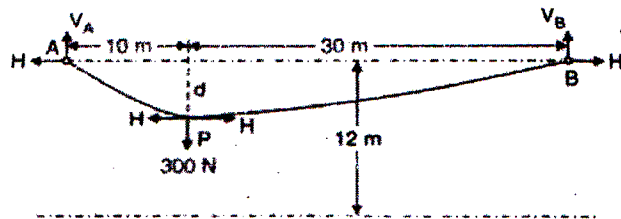


- (a) The magnitude of thrust at the springings 4
- (b) The reactions at the supports 4
- (c) Bending Moment at 6 m from the left hinge 4
- (d) The maximum positive bending moment. 3

6. A flexible rope weighing 1 N/m span between two points 40 m apart and at the same level, 12 m above the ground, is to carry a concentrated load of 300 N at a point P on the rope which is to be at a horizontal distance of 10 from the left-hand support. What is the maximum height above the ground to which the point P may be raised if the maximum tension in the rope is not to exceed 1000 N ? Assume that the distances measured along the rope are equal to their horizontal projection. 15



Section D

7. Two-wheel loads of 16 and 8 kN, at a fixed distance apart of 2 m, cross a beam of 10 m span. Draw the influence line for bending moment and shear force

Sep-21-00045

B. Tech. EXAMINATION, 2021

Semester IV (CBCS)

STRUCTURAL ANALYSIS-I

CE-401

Time : 2 Hours

Maximum Marks : 60

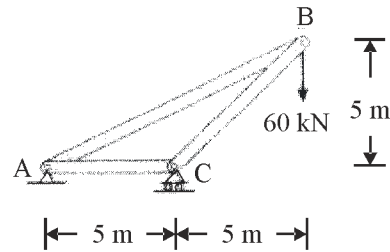
The candidates shall limit their answers precisely within 20 pages only (A4 size sheets/assignment sheets), no extra sheet allowed. The candidates should write only on one side of the page and the back side of the page should remain blank. Only blue ball pen is admissible.

Note : Attempt *Four* questions in all, selecting *one* question from any of the Sections A, B, C and D. Q. No. 9 is compulsory.

Section A

- 1. (a) Differentiate between static and Kinematic indeterminacy. 7½
- (b) Explain with suitable example the principle of superposition. 7½

2. (a) Find forces in all members in the following truss : 7½

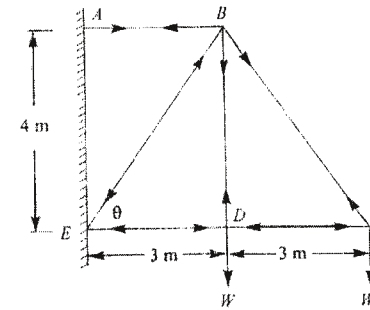


- (b) State the first and second theorems of Moment-Area method. Using this method find out the slope and displacement at the free end of a cantilever beam carrying a point load at mid-span. 7½

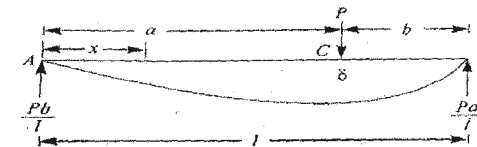
Section B

3. (a) Derive the expression of strain energy due to axial loading. 7½
- (b) A loaded truss is shown in figure. The sectional area of members is such that the tension members are stressed to 120 N/mm^2 , while the compression members are stressed to 75 N/mm^2 .

- Find the vertical deflection of the joint C. Take $E = 200 \text{ kN/mm}^2$. 7½



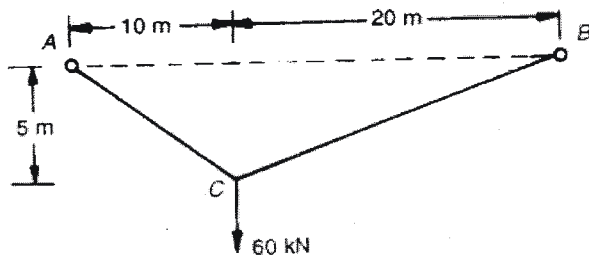
4. (a) Explain with suitable example the principle of virtual work. 7½
- (b) A beam of span 'L' is simply supported. It carries a concentrated load placed on the span as shown in figure. Determine the deflection under the load. 7½



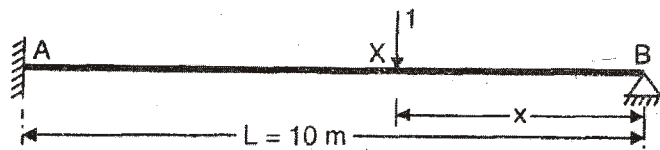
Section C

5. A symmetrical three hinged circular arch has a span of 16 m and a rise to the central hinge of 4 m. It carries a vertical load of 16 kN at 4 m from the left-hand end. Find :

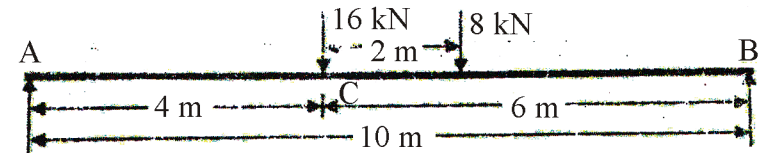
cable. Also determine the maximum tension in the cable and the total strain energy. $EA = 2400 \text{ kN}$. 4



(d) Draw the influence lines for (i) reaction at B; (ii) moment at A for the propped cantilever shown in figure. Compute the ordinates at intervals of 1.25 m. 3



for a point 4 m from the left abutment and find the maximum bending moment and shear force at that point : 15

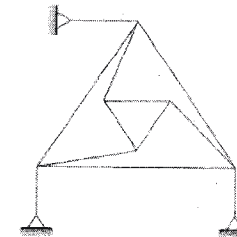


8. With a suitable example state and explain the Muller-Breslau principle. 15

(Compulsory Question)

9. This question contains four parts :

(a) Find the static indeterminacy for the truss structure shown in figure. 4



(b) State and derive Maxwell's reciprocal deflection theorem. 4

(c) A light flexible cable in the figure. Determine the horizontal components of tension in the