

Roll No.

Total No. of Pages : 03

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B.Tech.(CE) (Sem.-4)
STRUCTURAL ANALYSIS – I

Subject Code : BTCE-406

M.Code : 56088

Date of Examination : 14-07-22

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) Define conjugate beam method.
- (b) State second theorem of castigliano's.
- (c) What are the assumptions made in the slope deflection method.
- (d) Explain Betti's Law.
- (e) Explain various conditions for the stability of a dam.
- (f) How behavior of an arch is different from a beam, Explain?
- (g) Describe in brief the significance of influence line diagram.
- (h) Write down the expression for the strain energy due to axial force, bending moment.
- (i) How many types of stiffening girders are provided in suspension bridge? Also, explain its significance.
- (j) What is the limit of eccentricity for no tension criteria in the section?

SECTION-B

- A symmetrical parabolic arch hinged at springing and crown has a span of 20m. the central rise of the arch is 4m. It is loaded with a UDL of 2.5 kN/m on the left 8m length. Calculate :
 - The Direction and magnitude of reaction at hinges
 - The bending moment, normal thrust and shear at 4m from left end.
- A beam ACB, 8m long is fixed at A and is simply supported at B, and is provided with an internal hinge at C, 4m from A. Draw influence line diagrams for the following :
 - Reaction at A & B
 - B.M at A
 - B,M at middle point of AC
- A masonry dam trapezoidal in section is 1.2 m wide at top and 3m wide at the base. It retains water level with the top of the dam. The face of the dam which is in contact with water is vertical. Calculate the height of the dam so that there is no tension at the base. Take masonry weight as 19620N/m^3 .
- Two wheel loads 100 kN and 180kN, spaced 3m apart move on a girder of span 25 meters. Find maximum positive and negative shear force at a section 8 meters from the left end. Any wheel load can lead the other.
- A beam of length 'L' is simply supported at its ends and carries point load of 'W' at a distance 'a' from the ends. Using conjugate beam method calculate slope at each end and under each load. Determine the deflection under each load and at the centre.

SECTION-C

- Analyse the frame shown in figure by cantilever method. Area of each exterior column is one and half times that of the area of the interior column.

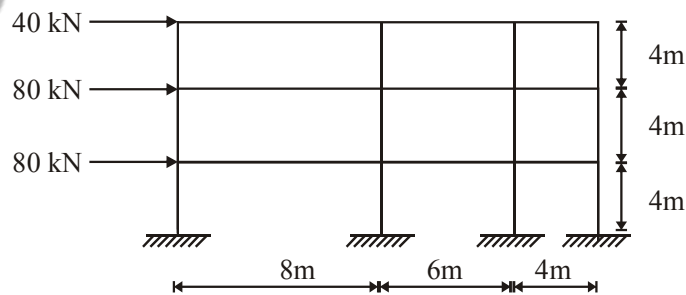


FIG.1

8. A suspension cable is supported at two points 25 m apart, the left support is 25 m above the right support. The cable is loaded with a UDL of 10kN/m throughout the span. The maximum dip in the cable from left support is 4 m. Find the maximum and minimum tensions in the cable.
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.

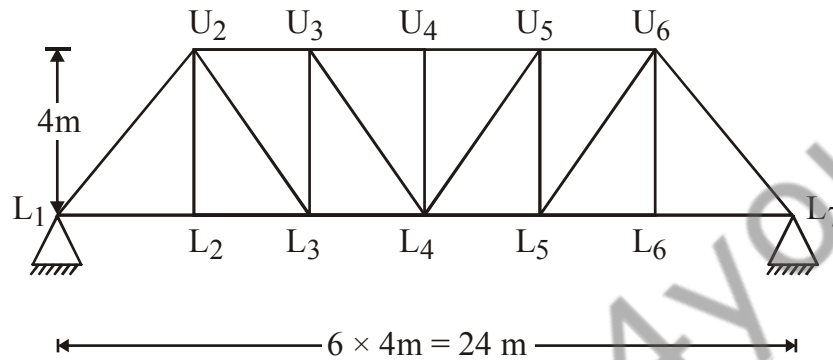


FIG.2

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.