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

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/mm^2 and moment of inertia I = 5000 cm^4.

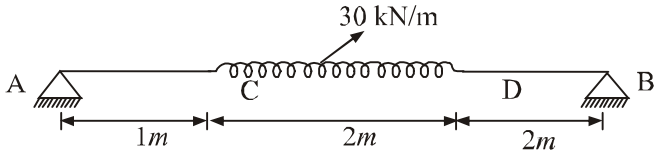

Figure 1

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

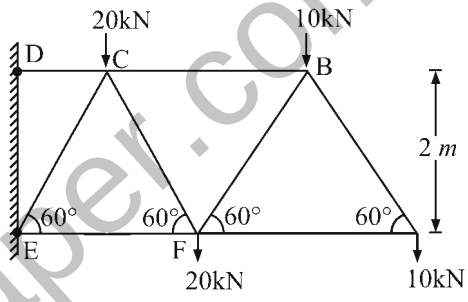

Figure 2

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.

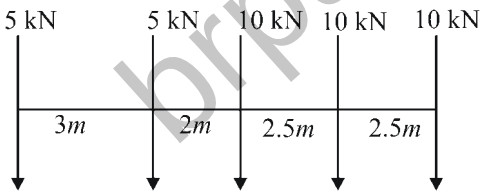

Figure 3

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/m^2 intensity over the backfill. The unit weight of backfill is 18 kN/m^3, 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 kN at point A. Find the vertical and horizontal deflection of point A. Assume EI- constant.

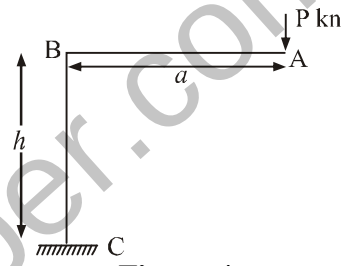

Figure 4

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.

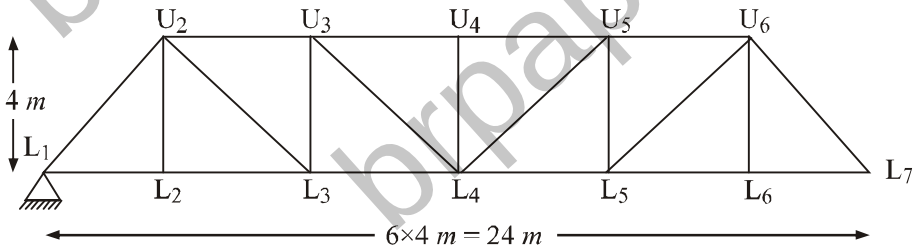

Figure 5