(b) 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 the following:

(i) The reactions at the supports, (3)

(ii) Magnitude of the thrust at the springing, (4)

(iii) Bending moment at 5 m from the left hand hinge and (4)

(iv) The maximum positive and negative bending moment. (4)

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Question Paper Code : 50346

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2023.

Sixth Semester

Civil Engineering

CE 8602 — STRUCTURAL ANALYSIS – II

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is the use of influence line diagram (ILD)?

2. Sketch the influence line diagram for shear force at any section of a simply supported beam.

3. What are the types of connections possible in the model of begg's deformeter?

4. State Muller Breslau principle.

5. Differentiate between circular arch and parabolic arch.

6. Which theorem is utilized in solving the two hinged arch? State the theorem.

7. What are the main functions of stiffening girders in suspension bridges?

8. Give the types of significant cable structures.

9. Define plastic hinge with an example.

10. List out the assumptions made for plastic analysis.

PART B — (5 × 13 = 65 marks)

11. (a) Two point loads of 100 KN and 200 KN spaced 3 m apart cross a girder of span 12 m from left to right with the 100 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 4 m from the left hand support. Also evaluate the absolute maximum bending moment due to the given loading system.

Or

(b) A simply supported beam has a span of 16 m is subjected to UDL (dead load) of 5 KN/m and a UDL (live load) of 8 KN/m (longer than the span) travelling from left to right. Draw the ILD for shear force and bending moment at a section 4 m from the left end. Use these diagrams to determine the maximum shear force and bending moment at this section.

12. (a) Draw the influence line for Moment at B for the continuous beam ABC simply supported at A, B &C using Muller Breslau's principle. AB = 3 m, BC = 4 m. EI is constant

Or

(b) A beam ABC is supported at A, B and C as shown in Fig. 1, It has the hinge at D. Draw the influence lines for

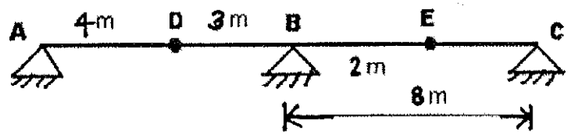

Fig. 1

(i) Reactions at A, B and C (5)

(ii) Shear to the right of B (4)

(iii) Bending moment at E (4)

13. (a) A circular (three hinged) arch of span 25 m with a central rise of 5 m is hinged at the crown and the end supports. It carries a point load of 100 KN at 6m from the left support. Calculate the following

(i) The reaction at the supports and (7)

(ii) Moment at 5 m from the left support (6)

Or

(b) A two hinged parabolic arch of span 25 m and rise 5 m carries an udl of 38 KN/m covering a distance of 10 m from left end. Find the horizontal thrust, the reactions at the hinges and the maximum negative moment.

14. (a) A suspension cable has a span of 120 m and a central dip of 10 m and is suspended from the same level at both towers. The bridge is stiffened by a stiffening girder hinged at the end supports. The girder carries a single concentrated load of 100 kN at a point 30 m from left end. Assuming equal tension in the suspension hangers. Calculate the horizontal tension in the cable and the maximum positive bending moment.

Or

(b) A suspension bridge has a span 50 m with a 15 m wide runway. It is subjected to a load of 30 kN/m including self weight. The bridge is supported by a pair of cables having a central dip of 4 m. Find the cross sectional area of the cable necessary if the maximum permissible stress in the cable materials is not to exceed 600 MPa.

15. (a) A uniform beam of span 4 m and fully plastic moment 'Mp' is simply supported at one end and rigidly clamped at other end. A concentrated load of 15 KN may be applied anywhere within the span, Find the smallest value of 'MP' such that collapse would first occur when the load is in its most unfavourable position.

Or

(b) Find the fully plastic moment required for the frame shown in fig,2, if all the members have same value of Mp

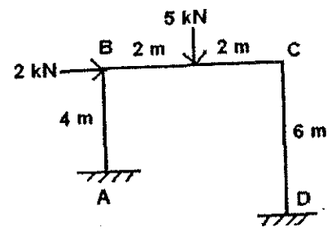

Fig. 2

PART C — (1 × 15 = 15 marks)

16. (a) A suspension cable is supported at two point "A" and "B", "A" being one metre above "B". the distance AB being 20 m. the cable is subjected to 4 loads of 2 KN, 4 KN, 5 KN and 3 KN at distances of 4 m, 8 m, 12 m and 16 m respectively from "A". Find the maximum tension in the cable, if the dip of the cable at point of application of first loads is 1 m with respect to level at A. Find also the length of the cable.

Or