

A 10887

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2006.

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. Explain the principle of virtual work.
2. What is meant by 'Williott diagram'?
3. What is meant by 'Compatibility condition'?
4. Write flexibility matrix for simply supported beam element with moments at supports as coordinates.
5. Write the slope deflection equation explaining the meanings of notations used.
6. Why slope-deflection method is also known as stiffness method?
7. What are the advantages of moment-distribution method?
8. Define the terms 'Stiffness' and 'Carryover factor'.
9. Explain about global coordinate system.
10. Explain the term 'Degree of freedom'.

11. (i) Derive the complementary virtual work for Bending Moment. (6)
- (ii) Calculate the deflection at 'A' for the beam shown in Fig. 1. (10)
- $I = 100 \times 10^6 \text{ mm}^4$ $E = 2 \times 10^5 \text{ N/mm}^2$

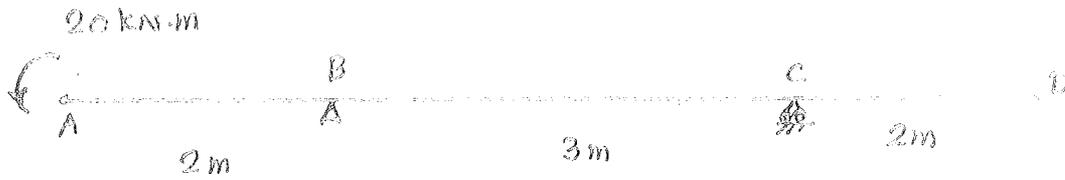


Fig. 1

12. (a) Analyse the continuous beam for moments by the flexibility method. The beam is shown in Fig. 2.

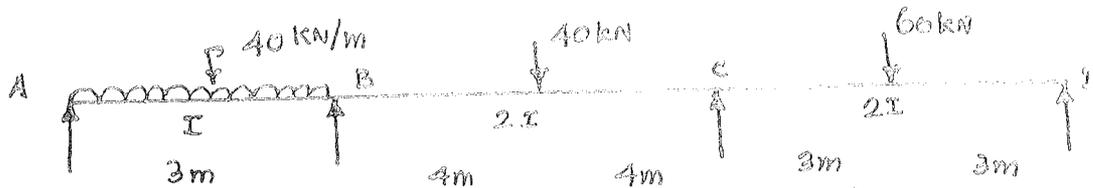


Fig. 2

Or

- (b) Determine the forces in the members of the truss shown in Fig. 3 by flexibility method. Assume $\frac{l}{AE} = 1$ for all members.

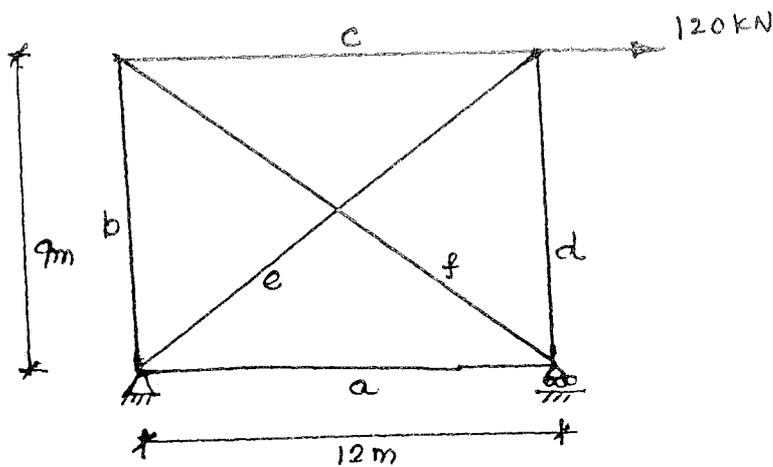


Fig. 3

13. (a) Find the moments at the critical points of the beam shown in Fig. 4 by slope deflection method. The support B settles by 1 cm. $EI = 500 \text{ kN/m}^2$.



Fig. 4

Or

- (b) Find the moment and rotations at the critical sections of the frame shown in Fig. 5. Use slope deflection method.

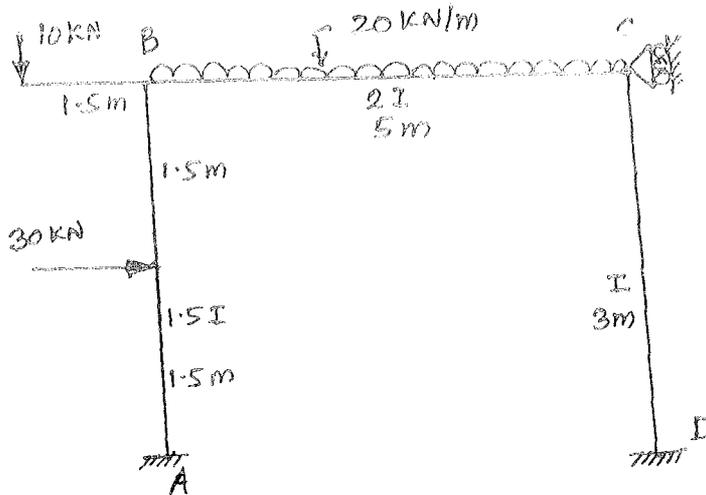


Fig. 5

14. (a) Find the support moments in the continuous beam shown in Fig. 6 if the support at A settles by 10 mm. $E = 22000 \text{ kN/cm}^2$, $I = 5000 \text{ cm}^4$. (Moment distribution method)

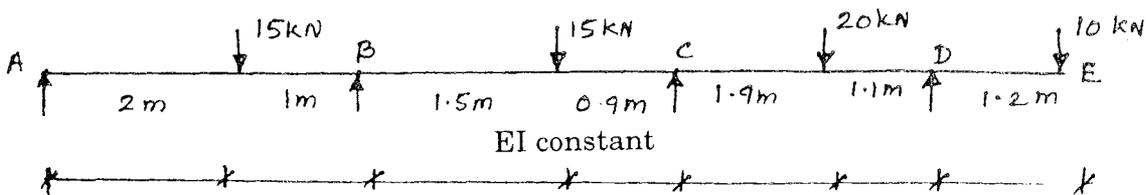


Fig. 6

Or

- (b) A rigid jointed portal frame ABCD is loaded as shown in Fig. 7. Determine the member end moments by moment distribution method.

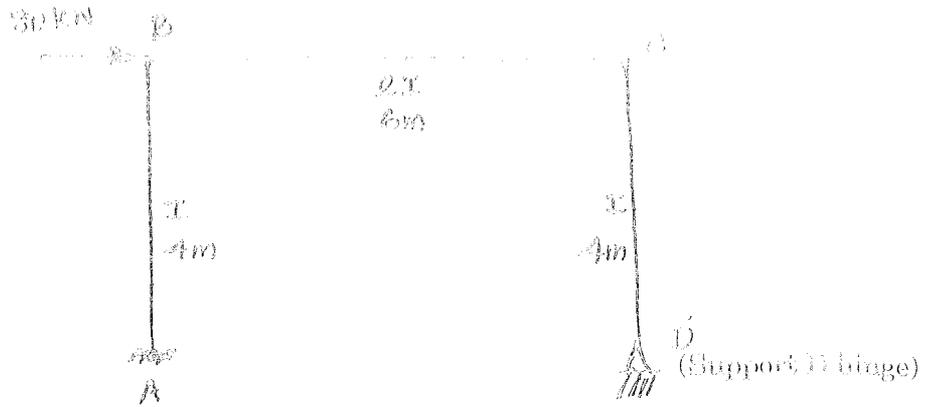


Fig. 7

15. (a) A two-span continuous beam ABC is fixed at A and simply supported over the supports at B and C. $AB = 6\text{ m}$ and $BC = 4\text{ m}$. Moment of inertia is constant throughout. A uniformly distributed load of 20 kN/m acts over AB and a single concentrated central load of 60 kN act on BC at mid point. Analyse the beam by stiffness matrix method.

Or

- (b) Analyse the frame shown in Fig. 8 by stiffness method.

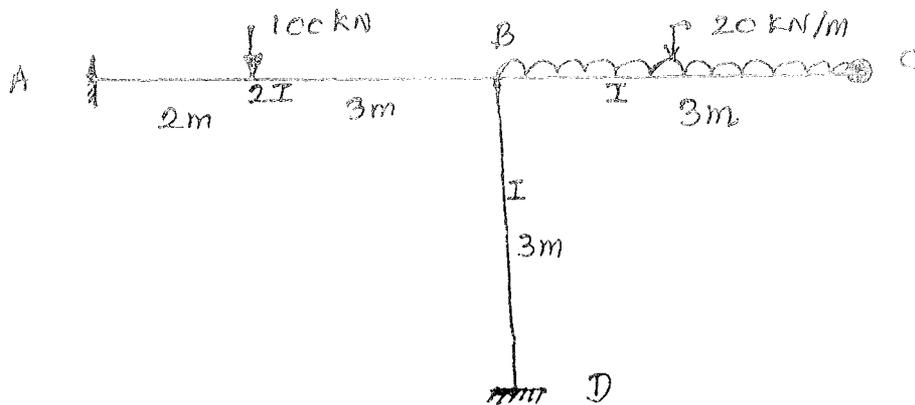


Fig. 8