Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐

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B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2007.

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. Define the term virtual work.

2. Define Williott-Mohr diagram.

3. Define compatibility equation.

4. Define indeterminate structures.

5. Write the slope deflection equation.

6. Differentiate between symmetry and antisymmetry structures.

7. Define stiffness factor.

8. What do you mean by carry over factor?

9. Define stiffness matrix.

10. Explain rotation transformation matrix.

PART B — (5 × 16 = 80 marks)

11. (a) Find the vertical and horizontal deflection of the point C of a pin jointed plane frame loaded as shown in Fig. 1.

The cross sectional area of each bar is 160 mm² and Young's modulus is 2×10^5 N/mm².

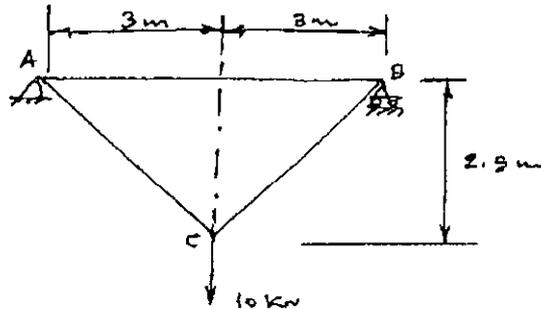Fig. 1 Qn 11 (a)

Or

(b) Find the horizontal deflection of joint B and joint D of a plane frame ABCD loaded as shown in Fig. 2. Young's modulus is 2×10^5 N/mm² and moment of inertia is 16×10^4 mm².
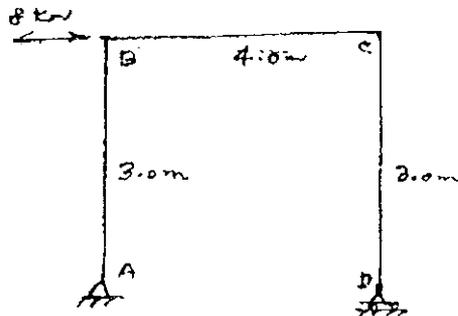

Fig. 2 Qn 11 (b)

12. (a) Fig. 3 shows a continuous beam ABC fixed at end A and supported on rollers at B and C (EI) is constant throughout the length of the beam ABC. Analyse the beam using flexibility method.
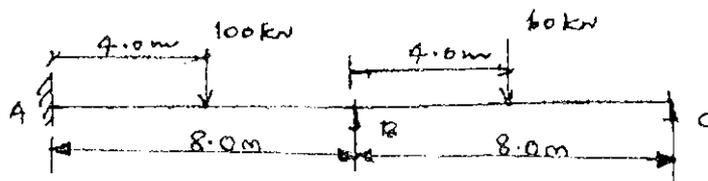

Fig. 3 Qn 12 (a)

Or

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(b) Using the flexibility method analyse a pin jointed frame shown in Fig. 4. It is given that the cross sectional area A and Young's modulus E are same for all the members of the frame.
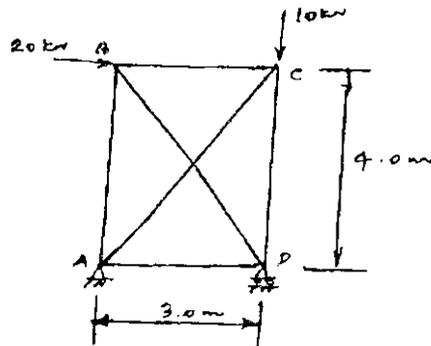

Fig. 4 Qn 12 (b)

13. (a) Using slope deflection method analyse a continuous beam ABC loaded as shown in Fig. 5 The ends A and C are hinged supports and B is a continuous support. The beam has constant flexural rigidity for both the span, AB and BC.

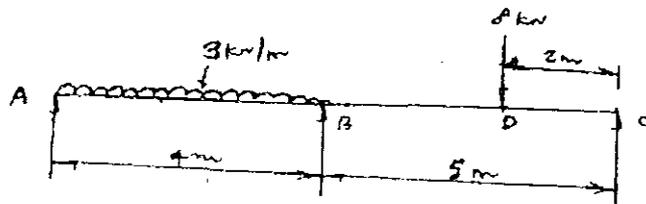

Fig. 5 Qn 13 (a)

Or

(b) Using slope deflection method analyse the portal frame loaded as shown in Fig. 6. EI is constant.
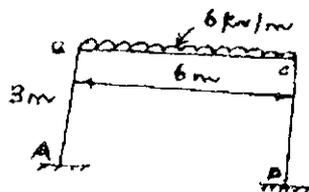

Fig. 6 Qn 13 (b)

14. (a) Analyse a continuous beam ABCD as shown in Fig. 7 by moment distribution method. EI is constant throughout the length of the beam.
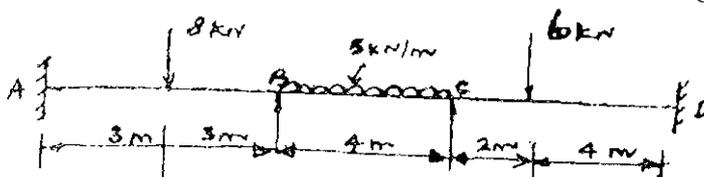

Fig. 7 Qn 14 (a)

Or

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(b) Analyse the frame shown in Fig. 8 by moment distribution method. EI is constant throughout the length of the frame.
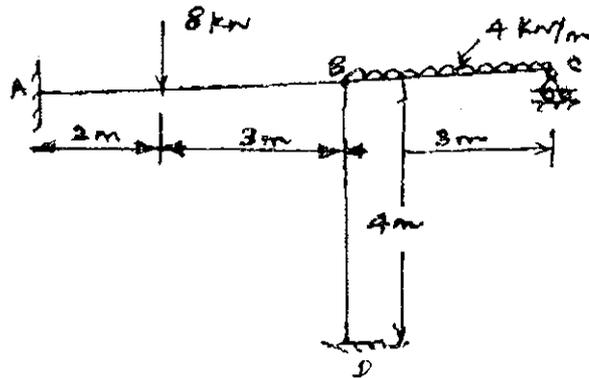

Fig. 8 Qn 14 (b)

15. (a) Using the displacement method, analyse a continuous beam loaded as shown in Fig. 9. All the supports are at the same level. EI is constant.
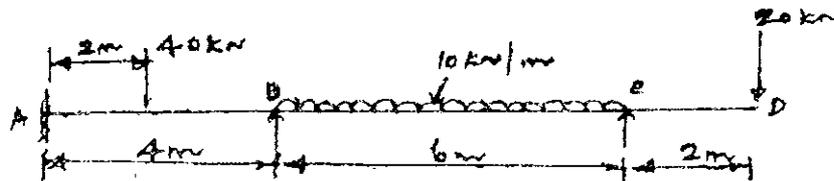

Fig. 9 Qn 15 (a)

Or

(b) Using the displacement (or) stiffness method analyse the frame shown in Fig. 10. EI is constant.
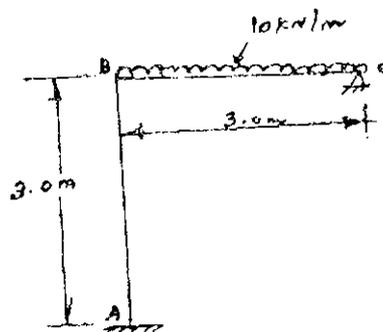

Fig. 10 Qn 15 (b)