

**A 191**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2005.

Fifth Semester

Civil Engineering

CE 331 — STRUCTURAL ANALYSIS — I

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the law of conservation of energy.
2. Explain about castiglione's first theorem.
3. What are the basic requirements of structural analysis?
4. Develop member flexibility matrix for beam element.
5. List the classical methods of structural analysis.
6. Differentiate between sway and non sway frames.
7. Explain the term distribution factor.
8. What is meant by shear equation?
9. Explain about stiffness coefficient ' $k_{ij}$ '.
10. What are the steps involved in matrix stiffness method?

PART B — (5 × 16 = 80 marks)

11. (i) Determine the vertical deflection at point  $L_2$  for the truss shown in Fig. 1. The areas of the members in sq. cm are indicated along members in parenthesis. Assume modulus of elasticity  $E$  as 200 GPa.
- (ii) Also determine the horizontal deflection at joint  $L_2$ .

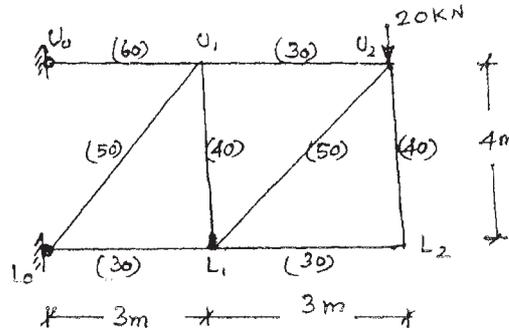


Fig. 1

12. (a) Analyse the continuous beam by flexibility method. (Fig. 2)

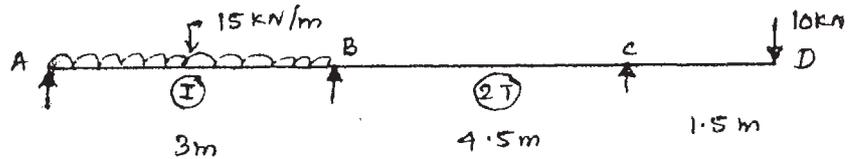


Fig. 2

Or

- (b) Analyse the portal frame shown in Fig. 3 by flexibility method.

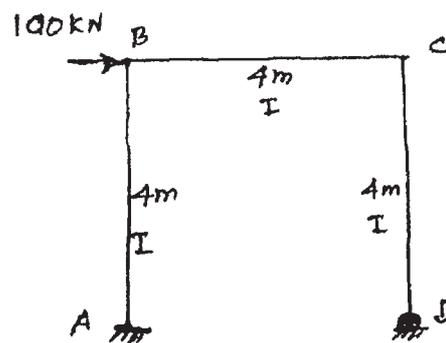


Fig. 3

13. (a) The continuous beam shown in Fig. 4 has a constant moment of inertia of  $15,000 \text{ cm}^4$ . The supports are initially at the same level. If the support sinks by  $1 \text{ cm}$  after loading, analyse the beam. Use slope deflection method.  $E = 200 \text{ kN/mm}^2$ .

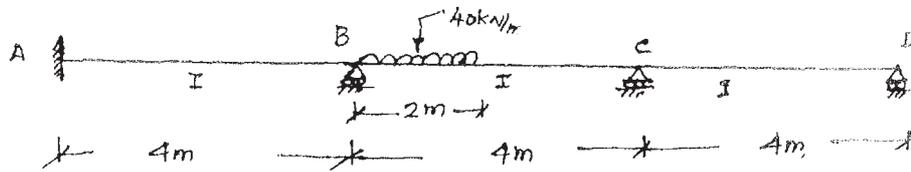


Fig. 4

Or

- (b) Analyse the frame shown in Fig. 5 by slope deflection method.

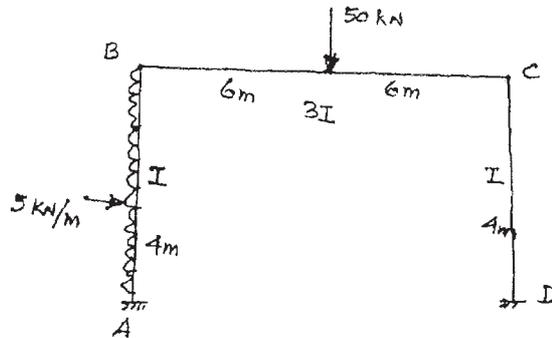


Fig. 5

14. (a) Analyse the continuous beam, shown in Fig. 6 by moment distribution method. Draw B.M.D.

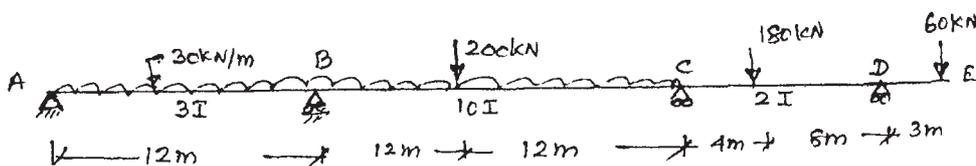


Fig. 6

Or

- (b) Find the moment at the critical sections. Draw B.M.D. for the frame shown in Fig. 7.

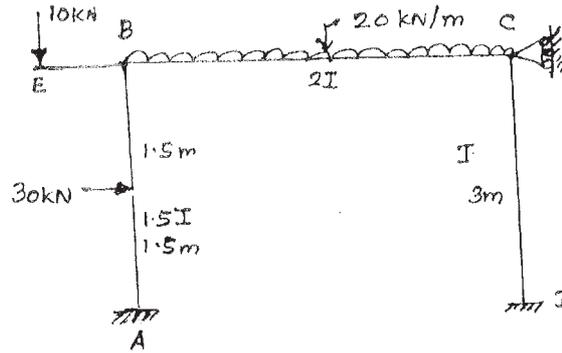


Fig. 7

15. (a) Analyse the continuous beam shown in Fig. 8 by stiffness method. Support 'B' sinks by 10 mm.

$$E = 2 \times 10^5 \text{ N/mm}^2$$

$$I = 2 \times 10^7 \text{ mm}^4$$

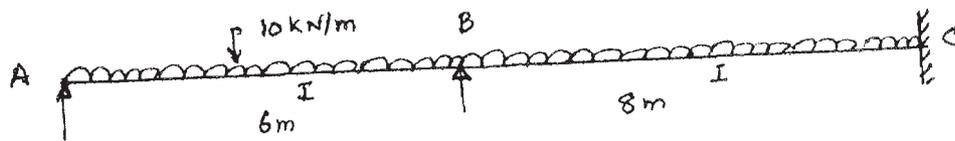


Fig. 8

Or

- (b) Analyse the frame shown in Fig. 9 by matrix displacement method.

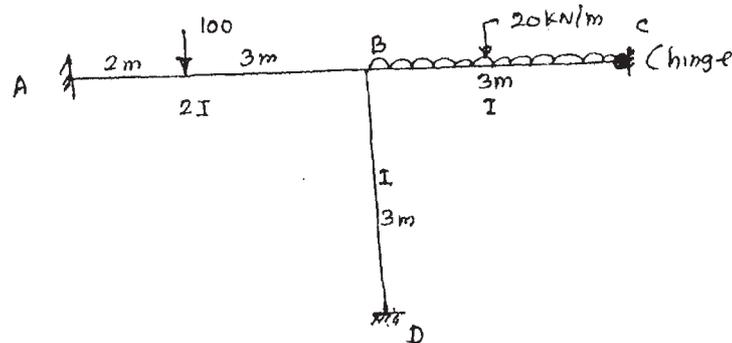


Fig. 9