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ET-502(B)

B.Tech. Civil (Construction Management) / B.Tech. Civil (Water Resources Engineering)

Term-End Examination

June, 2018

00193

ET-502(B) : STRUCTURAL ANALYSIS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. A three-hinged arch has a span of 30 m and a rise of 10 m. The arch carries a uniformly distributed load of 6 kN/m on the left half of its span as shown in Figure 1. Determine the reactions at A and B. Also determine the horizontal thrust. *14*

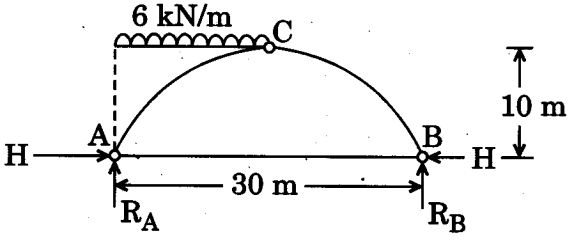

Figure 1

2. A simply supported girder has a span of 10 m. A 20 kN wheel load moves from one end to the other end on the span of the girder. Find the maximum bending moment which can occur at a section 4 m from the left end. Use influence line diagram to solve this problem. *14*

3. A fixed beam of span l carries uniformly distributed load of intensity w per unit run over the whole span as shown in Figure 2. Calculate the fixed end moments M_A and M_B by three moment equation. Also draw the bending moment diagram. *14*

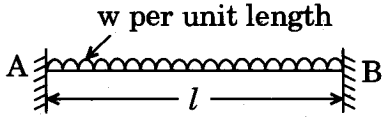

Figure 2

4. Analyse the continuous beam showing Figure 3 by the slope deflection method. EI is constant throughout the length. Also draw the bending moment diagram. *14*

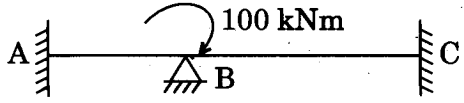

Figure 3

5. Show that the strain energy stored in the bar as shown in Figure 4 is $\frac{49}{54}\frac{P^2L}{\pi D^2 E}$ *14*

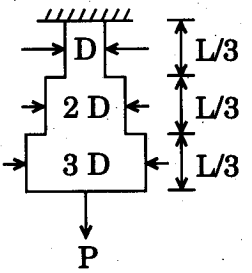

Figure 4

6. A cantilever beam has prop at a distance L from the fixed end and on this length there is a uniformly distributed load w per unit length. If the prop is rigid and holds its point of application on the horizontal. Find the reaction R_A on the prop as shown in Figure 5. *14*

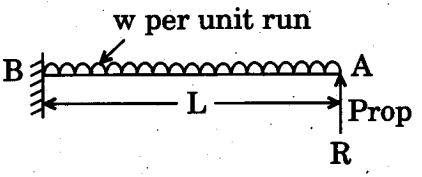

Figure 5

7. (a) Show that shape factor for a rectangular section is 3/2. *7*

(b) A fixed beam of span L carries a uniformly distributed load w (total load) on the left half as shown in Figure 6. The plastic moment of resistance of the beam is M_P. Show that the value of the collapse load is $\frac{14{\cdot}2\,M_P}{L}$ 7

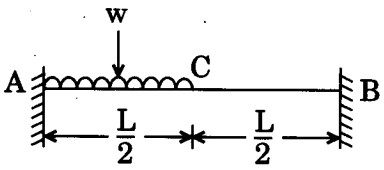

Figure 6

8. Using Euler's theory, compare the buckling strength of two long columns of same length, material and weight, one of solid circular section of 100 mm in diameter, the other of solid square section. Both the columns are pinned at the ends. *14*