Reg. No. : | | | | | | | | | | | |

R 3173

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

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. Choose the correct answer :

   The flexibility method is best suited when the static indeterminacy is _____ the Kinematic indeterminancy.

   (a) less than

   (b) equal to

   (c) greater than.

2. Find the degree of Kinematic indeterminancy of rigid jointed frame shown in fig(1)

Fig. (1) Qn. (2)

3. Write the stiffness matrix for a simply supported beam element.

4. Find the degree of static indeterminancy of rigid jointed frame shown in fig(1).

5. Differentiate between finite difference method and finite element method.

6. Define the term "Continuum".

7. List the possible locations of plastic hinges in a structure.

8. State lower bound theorem.

9. Why stiffening girders are necessary in the suspension bridges?

10. Give four examples of beams curved in plan.

PART B — (5 × 16 = 80 marks)

11. (a) Analyse the continuous beam ABCD details of which are given below by flexibility method

Support condition : A — fixed, B & C continuous simple, and D free

Span : AB = 4m, BC = 6m, CD = 2m

Load :40 kN at 2m from A, 10 kN/m over the span BC and 20 kN at D.

Or

(b) Analyse the Pin-jointed frame shown in fig. (2) by flexibility method

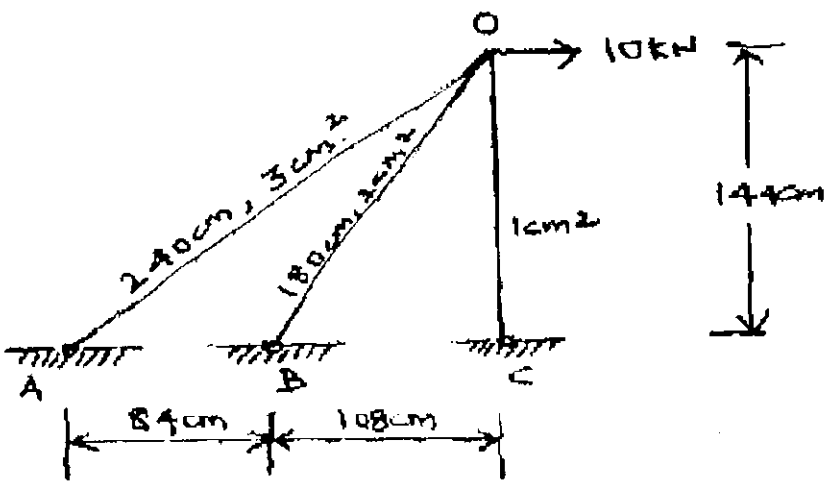
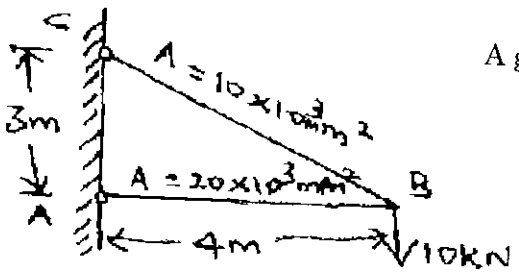


Fig (2) Qn. 11(b)

12. (a) Analyse the beam in problem 11(a) by stiffness method.

Or

(b) Using Stiffness method, determine the displacement at the joint B of a pin jointed frame shown in figure(3). Also calculate the forces in the members AB & BC due to given loading. The values of area of cross section are indicated. Take $E = 2 \times 10^5$ N/mm^2.



A given in mm^2

Fig. (3) Qn. 12 (b)

13. (a) Describe the steps involved in analyzing a structure using finite element approach.

Or

(b) Write short notes on the following:

(i) Discretization.

(ii) Pascal'a Triangle.

(10 + 6 = 16)

14. (a) Evaluate the collapse load of a propped cantilever beam of span 'L' subjected to uniformly distributed load of intensity 'w' throughout.

Or

(b) Determine the plastic moment capacity of the section required for the frame shown in fig.(4). The loads shown are working loads. Load factor $\lambda = 1.75$. Assume same plastic moment capacity for all the members.

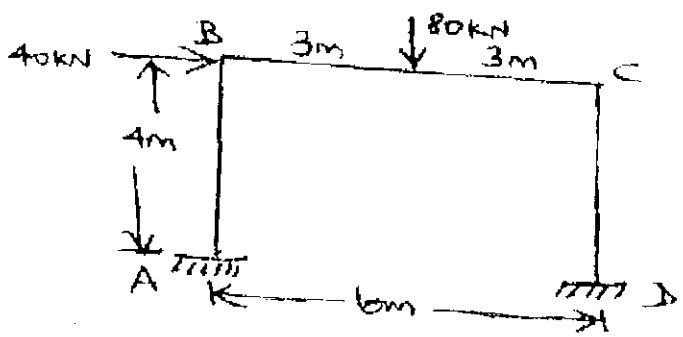


Fig. 4 Qn. 14 (b)

15. (a) A Space frame shown in fig.(5) is supported at A,B,C and D in a horizontal plane, through ball joints. The member EF is horizontal, and is at a height of 3m above the base. The loads at the joints E and F, shown in the figure act in a horizontal plane. Find the forces in all the members of the frame.

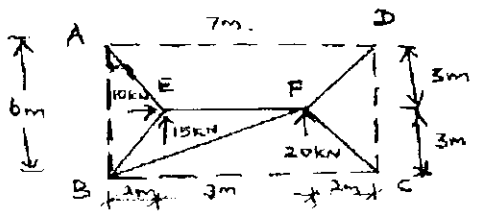


Fig. (5) Qn. 15 (a)

Or

(b) The three hinged stiffening girder of a suspension bridge of 100 m span subjected to two point loads of 20 kN each placed at 20 m and 40 m respectively from the left hand hinge. Determine the B.M and S.F in the girder at section 30 m from each end. Also, determine the maximum tension in the cable which has a central dip of 10 m.