Reg. No. :

C 3143

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2008.

Sixth Semester

(Regulation 2004)

Civil Engineering

CE 1351 — STRUCTURAL ANALYSIS – MODERN METHODS

(Common to B.E. (Part-Time) - Fifth Semester - Regulation 2005)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Why flexibility method is also called as force method?

2. Explain - method of consistent deformation.

3. Which property of a structure determines the size of its stiffness matrix?

4. What are the characteristics of the diagonal elements of a structure stiffness matrix?

5. Explain - plane stress problem.

6. Comment on (a) Element size and (b) Element shape.

7. Define shape factor.

8. State the upper bound theorem.

9. Give two examples for beams curved in plan.

10. What is the role of stiffening girder?

11. (a) Determine the forces in the members of pinned-frame shown in Fig. 1. Use flexibility method. Assume AE - constant.
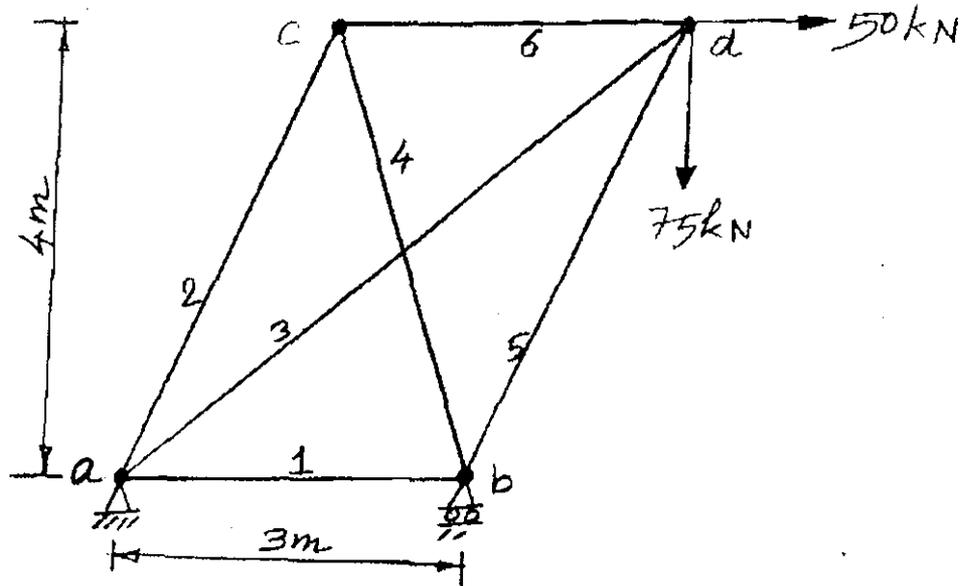
Fig. 1

Or

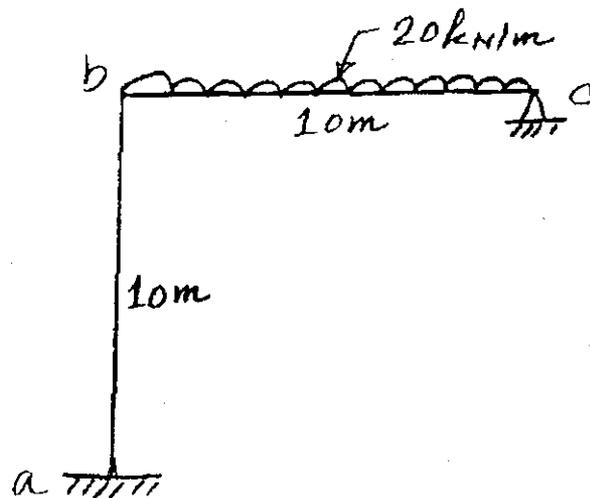(b) Analyse the knee-frame shown in Fig. 2 by flexibility method and hence draw the BMD. Assume EI - Constant.

Fig. 2

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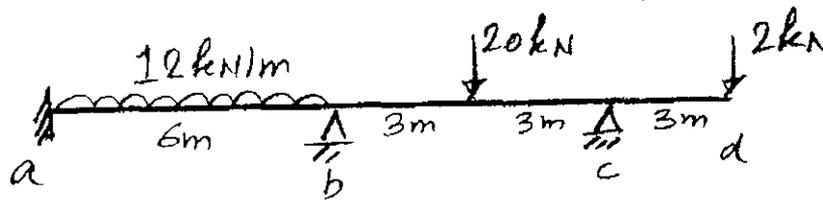12. (a) Analyse the continuous beam shown in Fig. 3 by matrix stiffness method and hence draw BMD.

Fig. 3 (EI constant)

Or

(b) Analyse the portal frame shown in Fig. 4 by matrix stiffness method and hence draw the BMD. Use the property of symmetry to reduce the number of unknown displacements.
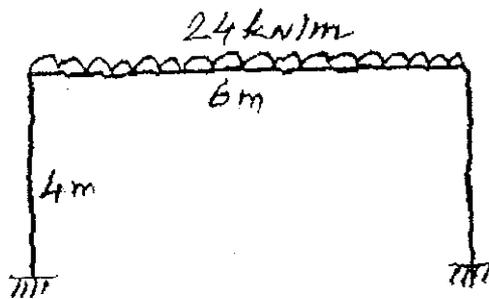

Fig. 4

13. (a) (i) Write on discretisation of structures? (6)

(ii) Derive the element stiffness matrix of a 2D-truss element. (10)

Or

(b) (i) Write on :

Nodal points

Interpolation functions

Shape functions. (9)

(ii) Write the element stiffness matrix of a 3D-beam element indicating the element co-ordinates. (7)

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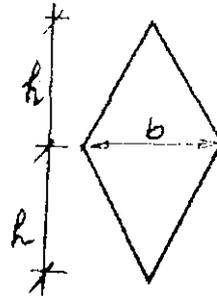14. (a) Determine the shape factor of the diamond section shown in Fig. 5.

Fig. 5

Or

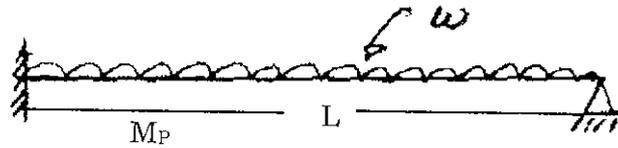(b) Determine the collapse load for the beam shown in Fig. 6.

Fig. 6

15. (a) A curved beam AB of uniform section is horizontal in plan and in the form of a quadrant of a circle of radius R. The beam is fixed at A and free at B. It carries a uniformly distributed load of W over its entire length. Sketch the variation of shear force, bending moment and torsional moment.

Or

(b) A suspension cable of span 50 m is stiffened by a three hinged girder. The dead load is 10 kN/m. Determine the maximum bending moment in the girder due to the passage of a concentrated load of intensity 100 kN from left to right. Determine the maximum tension in the cable.

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