

**B.TECH
(SEM VI) THEORY EXAMINATION 2022-23
ADVANCE STRUCTURAL ANALYSIS**

Time: 3 Hours

Total Marks: 100

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

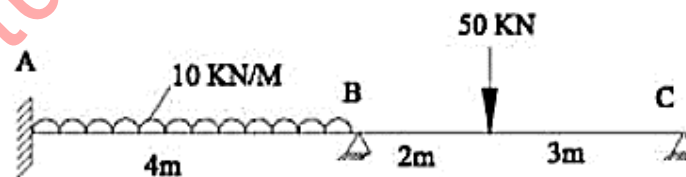
1. Attempt all questions in brief. 2 x 10 = 20

- a. What is the application of fixed beam?
- b. List the steps to follow for slope deflection method?
- c. Mention the use of the Muller-Breslau principle?
- d. What is the application of two hinged arch?
- e. Write the application of influence line.
- f. Why are suspension bridges useful?
- g. What is matrix force method of analysis?
- h. What is displacement method also known as?
- i. Mention the main aim of plastic analysis.
- j. Discuss the kinematic method of plastic analysis for frames?

SECTION B

2. Attempt any three of the following: 10x3=30

- a. Analyse the given in figure by moment distribution method and draw the B.M.D & S.F.D

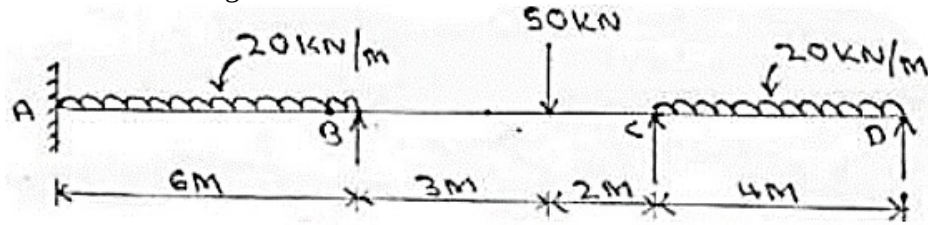


- b. A two-hinged parabolic arch of span l and rise h carries a uniformly distributed load of w per unit run over the whole span. Find the horizontal thrust, at each support.
- c. Explain the step by step procedure to analyze the two hinged stiffening girder.
- d. Explain the Procedure of analyzing the structure by stiffness method.
- e. Explain with an example how application of plastic analysis is helpful in designing structure?

SECTION C

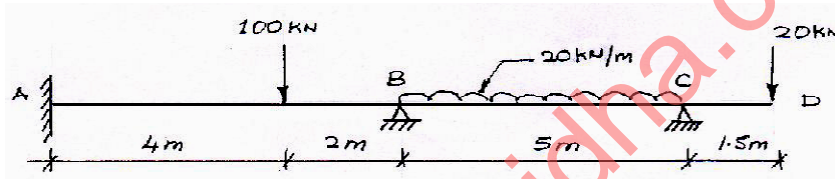
3. Attempt any *one* part of the following: 10x1=10

- a. Analyze the continuous beam as shown in figure by moment distribution method and draw the B.M. diagrams



Support B sinks by 10mm, and take $E = 2 \times 10^5 \text{ N/mm}^2$, $I = 1.2 \times 10^{-4} \text{ m}^4$

- b. Analyze continuous beam ABCD by slope deflection method and also draw bending moment diagram. Take EI constant.



4. Attempt any *one* part of the following: 10x1=10

- a. What is Muller Breslau's principle? Explain its use for a simply supported beam with UDL throughout section.
- 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.

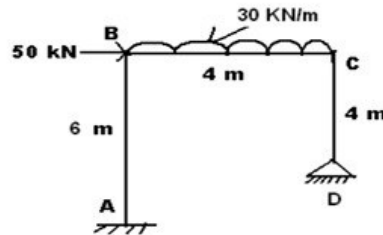
5. Attempt any *one* part of the following: 10x1=10

- a. A suspension bridge of 200 m span has two three-hinged stiffening girders supported by two cables having a central dip of 25 m. The width of road way is 8 m. The roadway carries a dead load of $\frac{1}{2}$ kN per sq. meter extending over the whole span and a live load of 1 kN per sq. meter extending over the left half of the bridge. Find the B.M. and S.F. at point 60 m and 150 m from left hinge. Also calculate maximum tension in the cable.
- b. A suspension cable stiffened with a three-hinged girder has 100 m span and 10 m central dip. The girder carries a load of 0.2 kN/m. A live load of 10 kN rolls from left to right. Determine
 (a) maximum bending moment anywhere in the girder; and
 (b) maximum tension in the cable.

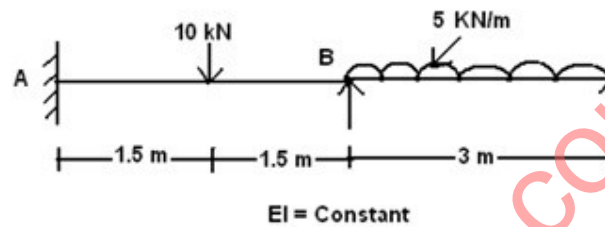
6. Attempt any *one* part of the following:

10x1=10

a. Analyse the portal frame ABCD shown in figure using force method.



b. Analyse the continuous beam ABC shown in figure by stiffness method and also draw the shear force diagram.



7. Attempt any *one* part of the following:

10x1=10

a. List the assumptions for plastic analysis of structures.

b. Explain in detail the Upper and Lower Bound Theorems for plastic analysis of structures.