C 1248

(Pages : 3)

Name .....

Reg. No. .....

FOURTH SEMESTER B.TECH. (ENGINEERING) [14 SCHEME] DEGREE EXAMINATION, APRIL 2016

CE 14 404—STRUCTURAL ANALYSIS–I

Time : Three Hours

Maximum : 100 Marks

Part A

Answer **eight** *questions out of ten.*

1. What is meant by principle of superposition ? Give the applications of principle of superposition.
2. Mention the effect of temperature in pin jointed truss.
3. Find the degree of static and kinematic indeterminacy of fixed beam.
4. Find the displacement at the centre of simply supported beam using Castigliano's theorem.
5. Compare shear force and bending moment diagram with influence line diagram.
6. What is the condition to be satisfied for maximum shear force and bending moment in simply supported beam shorter than span ?
7. Specify the various forces acting in three hinged parabolic action with neat sketches.
8. Mention the functions of stiffners in suspension bridges.
9. State the Betti's theorem and Maxwell's reciprocal theorem.
10. A suspension cable having supports at the same level has a span of 45 m and a maximum central dip of 3.6 m. If the maximum tension in the cable is limited to 600 kN, what is the maximum uniformly distributed load that the cable can support ?

(8 × 5 = 40 marks)

Part B

Answer **all** *the questions.*

11. Determine the rotation at A and deflection at C in the beam as shown in Fig. 1, using Castigliano's theorem method. Given E = 200 kN/mm^2 and I = 1 × 10^2 m^4.

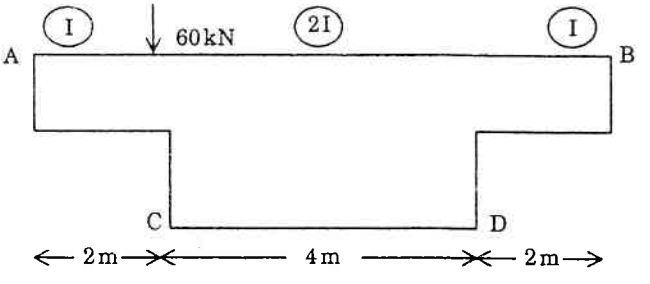

Fig. 1.

Or

Turn over

12. Determine the vertical and horizontal deflection at the free end of the beam as shown in Figure 2, using unit load method. Given E = 200 kN/mm^2 and I = 30 × 107 N/mm^2.

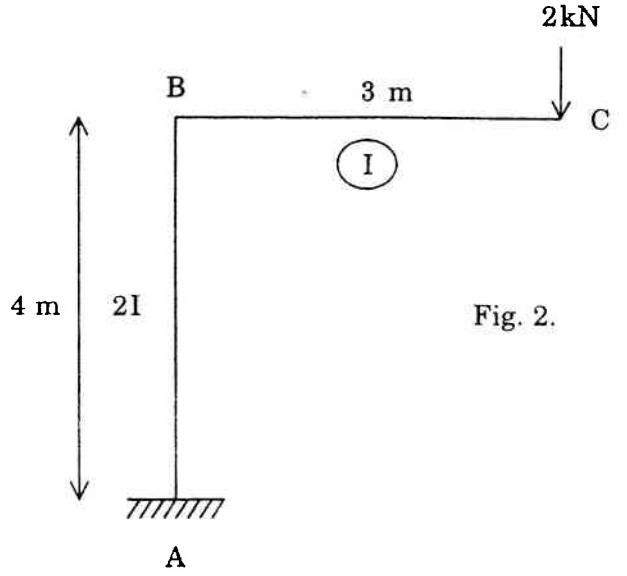

Fig. 2.

13. A continuous beam ABC is loaded as shown in Figure 3, Determine all reactions and draw bending moment and shear force diagrams using strain energy method.

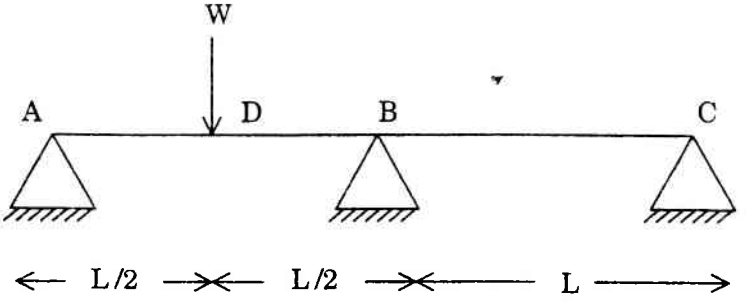

Fig. 3.

Or

14. Determine the force in the members of the truss in Figure 4, the cross-sectional area of vertical and horizontal members is 4000 mm^2 and that of the diagonals is 6000 mm^2.

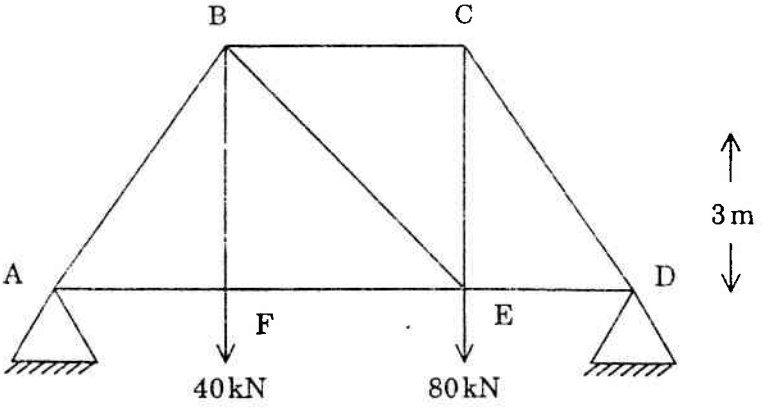

Fig. 4.

(4 × 15 = 60 marks)

15. A train of concentrated loads shown in Fig ure 5, moves from left to right on a simply supported girder of span 16 m. Determine the absolute maximum shear force and bending moment developed in the beam.

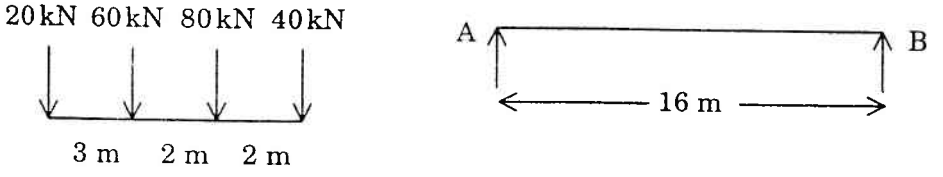

Fig. 5.

Or

16. Determine the maximum forces in the members 1, 2, 3 and 4 of the truss shown in Figure 6, when uniformly distributed load of 30 kN/m longer the span traverses along than girder.

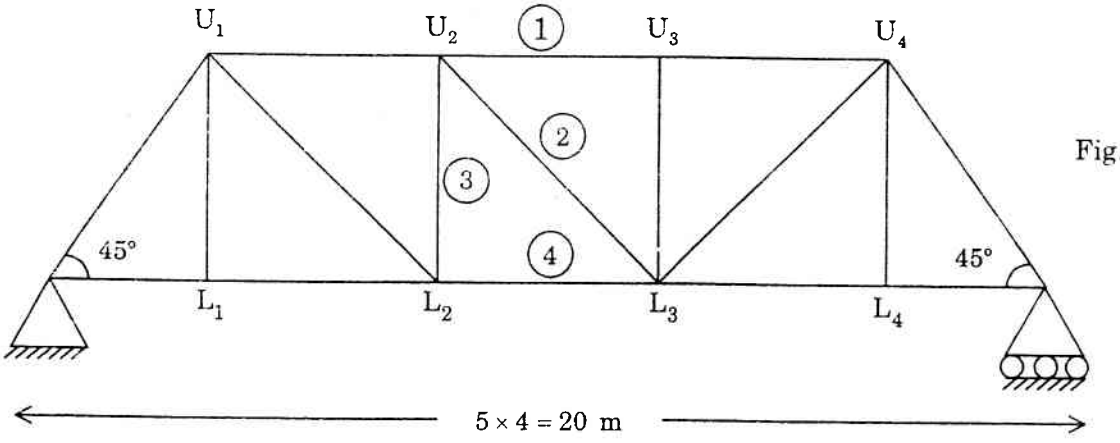

Fig. 6.

17. A three hinged parabolic arch hinged at the supports' and at the crown has a span of 24 m and central rise of 4 m. It carries a concentrated load of 50 kN at 18 m from left support and a uniformly distributed load of 30 kN/m over the left half portion. Determine the moment, thrust and radial shear at a section 6 m from the left support.

Or

18. A suspension bridge of 120 m span has two three hinged stiffening girders supported by two cables having a central dip of 12 m. The roadway has a width of 6 m. The dead load on the bridge is 5 kN/m^2 while the live load is 10 kN/m^2 which acts on the half of the span. Determine the shear force and bending moment in the girder at 30 m from the left end. Find also the maximum tension in the cable for this position of live load.