PAPER ID-411152

Roll No:

B.TECH
(SEM V) THEORY EXAMINATION 2021-22
DESIGN OF STRUCTURE I

Time: 3 Hours   *Total Marks: 70*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   **2 x 7 = 14**

   a.   Define relative stiffness of a member.
   b.   Draw the ILD for Horizontal trust for Three Hinged Girder.
   c.   What is two-hinged arch? Explain why two hinged arches is an indeterminate structure?
   d.   Define thrust in arch.
   e.   Explain plastic moment and yield moment of a section.
   f.   Define the term 'Flexibility' and 'Stiffness'.
   g.   Write down the applications of Static and Kinematic theorem for Plastic Analysis of beams.

SECTION B

2.   **Attempt any *three* of the following:**   **7 x 3 = 21**

   a.   Analyze two span continuous beam ABC by slope deflection method. Then draw Bending moment & Shear force diagram. Take EI constant.
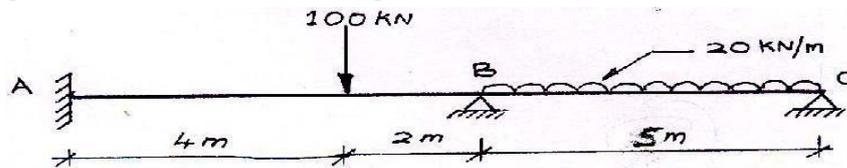

   b.   Explain Muller-Breslau's Principle and its applications for drawing influence lines for indeterminate beams.
   c.   Explain the step by step procedure to analyse the two-hinged stiffening girder.
   d.   Differentiate between force and displacement method.
   e.   Define collapse load. Determine the relation between shape factor, load factor and factor of safety.

SECTION C

3.   **Attempt any *one* part of the following:**   **7 x 1 = 7**

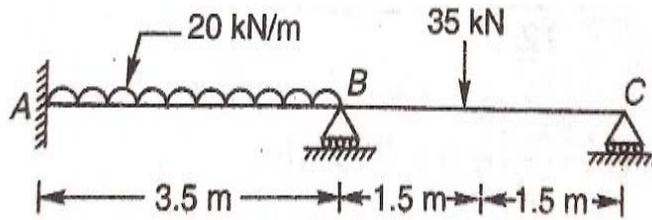   (a) Analyse the portal frame by moment distribution method-

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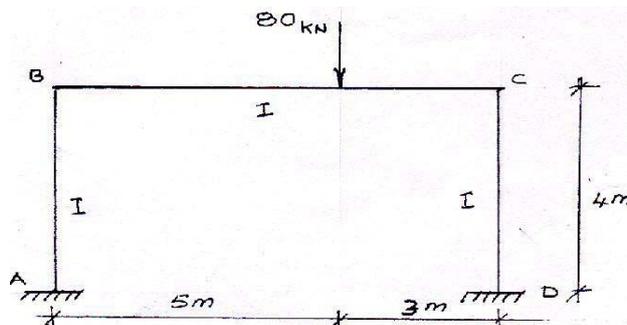
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(b) Find the final moments at the critical points of two span continuous beam shown below-

4. **Attempt any *one* part of the following:** 7 x 1 = 7

(a) Compute the ordinate of influence line for moment at mid span of BC for the beam shown below at 1m interval and draw influence line diagram. Assume EI is constant.

(b) A semi-circular arch of radius R with the two ends hinged is subjected to a concentrated load W at the crown. Obtain the horizontal thrust of the arch has the constant cross-section.
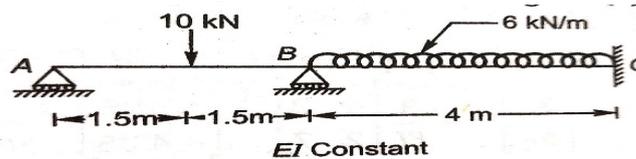
5. **Attempt any *one* part of the following:** 7 x 1 = 7

(a) A three hinged stiffening girder of a suspension bridge of 100 m span subjected to two point loads 10 kN each placed at 20 m and 40 m respectively from the left hand hinge. Determine the bending moment and shear force in the girder at section 30 m from each end. Also determine the maximum tension in the cable which has a central dip of 10 m.

(b) A suspension cable of span 20 m and central dip 2m is carrying a UDL of 20 kN/m. Find the horizontal pull in the cable. Also find the maximum and minimum tension in the cable.

6. **Attempt any *one* part of the following:** 7 x 1 = 7

(a) Analyse the beam using flexibility method-

(b) Explain the Procedure of analyzing the structure by stiffness method.

7. **Attempt any *one* part of the following:** 7 x 1 = 7

(a) Explain the methods that are used for plastic analysis of beams and frames.

(b) Determine the plastic moment capacity for the frame-