Roll No.

Total No. of Questions: 09   Total No. of Pages: 03

B. Tech. (CE) (Sem.-4)
Structural Analysis -1
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 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. Define:

   (a) Describe in brief the active and passive pressure in case of retaining wall.

   (b) Explain the Maxwell's law of reciprocal deflections.

   (c) What type of supports can be used at the piers of a suspended cable?

   (d) Define Muller Breslau Principle.

   (e) When does Macaulay's method is preferred over double integration method?

   (f) Explain why stiffening girders are provided in suspension bridges?

   (g) What is radial shear and normal thrust in a three hinged arch?

   (h) Describe conjugate beam method in brief.

   (i) Discuss the concept of virtual work.

   (j) What is middle third rule?

SECTION B

2. Compare the strain energy of a beam simply supported at its ends loaded with uniformly distributed load 'w' kN/m with that of the same beam loaded with a central concentrated load 'P', where P= wL/2.

3. A simply supported beam 9 m long is loaded as shown in Figure 1. Draw shear force and bending moment diagrams.

Figure 1.
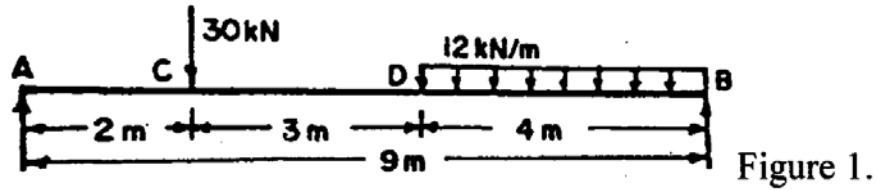
4. Determine the maximum forces in the members U_2U_3, L_3U_3 and L_3L_4 of the bridge truss as shown in fig. 2. If uniformly distributed load of 60 kN/m, longer than span, traverses along the bottom chord members.

Fig. 2
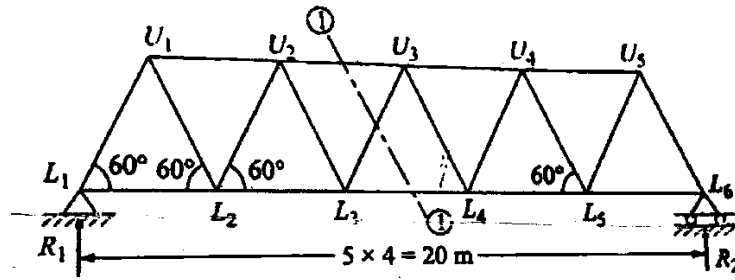
5. A train of wheel loads as shown in fig. 3 crosses a girder of 25 m span with 120 kN load leading. Determine the value of

i) Maximum bending moment at the section 8 m from left end of the girder.
ii) Absolute maximum bending moment of the girder.

Figure 3
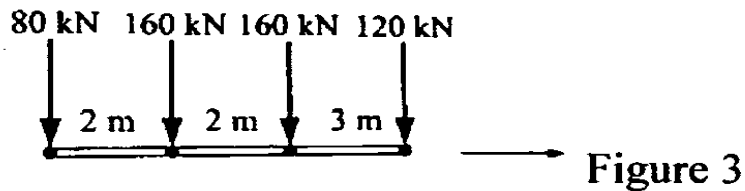
6. A masonry dam 6 m high and 3 m wide has water level with its top. Find (i) total pressure per metre length of the dam, (ii) point at which the resultant cuts the base and (iii) maximum and minimum intensities of stress at the bottom of the dam.

SECTION C

7.   A suspension Cable bridge has a cable of span 100 m and dip of 10 m. The cable is stiffened by a 3 hinged stiffening girde. Sketch the influence line diagram for bending moment at quarter span of girder. Determine the maximum moment at this section when a uniformly distributed load longer than span of intensity 10 kN/m traverses the span.

8.   Using conjugate beam method, determine the deflection and rotation at the free end in the beam as shown in figure 4.
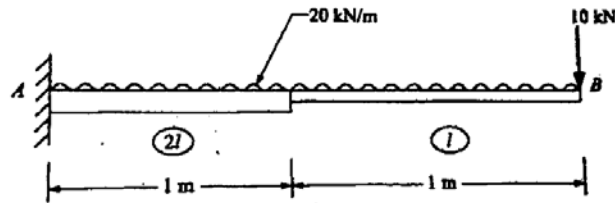

Figure 4

9.   Determine the forces in the members of the truss shown in figure 5 using method of joints.
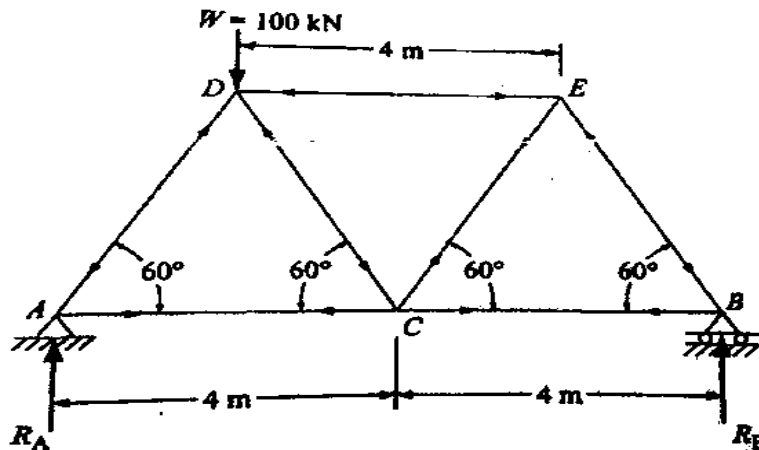

Figure 5.