

28/12/2022

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Question Paper Code	11515
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**B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022**  
 Sixth Semester  
**Civil Engineering**  
**CE8602 - STRUCTURAL ANALYSIS II**  
 (Regulations 2017)

Duration: 3 Hours

Max. Marks: 100

**PART - A (10 × 2 = 20 Marks)**  
 Answer ALL Questions

- |   | <i>Marks,<br/>K-Level, CO</i> |
|---|-------------------------------|
| 1. What is the use of influence line diagram (ILD)?   | 2,K1,CO1                      |
| 2. Give the condition at which maximum absolute bending moment occurs in a simply supported beam when a number of point loads are moving on it. | 2,K2,CO1                      |
| 3. Name the type of rolling loads for which the absolute maximum bending moment occurs at the mid span of a beam.                               | 2,K2,CO3                      |
| 4. Sketch the influence line diagram for shear force at any section of a simply supported beam.   | 2,K1,CO3                      |
| 5. Give the applications of two hinged arches.  | 2,K2,CO4                      |
| 6. What is the degree of static indeterminacy of the fixed arch?  | 2,K1,CO4                      |
| 7. What is the nature of forces in the cables?  | 2,K2,CO5                      |
| 8. Mention the different types of cable structures.   | 2,K2,CO5                      |
| 9. List out the shape factors for the Diamond section, Triangular section, Circular section.  | 2,K1,CO6                      |
| 10. State upper bound theorem.  | 2,K1,CO6                      |

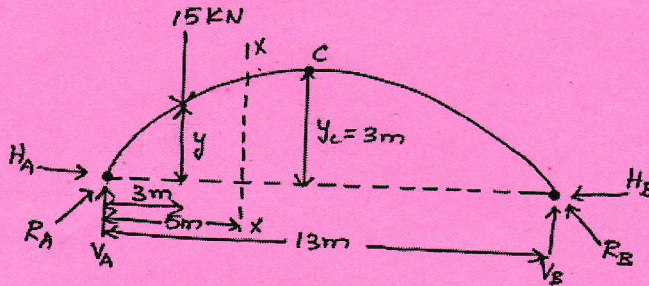
**PART - B (5 × 13 = 65 Marks)**  
 Answer ALL Questions

11. a) Two point loads of 18 kN and 36 kN spaced 1.5 m apart cross a girder of span 4.5 m from left to right with the 18 kN leading. Draw the ILD for shear force and bending moment and find the values of maximum shear force and bending moment at a section 2 m from the left hand support. Also evaluate the absolute maximum bending moment due to the given loading system. *13,K3,CO1*
- OR**
- b) A simply supported beam has a span of 15 m and subjected to an UDL of 30 kN/m, 5 m long travelling from left to right. Draw the ILD for shear force and bending moment at a section 6 m from the left end. Use these diagrams for calculating the maximum BM and SF at this section. *13,K3,CO1*

12. a) Draw the influence line for  $R_B$  of the continuous beam ABC simply supported at A & C using Muller Breslau's principle.  $AB = 4$  m,  $BC = 3$  m.  $EI$  is constant. 13,K3,CO3

OR

- b) Draw the influence line diagram for the propped reaction of a propped cantilever beam having span 4.5 m. Take  $EI = \text{constant}$  13,K3,CO3
13. a) A symmetrical three hinged circular arch has a span of 13 m and a rise to the central hinge of 3 m. it carries a vertical load of 15 kN at 3 m from the left hand end. Find 4,K3,CO4
- i. The reactions at the supports, 4,K3,CO4
  - ii. Magnitude of the thrust at the springing, 5,K3,CO4
  - iii. Bending moment at 5 m from the left hand hinge and the maximum positive and negative bending moment.



OR

- b) A three hinged parabolic arch of span 25 m and rise 5 m carries an udl of 38 kN/m covering a distance of 10m from left end. Find the horizontal thrust, the reactions at the hinges and the maximum negative moment. 13,K3,CO4
14. a) A suspension bridge is of 160 m span. The cable of the bridge has a dip of 12 m. the cable is stiffened by a three hinged girder with hinges at either end and at centre. The dead load of the girder is 15 kN/m. find the greatest positive and negative bending moments in the girder when a single concentrated load of 340 kN passes through it. Also find the maximum tension in the cable. 13,K3,CO5

OR

- b) A suspension bridge of 300 m span has two nos. of three hinged stiffening girders supported by cables with a central dip of 30 m. if 4 point loads of 400 kN each are placed at the centre line of the roadway at 10, 30, 50 and 70 m from left hand hinge. Find the shear force and bending moment in each girder at 75 m from each end. Calculate also the maximum tension in the cable. 13,K3,CO5

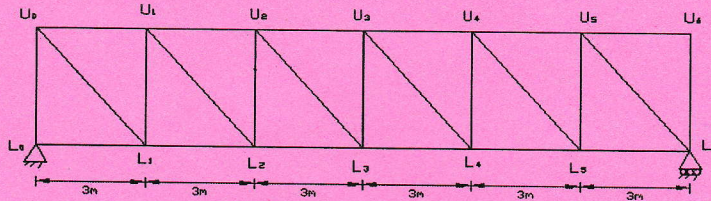
15. a) Determine the shape factor of a T-section beam of flange dimension 138 x 12 mm and web dimension 100 x 12 mm thick. 13,K3,CO6

**OR**

- b) Analyse a propped cantilever of length 'L' and subjected to udl of w/m length for the entire span and find the collapse load. 13,K3,CO6

**PART - C (1 × 15 = 15 Marks)**

16. a) Draw the ILD for the forces in members  $U_3L_3$  and  $U_3L_4$  of the truss shown in fig. below 15,K3,CO2



**OR**

- b) A train of 5 wheel loads crosses a simply supported beam of span 22.5 m. Using influence lines calculate the maximum positive and negative shear forces at mid span. And absolute maximum bending moment anywhere in the span. 15,K3,CO2

