

P 7400

M.E. DEGREE EXAMINATION, MAY/JUNE 2006.

First Semester

Structural Engineering

ST 131 — MATRIX-COMPUTER METHODS OF STRUCTURAL ANALYSIS

Time : Three hours

Maximum : 100 marks

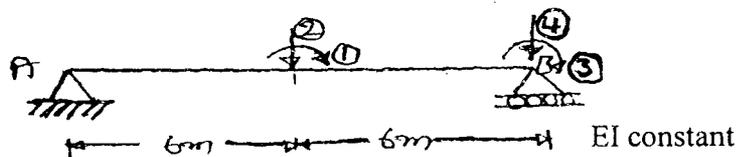
Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Kinematic Indeterminacy of a structure.
2. Differentiate between flexibility method and stiffness method.
3. Define force transformation matrix.
4. Define local and global co-ordinates.
5. What are the types of displacements and give the formula for each one?
6. What is meant by Translational stiffness and Rotational stiffness?
7. What are the computer packages for analysing the structures?
8. What is meant by static condensation?
9. Differentiate between space trusses and space frames.
10. What are the importancy/significancy of computer programming techniques for analysing the structures.

PART B — (5 × 16 = 80 marks)

11. (i) Develop the flexibility matrix for the simply supported beam AB with reference to the co-ordinates shown in Fig. 1 (6)



(ii) Analyse the portal frame shown in Fig. 2

(10)

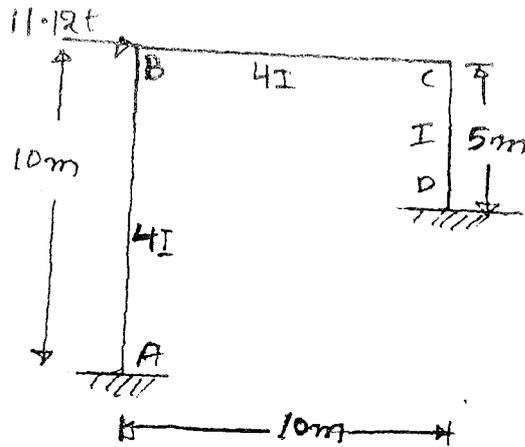


Fig. 2

12. (a) Analyse the continuous beam shown in Fig. 3 by displacement method.

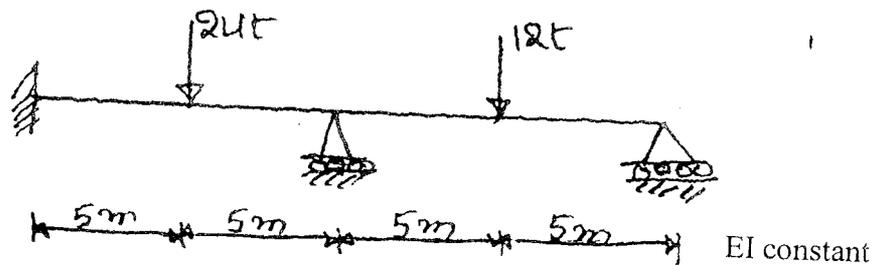


Fig. 3

Or

(b) Analyse the rigid-jointed plane frame shown in Fig. 4 including the effect of the axial deformations of the members. A , I and E are constant. $A = 150 \text{ cm}^2$, $I = 60,000 \text{ cm}^4$ and $E = 2,000 \text{ t/cm}^2$.

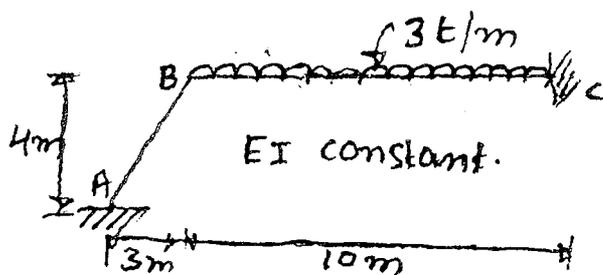


Fig. 4

13. (a) Write the procedure for Transformation of system displacements to elements displacements by considering simple case of frames.

Or

- (10) (b) Analyse the space frame shown in Fig. 5 by the displacement method. The frame carries a vertical downward load of 20 t at the centre of member BC. Hence determine the bending moments at A and C and twisting moments at D. EI is the same for all the members and $GJ = 0.5 EI$.

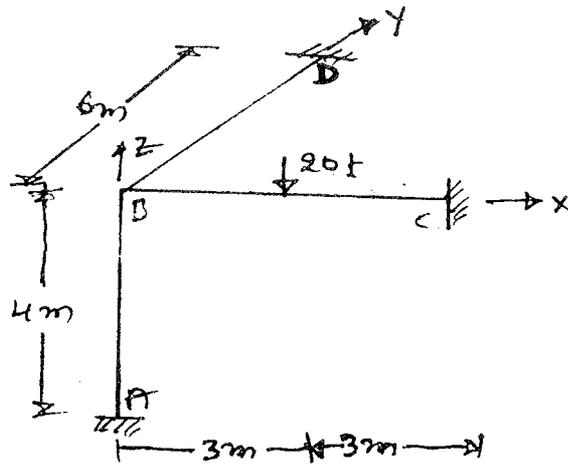


Fig. 5

14. (a) Write a program for displacement method of analysis of structures.

Or

- (b) Write a programme for flexibility method of analysis of structures.

15. (a) Explain about sub-structuring static condensation and its significances and applications.

Or

- (b) Analyse the pin-jointed frame shown in Fig. 6 by the force method. Hence determine the force in member AC. Verify the result by the displacement method. All members have the same cross-sectional area.

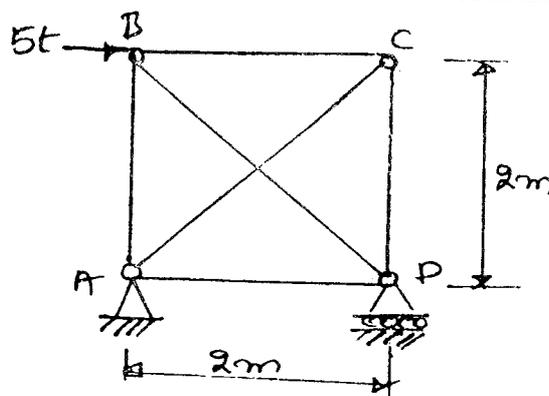


Fig. 6