

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH
BRANCH: CIVIL

SEMESTER: III
SESSION: MO/2024

SUBJECT: CE202 STRUCTURAL ANALYSIS - I

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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| | CO | BL |
| Q.1(a) Consider two suitable examples from beam and truss structures and explain the difference between the determinate and indeterminate structures. | [5] | 1 K2 |
| Q.1(b) Determine the support reactions at the fixed-end support of the cantilever beam shown in Figure 1. | [5] | 2 K4 |

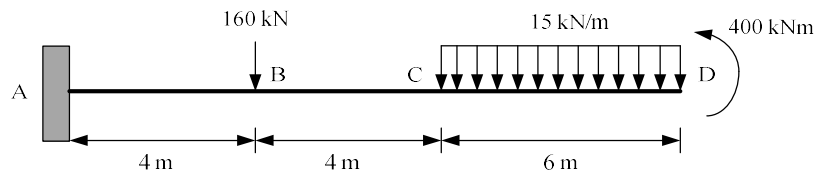


Figure 1 Cantilever Beam with various loading

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| Q.2(a) Determine the forces of each member of the truss shown in Figure 2. Also, state whether the member forces are tensile or compressive. | [5] | 3 K4 |
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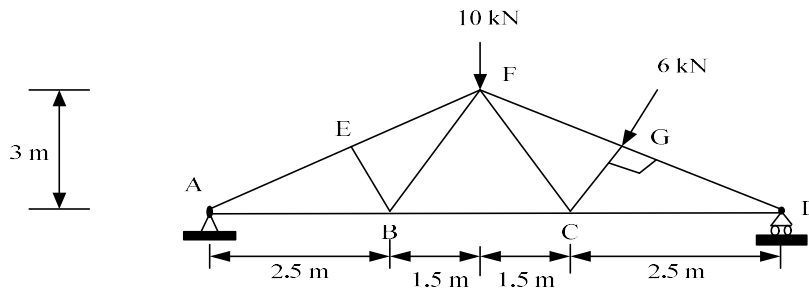


Figure 2 Truss with vertical and inclined loading

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| Q.2(b) Draw the shear force and bending moment diagram of the simply supported beam with overhang under various loading shown in Figure 3. Also indicate the values of Shear force and bending moment at A, B, C, D, and E points. | [5] | 3 K4 |
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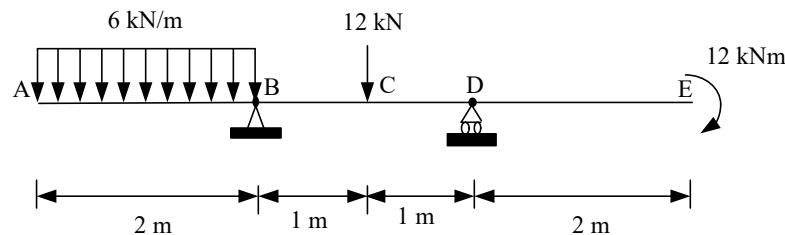


Figure 3 Simply supported beam with overhang under various loading

PTO

- Q.3(a) A three hinged Parabolic arch of 20 m span and 4 m central rise carries a point load of 4 kN at 4 m from the left hand hinge. Calculate the normal thrust and Shear at the section under the load. Also, Calculate the maximum positive bending moment and negative. [5] 3 K4
- Q.3(b) Determine the tension in each segment of the cable shown in Figure 4 given below. Also, what is the dimension h? [5] 3 K4

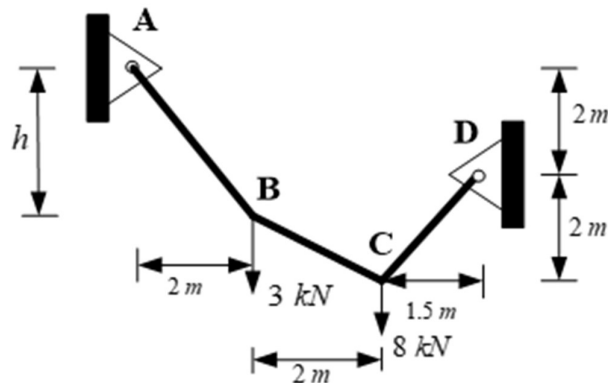


Figure 4 Cable with various segments under point loads

- Q.4(a) A simply supported beam of length 10 m is subjected to moving point loads of 10 kN and 5 kN space 2 m apart. Determine the maximum shear force and maximum bending moment at 6m distance from left support by ILD method. [5] 4 K4
- Q.4(b) A simply supported beam supported to an UDL W kN/m over entire span of L . Determine the slope and deflection by Double Integration Method. [5] 5 K3
- Q.5(a) Find the deflection of the beam shown in Figure 5 given below by using Strain Energy Method. [5] 5 K4

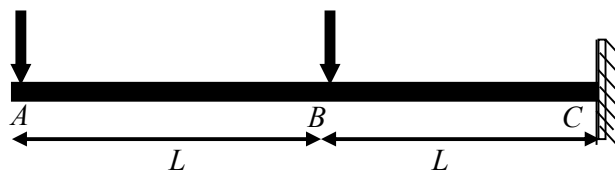


Figure 5 Cantilever beam with two point loads

- Q.5(b) Determine the slope and deflection of point B of the steel beam shown in Figure given below by using unit load method. Take $E = 200$ GPa, $I = 500(10^6)$ mm⁴. [5] 5 K4

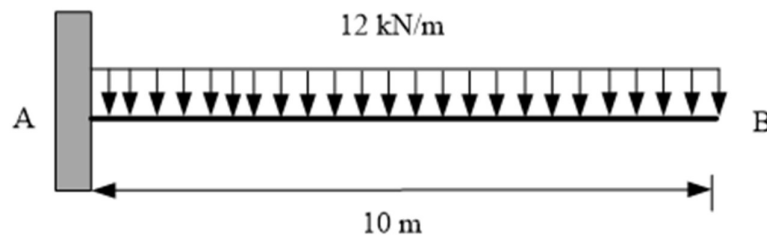


Figure 6 Cantilever beam with uniformly distributed load

K1 = Remember, K2 = Understand, K3 = Apply and K4 = Analyse

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