No. of Printed Pages : 4

ET-502(B)

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

Term-End Examination

00413

December, 2018

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.*

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1. 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 horizontal thrust and reactions at A and B. *14*

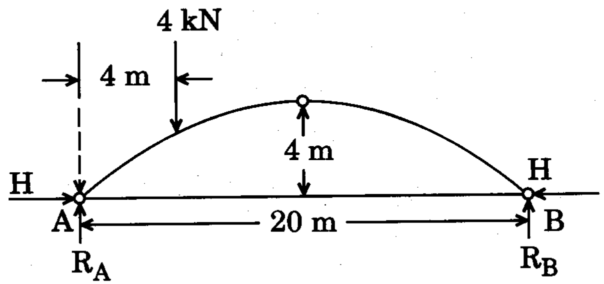

Figure 1

2. A live load of 15 kN/m moves on a simply supported girder of 15 m. Find the maximum bending moment which can occur at a section 5 metres from the left end. The length of load is greater than the span. Use influence line diagram to solve this problem. *14*

3. A fixed beam of span L is subjected to eccentric point load W as shown in Figure 2. Calculate the fixed end moments by three moment equation. Also draw the bending moment diagram. *14*

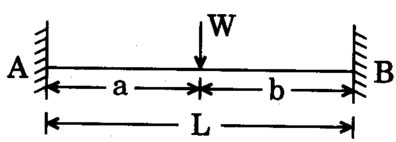

Figure 2

4. Analyse the continuous beam shown in Figure 3 by the slope deflection method. The EI is constant throughout the length and supports remain at same level after loading. Also draw the bending moment diagram. *14*

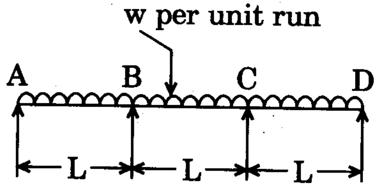

Figure 3

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

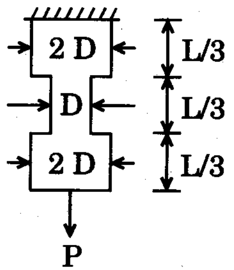

Figure 4

6. A simply supported beam of span L carries uniformly distributed load of w kN/m over the whole span. If a central prop is introduced at the same level as the end supports, show that the reaction at the prop is $\frac{5wL}{8}$. 14

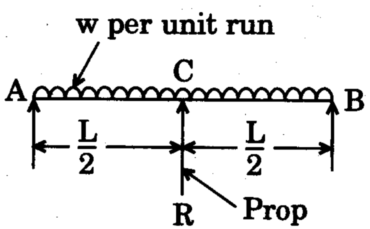

Figure 5

7. (a) Show that shape factor for a circular section is 1·70. *7*

(b) Show that the collapse load for the propped cantilever beam shown in Figure 6 is $\dfrac{11{\cdot}656\ M_P}{L^2}$ *7*

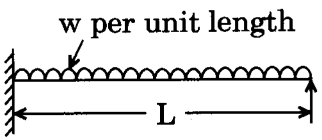

Figure 6

The plastic moment of the section is M_P.

8. Compare the buckling strength of two columns, hinged at ends, one of which is having a rectangular section of 30 mm × 120 mm and the other one of square section 60 mm × 60 mm. Both the columns are of same length and made up of same material. Use Euler's formula. *14*