[Total No. of Questions - 9] [Total No. of Printed Pages - 4]
(2064)

14627

B. Tech 4th Semester Examination

Structural Analysis-I (N.S.)

CE-221

Time : 3 Hours **Max. Marks : 100**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt one question each from Sections A, B, C and D. Section E is compulsory. All questions carry equal marks.

SECTION - A

1. A three hinged parabolic arch rib has a span of 84 m and a rise of 18 m to the central pin at the crown. The rib carries load of intensity 2 kN per m uniformly distributed horizontally over a length of 1/3 of the span from the left hand springing. Calculate the bending moments in the rib at the quarter span points. (20)

2. A Cable is suspended between two points, 75 m apart horizontally with its left end lower than the right end by 12m. The cable supports a uniformly distributed load of 5 kN/m along the horizontal span. Given that the central sag is 7.5m, determine:

   (a) the position of lowest point,

   (b) the horizontal tension

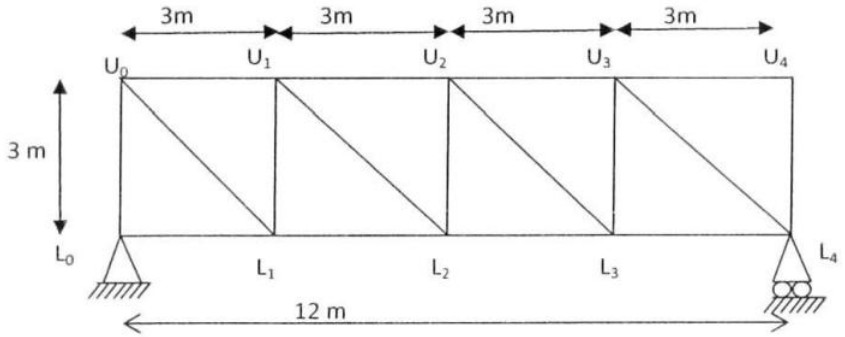
   (c) the length of the cable and

   (d) the cable tension at two ends. (20)

SECTION - B

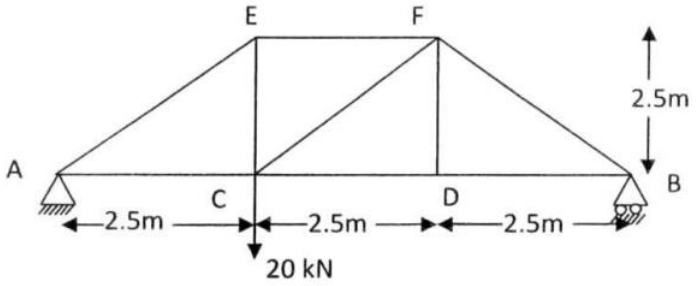
3. Two point loads 100 kN and 200 kN spaced 3m apart cross a beam of span 15 from left to right with 100 kN load leading. Draw the influence line diagram for shear force and bending moment and find the value of maximum shear force and bending moment at a section D, 6 m from left hand support. Also calculate the absolute maximum bending moment due to given load system. (20)

4. Draw the influence line diagram for forces in members U1U2, U1L2, L1L2 and U1L1 of the truss shown below. (20)

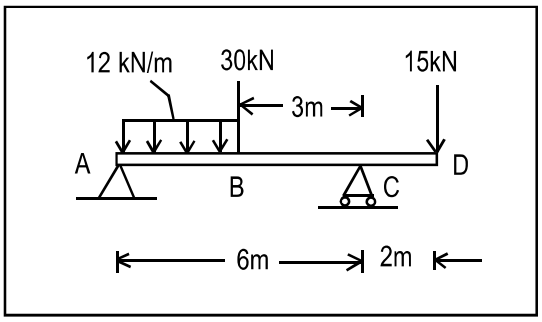


SECTION - C

5. Using Castigliano's first theorem, determine the vertical displacement of both point C and D for pin jointed truss shown in Fig. Cross section of all members is 200 mm^2 and E=2x10^5 N/mm^2. (20)

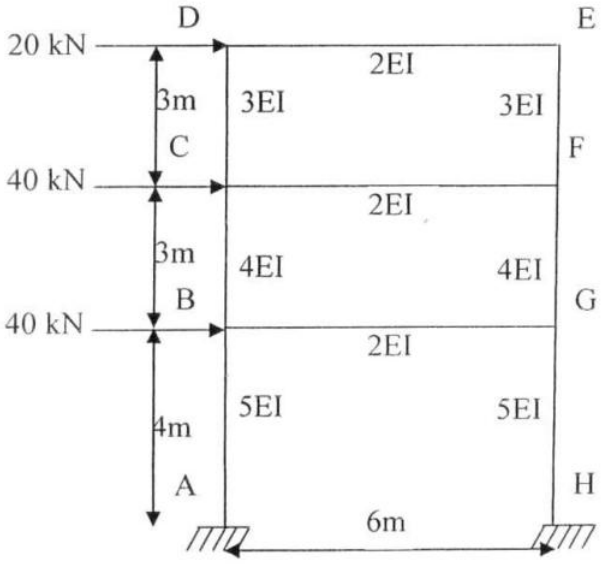


6. Determine the slope at B and deflections at B and D using any method of your choice for the beam shown in Figure. Assume uniform flexural rigidity EI= 8000 kNm^2. (20)



SECTION - D

7. For the frame shown below, determine by **Cantilever method** all column end and beam end moments and shears due to lateral loads shown. (20)



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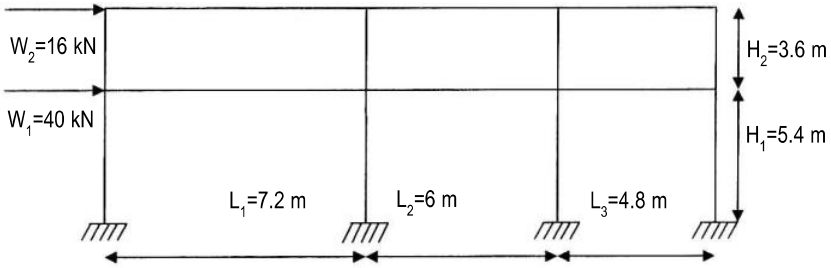
8. For the frame shown below, determine by **portal method** all column end and beam end moments and shears due to lateral loads shown. EI for all the members is constant. (20)



SECTION - E

9. Attempt any Five.

   (a) Using Moment area method find the slope and deflection at free end of a cantilever of length 5 m carrying a point load of 10kN at free end.

   (b) Define how cables and arches are related.

   (c) State and illustrate Muller Breslau's principle.

   (d) Define Static and kinematic indeterminacy and difference thereof.

   (e) Explain conjugate beam method to determine slopes and displacements.

   (f) State and demonstrate principle of virtual work.

   (5×4=20)