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Question Paper Code : 31206

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

Fifth Semester

Civil Engineering

CE 2302/CE 51 — STRUCTURAL ANALYSIS — I

(Regulation 2008)

(Common to PTCE 2302 – Structural Analysis – I for B.E. (Part-Time)
Third Semester – Civil Engineering – Regulation 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the Principle of virtual work.

2. What are the difference between determinate and indeterminate structures?

3. State Muller Breslau's principle.

4. What are the types of arches?

5. Define horizontal thrust.

6. Express the slope deflection equation.

7. What are the assumptions made in slope deflection method?

8. Define distribution factor.

9. Explain the relative stiffness factor.

10. Explain the point of contra flexure.

PART B — (5 × 16 = 80 marks)

11. (a) Determine the vertical and horizontal deflection of components of joint C of the truss in Fig. 1. Take $E = 200 \times 10^6$ kN/m^2 and the sectional area of each bar $A = 100 \times 10^{-6}$ m^2 using the principle virtual work.

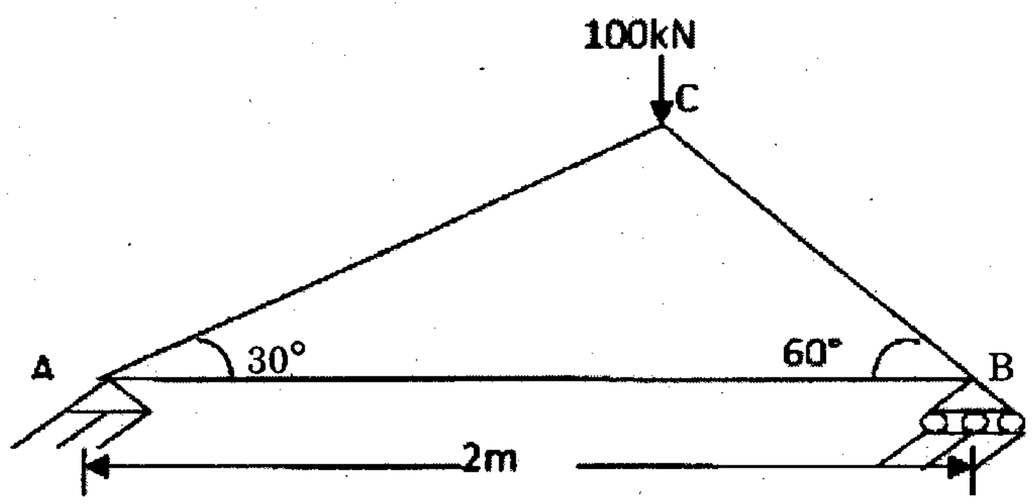

Fig. 1

Or

(b) Determine the deflection at center of the beam and slope at end A of the beam shown in Fig. 2. Take $E = 200 \times 10^6$ kN/m^2 and $I = 13 \times 10^{-6}$ m^4. Use the principle of virtual work.

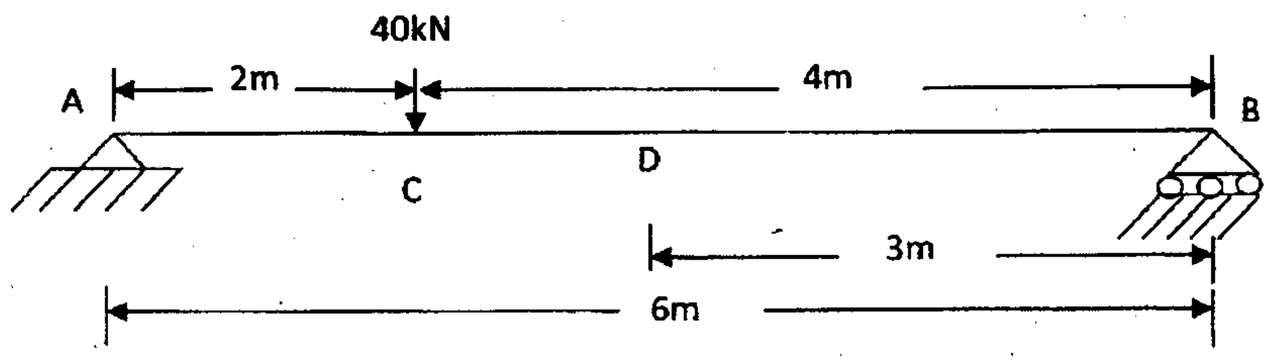

Fig. 2

12. (a) Two wheel loads of 40 kN and 20 kN spaced 4 m apart cross a girder of 10 meters span, with the 20 kN load leading, from left to right. Draw the maximum shear force and bending moment diagrams.

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. 3. Compute the ordinates at 1 m interval.

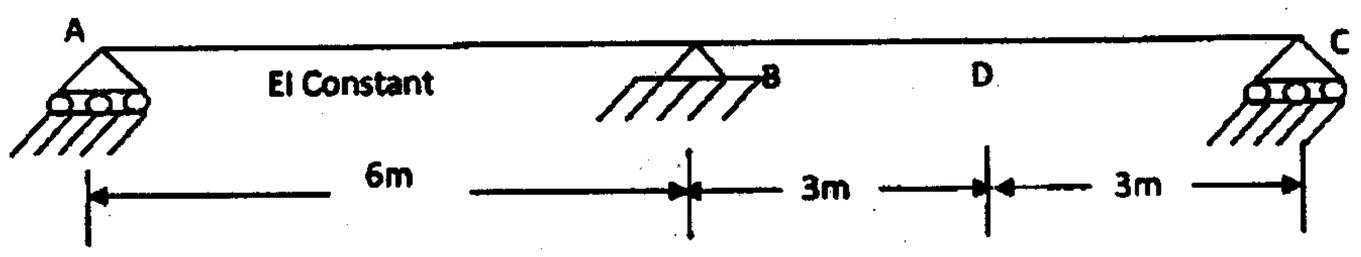

Fig. 3

13. (a) A parabolic arch hinged at the springing and crown has a span of 20 m. The central rise of the arch is 4 m. It is loaded with uniformly distributed load of intensity 4 kN/m on the left 4 m length. Calculate

(i) the direction and magnitude of reaction at the hinges,

(ii) the bending moment, normal thrust and shear at 4 m and 12 m from the left end,

(iii) maximum positive and negative bending moments.

Or

(b) A two hinged parabolic arch has a span of 30 m and a central rise of 5 m. Calculate the maximum positive and negative bending moments at a section 10 m from the left support, due to a single point load 10 kN rolling from left to right.

14. (a) ABC is a continuous beam with constant EI throughout its length as shown in Fig.4. The end supports A and C are fixed and the beam is continuous over middle support B. Span BC is uniformly loaded with 15 kN/m length while a concentrated vertical downward load of 125 kN acts at the midspan of AB. Calculate the moments by slope deflection method.

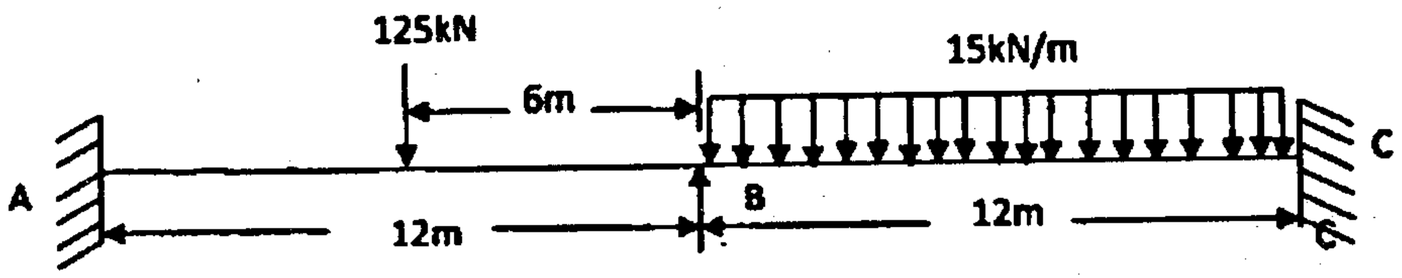

Fig. 4

Or

(b) Analyse the portal frame shown in Fig. 5. Take I1 : I2 : I3 = 3 : 2 : 1. Use slope deflection method.

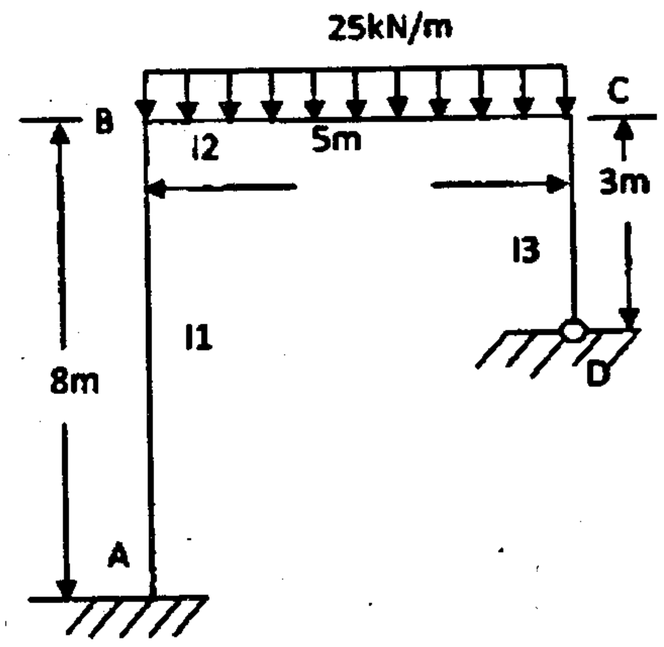

Fig. 5

15. (a) Analyse the continuous beam loaded as shown in Fig. 6 by the method of moment distribution. Draw the bending moment and shear force diagrams.

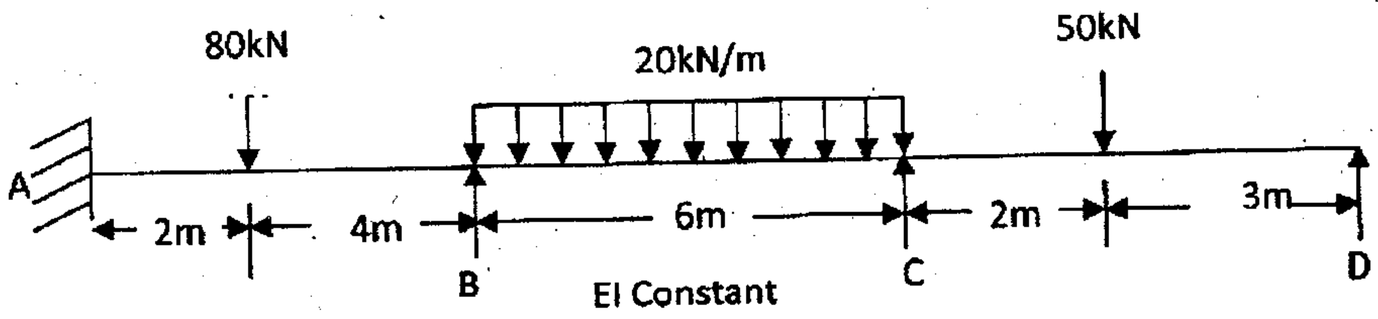

Fig. 6

Or

(b) Analyse the structure loaded as in Fig. 7 by using moment distribution method and draw the bending moment and shear force diagrams.

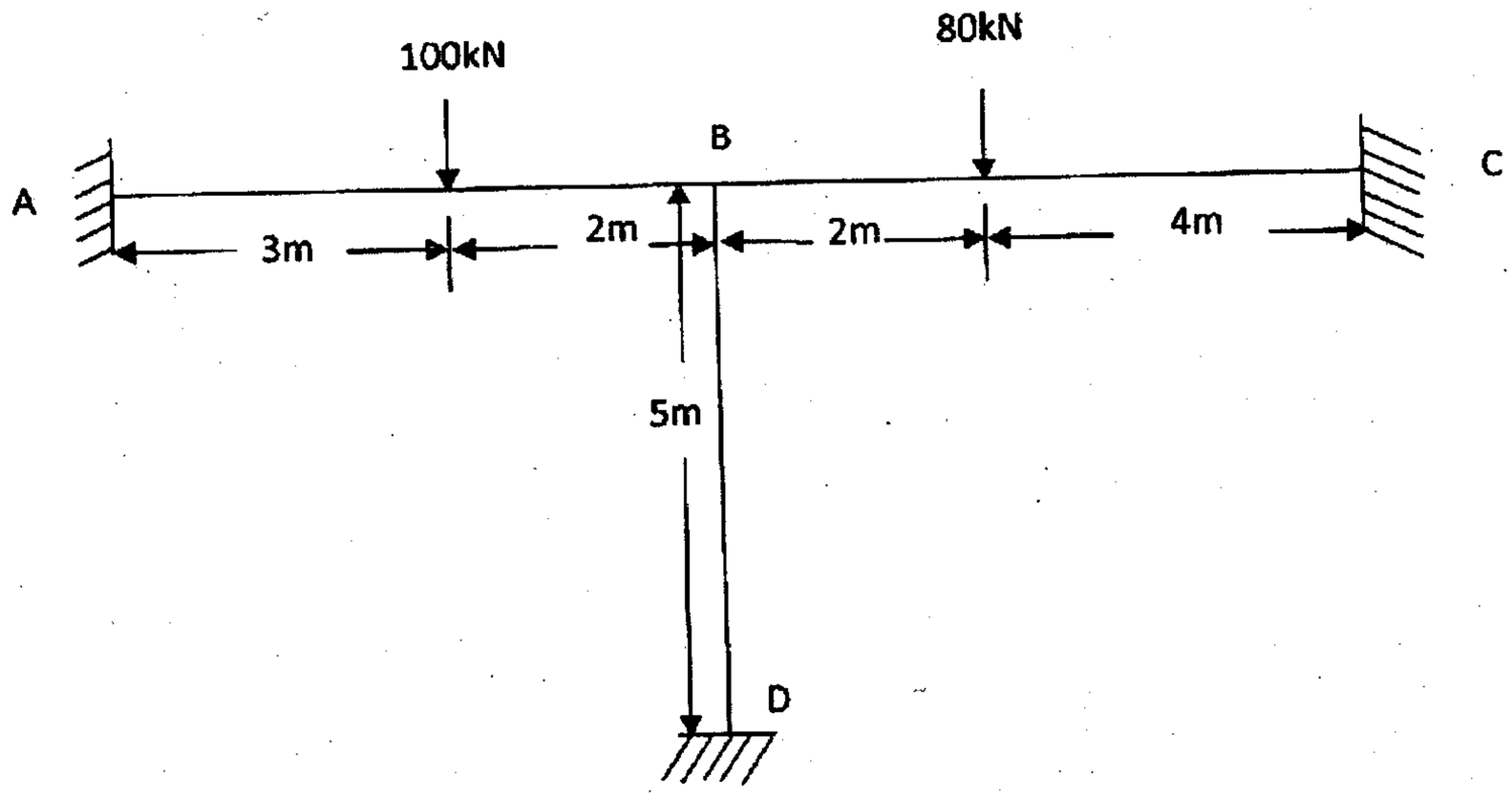

Fig. 7