Roll No. Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(CE) (2011 Onwards) (Sem.–4)

STRUCTURAL ANALYSIS – I

Subject Code : BTCE-406

M.Code : 56088

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

1. Answer briefly :

(a) State moment area theorem.

(b) What is a conjugate beam? Discuss its utilities.

(c) State and prove Maxwell-Betti's theorem.

(d) Define as arch. How an arch differ from a beam?

(e) Describe the perfect frames.

(f) Define the horizontal thrust at the support.

(g) What is meant by absolute maximum bending moment in a beam?

(h) Define Muller Breslau Principle.

(i) Define Mohr's theorem.

(j) Draw influence line diagram for shear force and bending moment at mid span of a simply supported beam of length "L".

SECTION-B

2. A parabolic arch hinged at springing and crown has a span of 20m and a central rise of 4m carries a point load of 6 kN at 6m horizontally from the left side hinge. Calculate the normal thrust, bending moment and shear force at the section under the load.

3. A suspension cable is suspended from two piers 200m centre to centre, one support being 5 m above the other. The cable carries a u.d.l of 15N/m and has its lower point 10m below the lower support. The ends of the cable are attached the saddled on rollers at top of piers. The back stays are inclined at 60° to the vertical. Determine :

   (a) The maximum tension in the cable

   (b) Tension in the back stays

4. A masonry dam 10m high, 2m wide at the top, 5m wide at the base has its water face vertical. Calculate the height upto which water may be stored without causing any tension at the base. Also, calculate the width required at the base of the dam when it is completely filled with water. The density of the masonry is 26kN/m^3 and of water is 10kN/m^3.

5. A beam of length "L" is simply supported at its ends and carries a point load of "W" at the centre. The moment of inertia of the beam is "2I" for the left half and "I" for the right half. Using conjugate beam method calculate slope at each end and at the centre. Also, find the deflection at the centre.

6. Analyse the continuous beam shown in Fig. (1) by Castigliano's theorem. Draw the S.F.D and B.M.D for the beam.

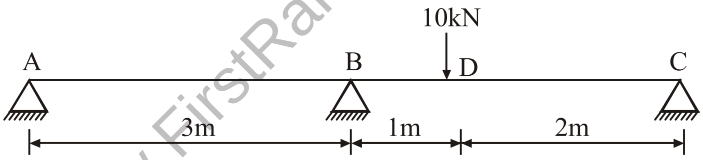

Fig.1

SECTION-C

7. Draw the influence lines for the bar forces in members U_1U_2, L_1L_2, U_1L_2 of the truss as shown in Fig. (2). Length of each panel is 6m and height of truss is 4m.

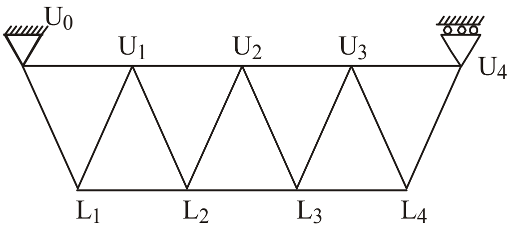

Fig.2

8. The system of concentrated loads shown in Fig. (3) rolls from left to right across a simply supported beam of span 40m, the 4kN load is leading. For a section 15m from the left hand support, determine :

   (a) The maximum bending moment

   (b) The maximum shear force

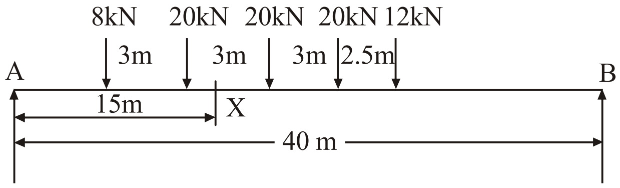

Fig.3

9. A plane truss is loaded as shown in Fig. (4). Determine the nature and magnitude of the forces in all the members.

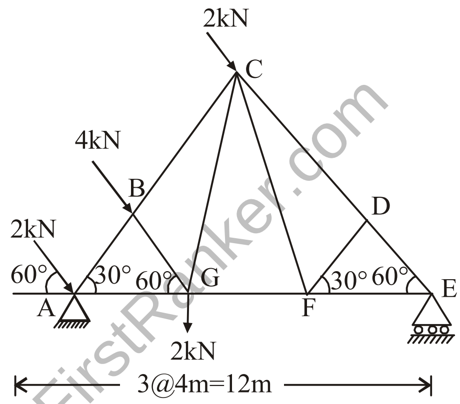

Fig.4

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.