

**C 3112**

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2007.

Fifth Semester

(Regulation 2004)

Civil Engineering

CE 1302 — STRUCTURAL ANALYSIS – CLASSICAL METHODS

(Common to BE (Part-Time) Fourth Semester Regulation 2005)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the principle of virtual work.
2. Differentiate : Determinate and indeterminate structures.
3. State Muller Breslau's Principle.
4. Define : Influence line.
5. State Eddy's theorem.
6. Write the expression for H for a two hinged circular arch when a load of W is applied at the centre.
7. Write the slope deflection equation.
8. What are the reasons for the sway of portal frames?
9. Define stiffness and carry over factor.
10. Explain how will you calculate the redundancy for plane and space rigid frames.

PART B — (5 × 16 = 80 marks)

11. (a) Find graphically the horizontal and vertical deflection of joint A of the truss shown in figure (1).  $E = 2 \times 10^5 \text{ N/mm}^2$ .

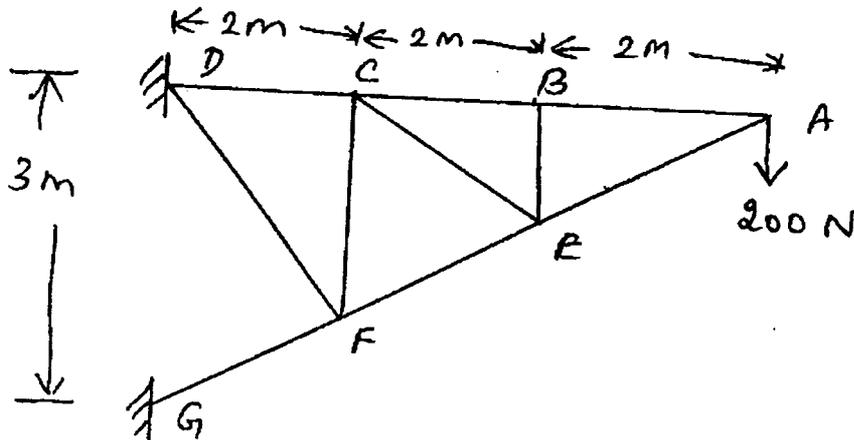


Figure (1)

Or

- (b) Determine the horizontal deflection of the roller support C of the frame shown in figure (2), due to applied load of 80 kN at B. Members AB, BC and BD are each of  $800 \text{ mm}^2$  area and AD and CD are each of  $1600 \text{ mm}^2$  area.  $E = 2.06 \times 10^5 \text{ N/mm}^2$ .

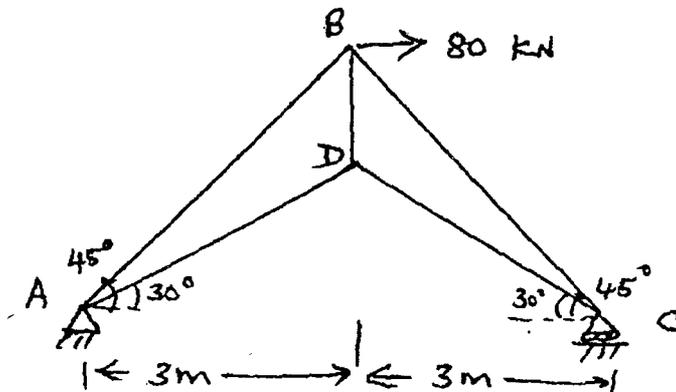


Figure (2)

12. (a) A simply supported beam has a span of 25 m. Draw the influence line for shearing force at a section 10 m from one end, and using the diagram determine the maximum shearing force due to the passage of a point load of 5 kN, followed immediately by a uniformly distributed load of 2.4 kN/m extending over a length of 5 m.

Or

- (b) Draw the influence line for  $R_A$  for the continuous beam shown in figure (3). compute the ordinates at every 1 m interval.

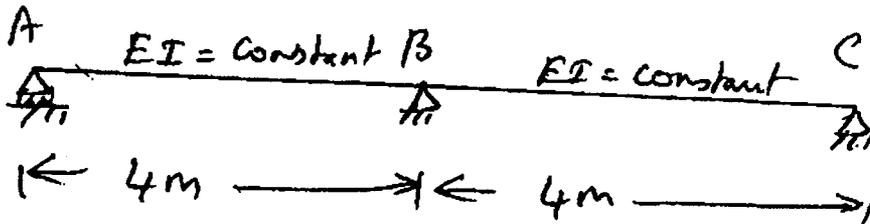


Figure (3)

13. (a) A three hinged circular arch of span 16 m and rise 4 m is subjected to two point loads of 100 kN and 80 kN at the left and right quarter span points respectively. Find the reaction at the supports. Find also the bending moment, radial shear and normal thrust at 6 m from left support.

Or

- (b) A parabolic arch hinged at the ends has a span of 60 m and a rise of 12 m. A concentrated load of 8 kN acts at 15 m from the left hinge. The second moment of area varies as the secant of the inclination of the arch axis. Calculate the horizontal Thrust and the reactions at the hinge. Also calculate the maximum bending moment at the section.

14. (a) Analyse the frame shown in figure (4) by slope deflection method.

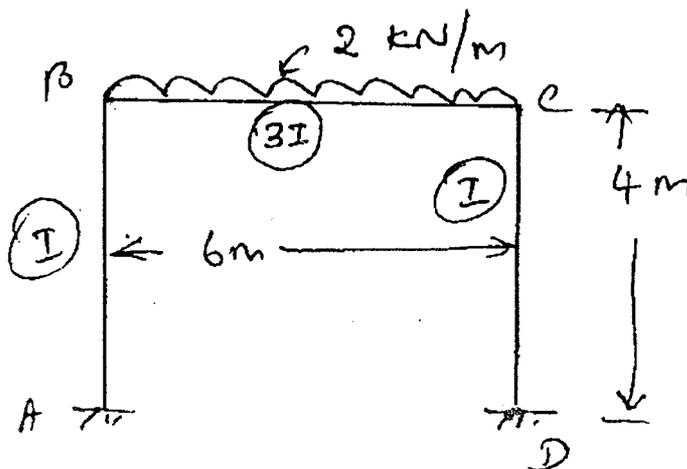


Figure (4)

Or

- (b) A continuous beam of constant moment of inertia is loaded as shown in figure (5). Find the support moments and draw the B.M. diagram.

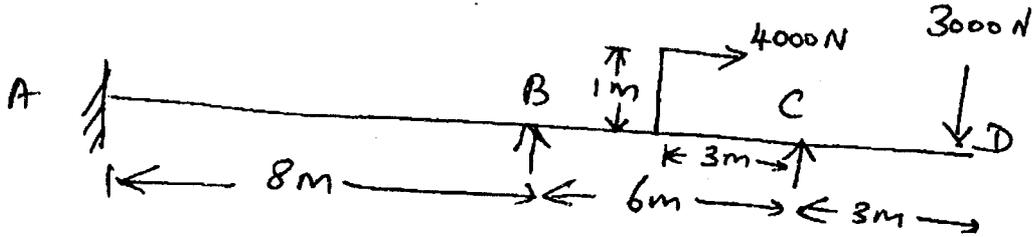


Figure (5)

15. (a) A continuous beam ABCD consists of three span, and is loaded as shown in figure (6). Ends A and D are fixed. Determine the bending moments at the supports and plot the bending moment diagram. Use moment distribution method.

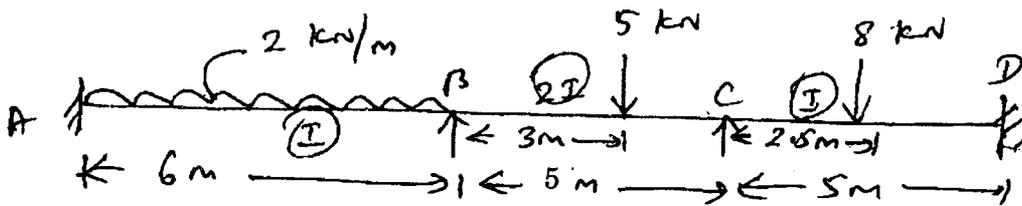


Figure (6)

Or

- (b) Analyse the portal frame shown in figure (7). The end A is fixed and D is hinged. The joints B and C are rigid. Draw the bending moment diagram and sketch the deflected shape of the frame.

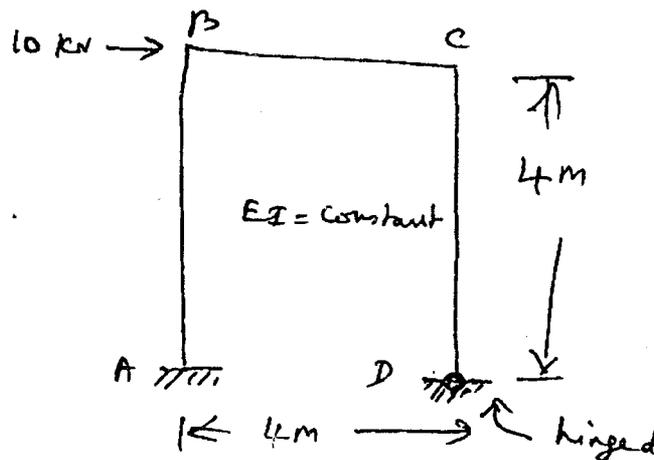


Figure (7)