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**Question Paper Code : 33233**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Fifth Semester

Civil Engineering

CE 1302/CE 1303/070100046 — STRUCTURAL ANALYSIS — CLASSICAL METHODS

(Regulation 2004/2007)

(Common to B.E. (Part-Time) Fourth Semester—Civil Engineering—Regulation 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the deflection at free end of a cantilever beam of span 5 m carrying a point load 10 kN at midspan?  $EI = 25000 \text{ kNm}^2$ .
2. What is Williot diagram?
3. Say true or false, if false give justification 'Deflection in pin jointed frames depends upon both flexural rigidity and axial rigidity'.
4. Determine the slope at the free end of a cantilever beam due to applied moment,  $M$  at free end using the principle of virtual work.
5. What is static indeterminacy in case of (a) Two hinged and (b) Fixed arches?
6. A symmetric circular arch has 40 m span and 6 m rise. Find its radius..
7. State Eddy's theorem.
8. What are the causes of sway frames?
9. Define : Stiffness.
10. State how the redundancy of a rigid frame is calculated.

PART B — (5 × 16 = 80 marks)

11. (a) Find vertical and horizontal deflection at 'C' of the truss shown in Figure Q. No. 11(a). The cross sectional area of all the members is 400 mm<sup>2</sup>. The modulus of elasticity is 200 GPa. (16)

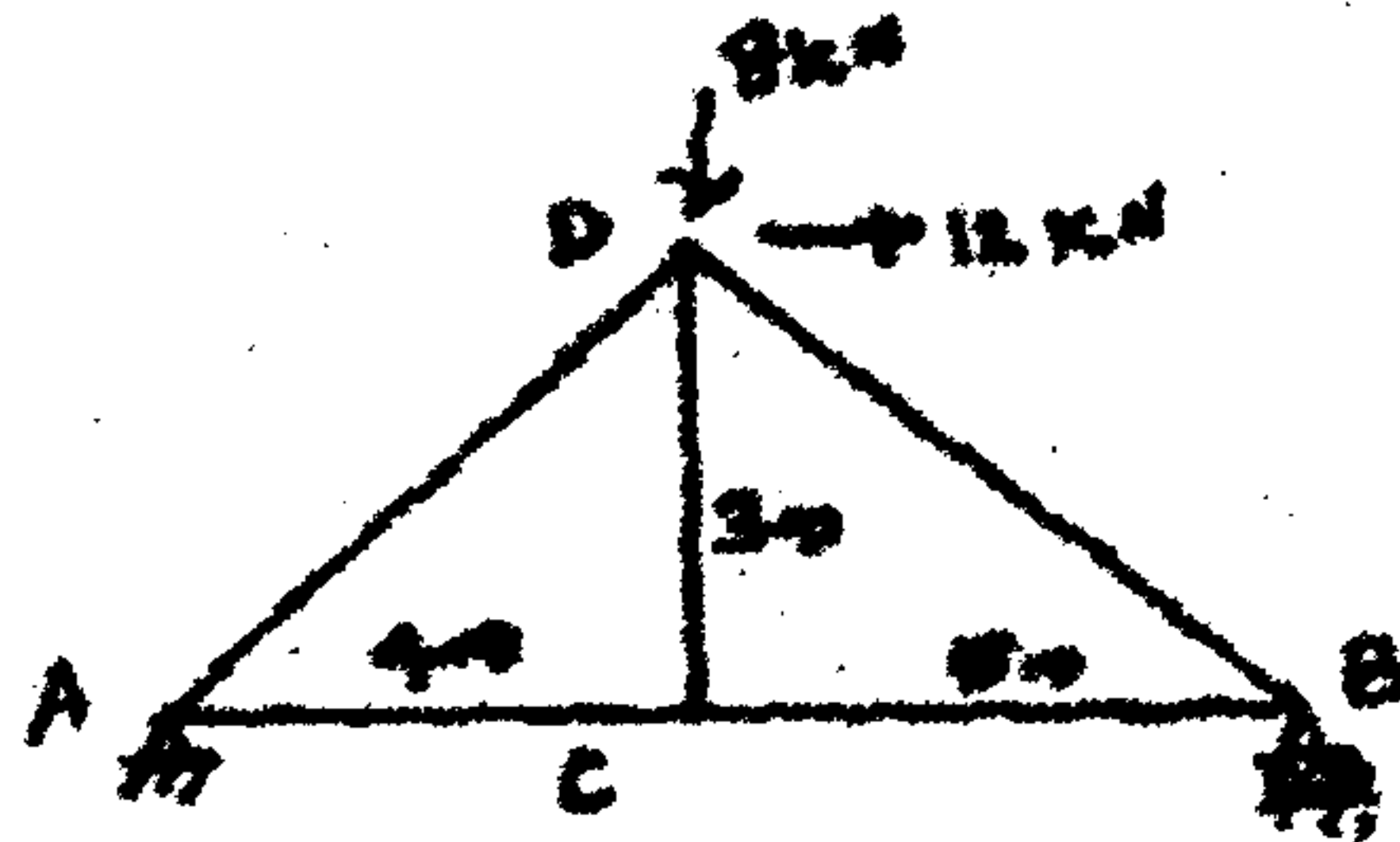


Figure. Q. No. 11(a)

Or

- (b) Find Rotation at 'A' and Rotation and Horizontal displacement at 'B' of the rigid jointed frame shown in figure Q. No. 11(b).

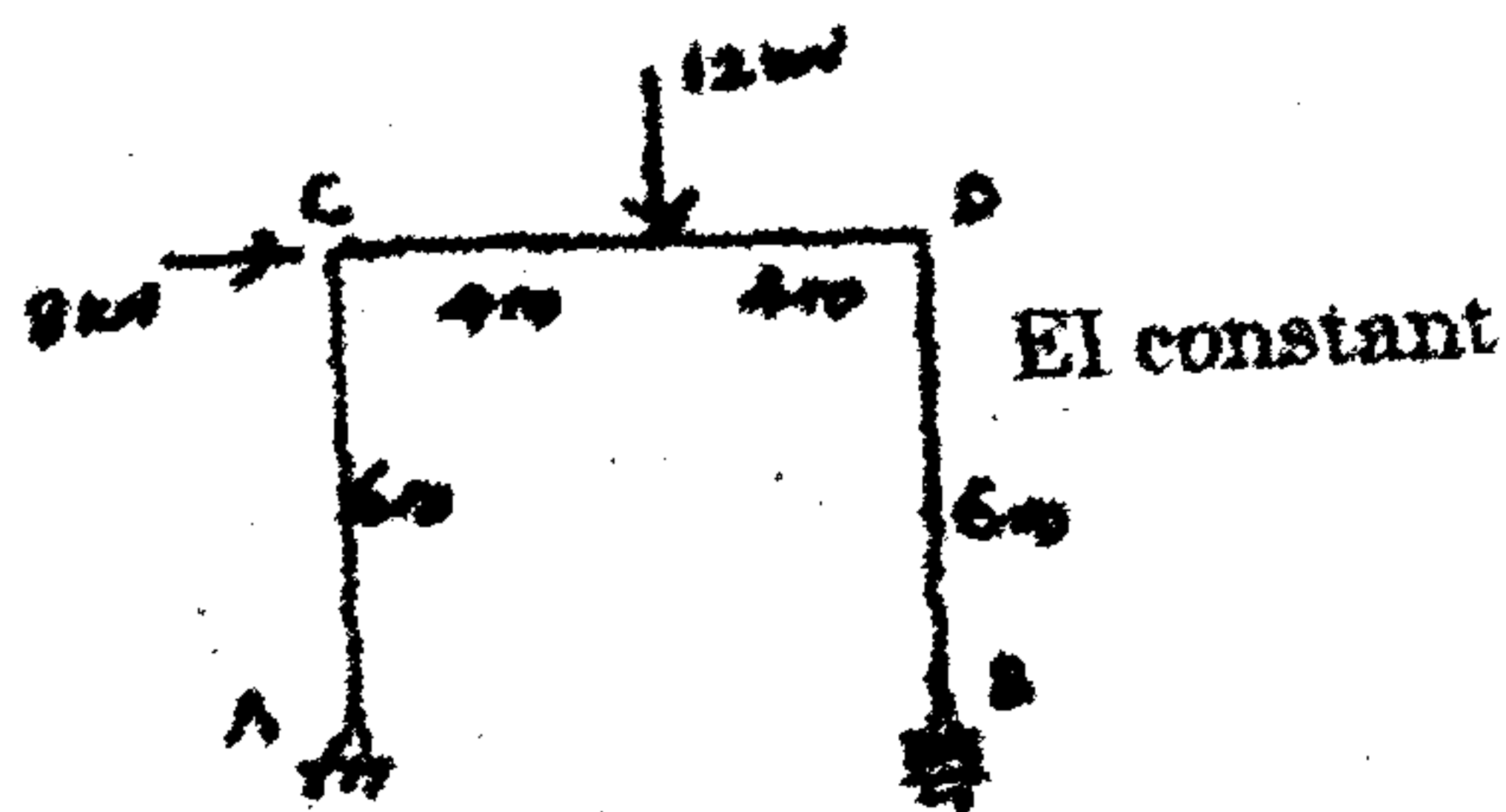


Figure. Q. No. 11(b)

12. (a) Draw the influence lines for shearing force and BM at a section 3 m from one end of a simply supported beam, 12 m long. Use the diagrams to calculate the maximum shearing force and the maximum bending moment at this section due to a uniformly distributed rolling load, 5 m long of 2 kN per meter intensity.

Or

- (b) Determine the influence line for the shear force at D, the middle point of span BC, of a continuous beam shown in Fig. Q. No. 12 (b). Compute the ordinates at 1 m interval.

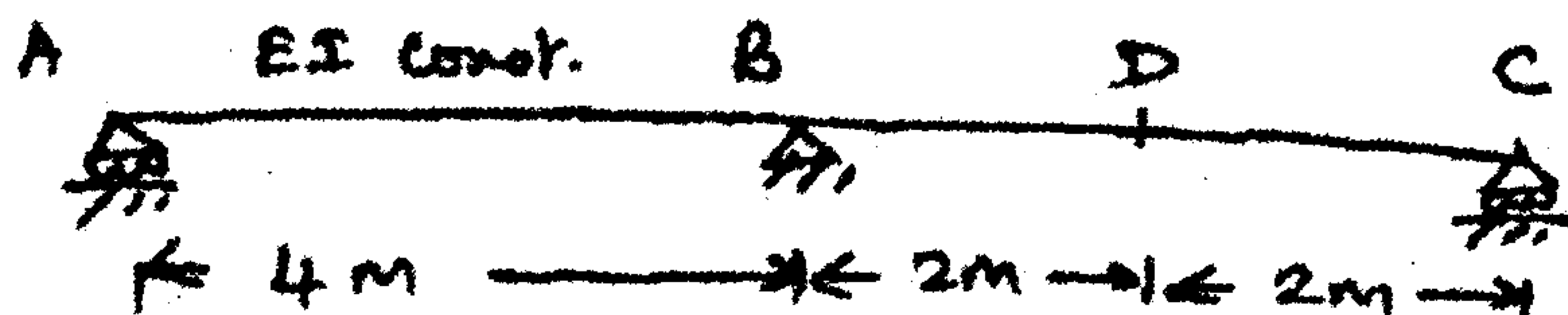


Fig. Q. No. 12(b)

13. (a) A symmetrical three hinged parabolic arch of span 40 m and rise of 8 m carries a udl of 30 kN/m over the left half of the span. Find (i) Reaction at the supports. (ii) Bending moment, radial shear, and Normal thrust at a distance of 15 m from the left support.

Or

- (b) A parabolic two hinged arch (hinged at its ends) has a span of 80 m and a rise of 5 m. A concentrated load of 12 kN acts at 10 m from the left hinge. The second moment of area varies as the secant of the slope of the rib axes. Calculate the horizontal thrust and the reaction at the hinges. Also calculate the maximum bending moment anywhere on the arch.

14. (a) Analyse the beam shown in Fig. Q. No. 14(a) by slope deflection method and draw the SFD and BMD.  $EI = \text{Constant}$ .

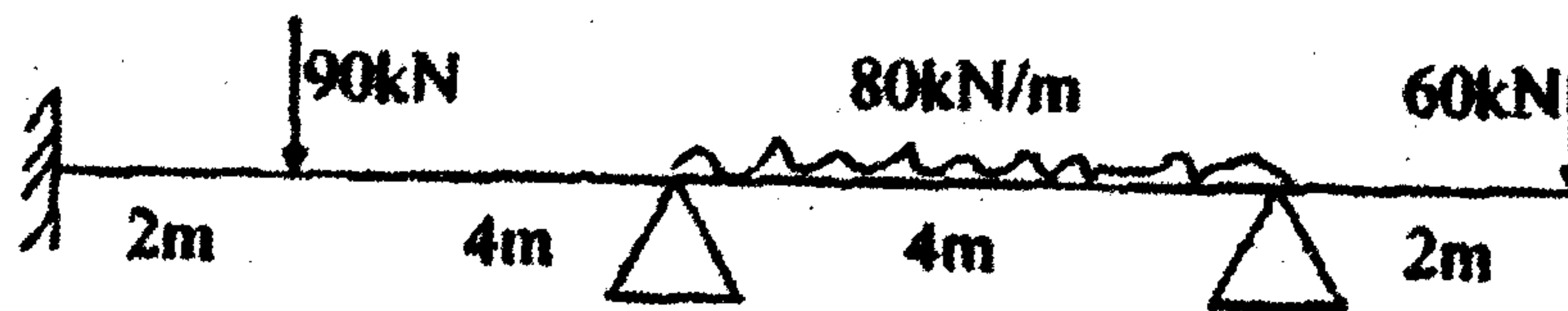


Fig. Q. No. 14(a)

Or

- (b) Analyse the frame shown in Fig. Q. No. 14(b) by slope deflection method and draw the SFD and BMD.  $EI = \text{Constant}$

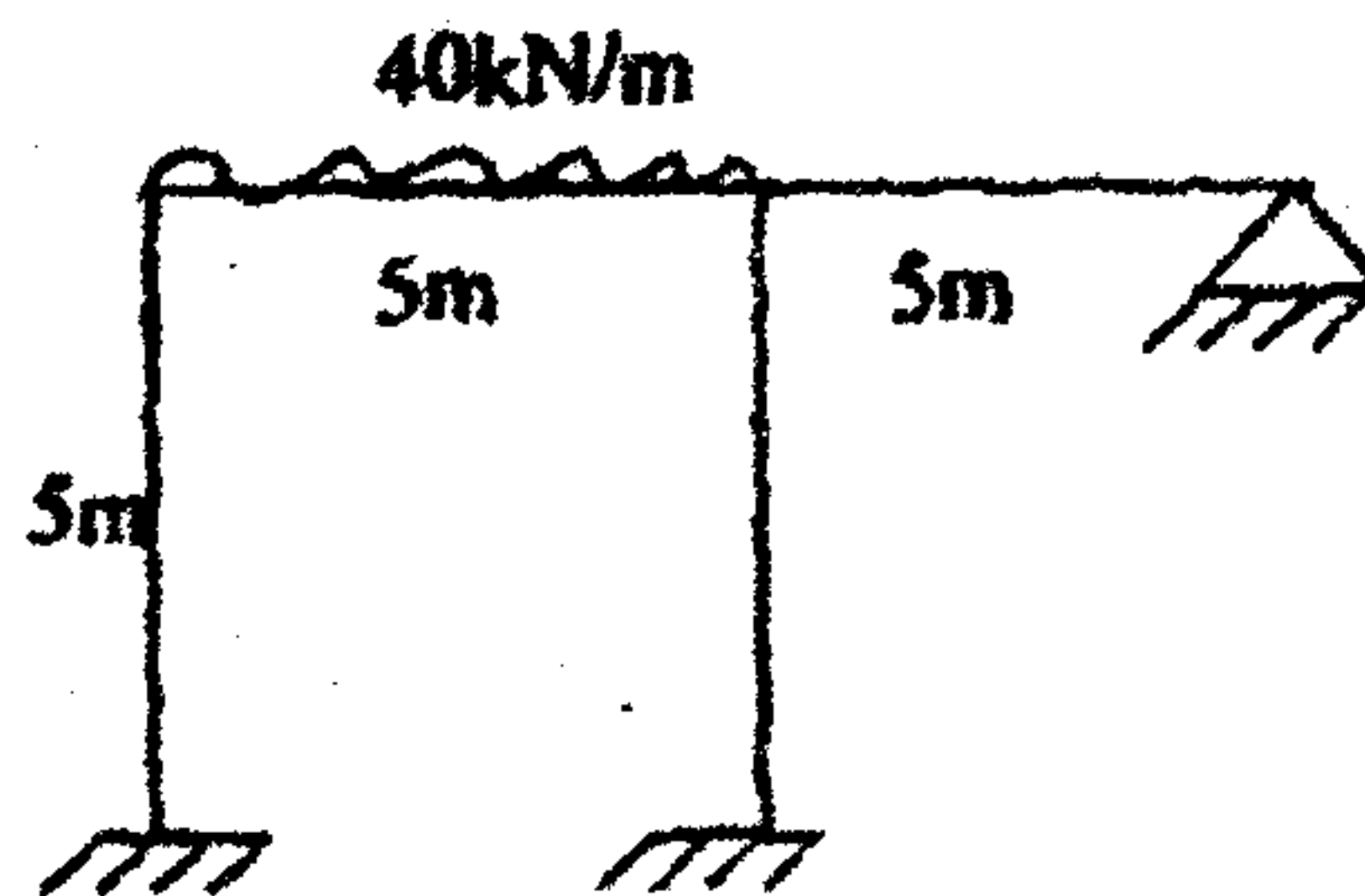


Fig. Q. No. 14(b)

15. (a) Analyse the continuous beam shown in Fig. Q. No. 15(a) by moment distribution method and draw the BMD.

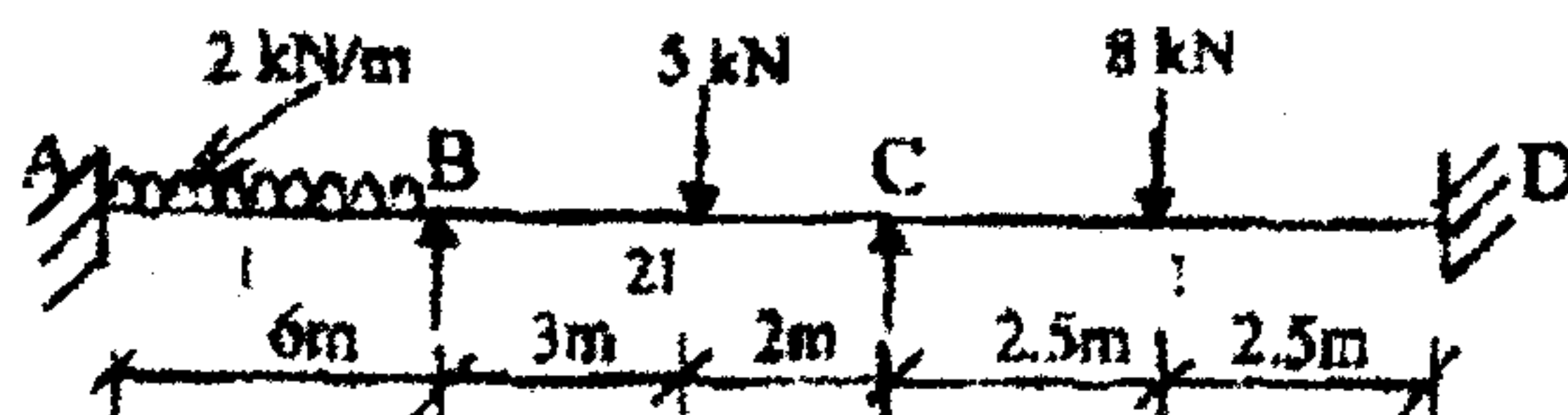


Fig. Q. No. 15(a)

Or

- (b) Analyse the frame shown in Fig. Q. No. 15(b) by moment distribution method and draw BMD.

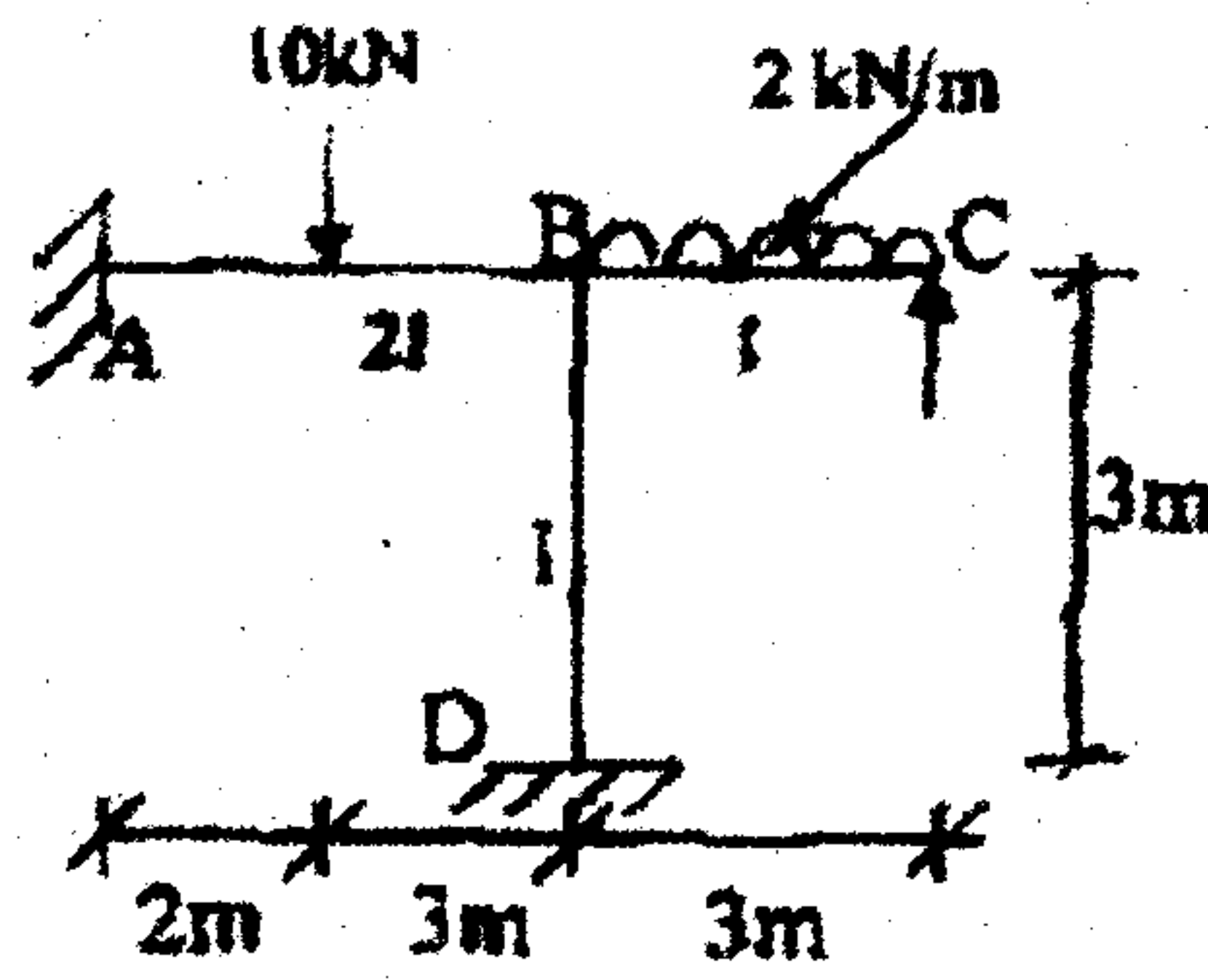


Fig. Q. No. 15(b)