABCD using stiffness method shown in Figure 15(a) and draw the bending moment diagram.

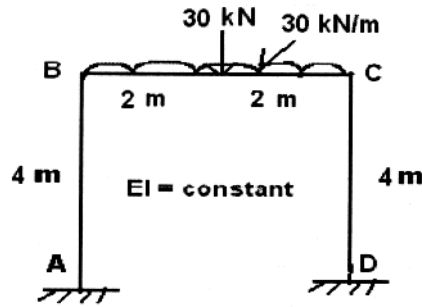


Figure 15(a)

Or

- (b) Analyze the frame shown in Figure 15(b) by the matrix stiffness method.

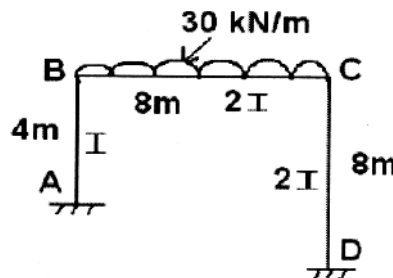


Figure 15(b)

PART C — (1 × 15 = 15 marks)

16. (a) Analyze the continuous beam ABC of Figure 16(a) using the stiffness method and also draw the bending moment diagram.

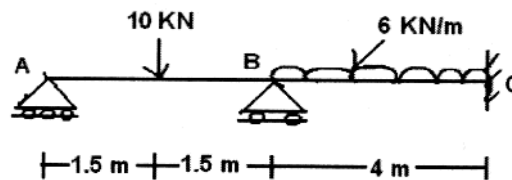


Figure 16(a)

Or

- (b) Analyze the portal frame ABCD shown in Figure 16(b) using stiffness method and also draw the bending moment diagram.

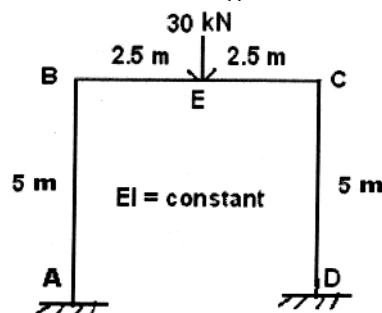


Figure 16(b)