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Total No. of Pages : 03

Total No. of Questions : 09

B.Tech.(CE) (2011 Onwards) (Sem.-4)

STRUCTURAL ANALYSIS – I

Subject Code : BTCE-406

Paper ID : [A1176]

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 has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A**1. Write briefly :**

- a) Define Muller Breslau Principle.
- b) What do you understand from a determinate structure?
- c) A cantilever beam of length 'L' carrying a point load 'W' at the free end. What will be the value of slope and deflection at free end?
- d) Describe in brief the significance of influence line diagram.
- e) What is middle third rule? Describe in brief.
- f) What is retaining wall? Write down different types of retaining walls.
- g) Define Betti's Law.
- h) How behaviour of an arch is different from a beam, explain?
- i) What will be the value of horizontal thrust if a cable supported at same level with dip 'd' is subjected to udl of intensity 'w' throughout its length 'L'.
- j) Draw influence line diagram for shear force at distance 'x' from left end of a simply supported beam of length 'L' when a unit load moves from left end to right end.

SECTION-B

2. Determine the maximum deflection in the beam loaded as shown in figure 1, take young's modulus (E) = 2×10^5 N/mm² and moment of inertia $I = 5000$ cm⁴.

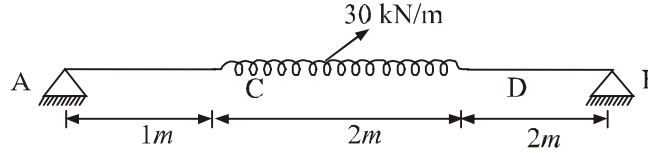


Figure 1

3. Analyse the plane truss loaded as shown in figure 2.

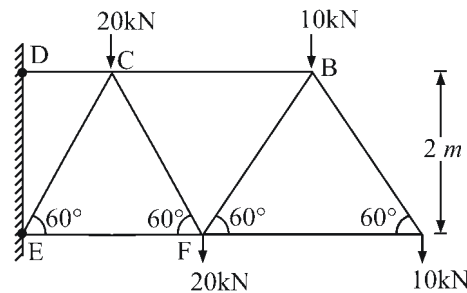


Figure 2

4. Following system of concentrated loads as shown in figure 3, move over a simply supported girder having span 30 m, with 10 kN load leading. Determine absolute maximum shear force and absolute maximum bending moment in the girder.

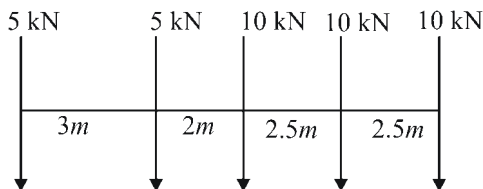


Figure 3

5. A suspension cable of 130 m horizontal span is supported at the same level. It is subjected to a uniformly distributed load of 28.5 kN per horizontal metre. If the maximum tension in the cable is limited to 5000 kN. Calculate the minimum central dip needed.
6. A retaining wall, 4 m high, has a smooth vertical back. The backfill has a horizontal surface in level with the top of wall. There is uniformly distributed surcharged load 36 kN/m² intensity over the backfill. The unit weight of backfill is 18 kN/m³, its angle of shearing resistance is 30° and cohesion is zero. Determine the magnitude and the point of application of active pressure per metre length of the wall.

SECTION-C

7. A suspension bridge of 140 m span has two numbers of 3 hinged stiffening girders supported by two cables with a central dip of 12 m. The width of the roadway supported by the girder is 5m. The dead load is 7 kN/m^2 of floor area. A live load of 12.5 kN/m^2 covers the left hand half of the bridge. Find the shear force and bending moment at the loaded quarter span point. Determine also the maximum tension in the cable.
8. A rigid frame ABC as shown in figure 4 carries a concentrated vertical load $P \text{ kN}$ at point A. Find the vertical and horizontal deflection of point A. Assume EI - constant.

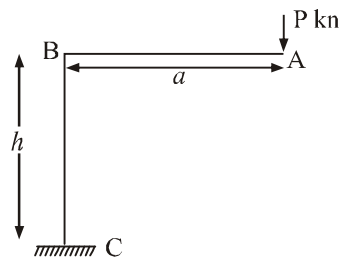


Figure 4

9. Draw influence line diagram for the forces in the members U_2L_3 , U_3L_3 , U_2L_2 of a through type bridge truss as shown in figure 5.

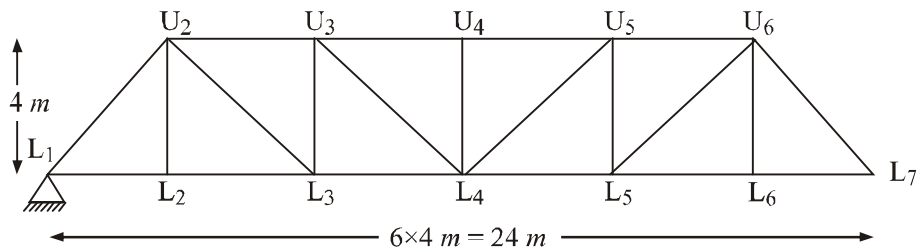


Figure 5