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ET-502(B)

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

Term-End Examination

June, 2011

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 simply supported girder has a span of 10 metres. A 15 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 meters from the left end. **14**

2. A three hinged semicircular arch of radius R carries a uniformly distributed load of W per unit run over the whole span. Show that the horizontal thrust is $\frac{WR}{2}$. **14**

3. A fixed beam of span 'L' is subjected to eccentric point load 'W' as shown in Figure - 1. Calculate the fixed end moments M_A and M_B by three moment equation. **14**

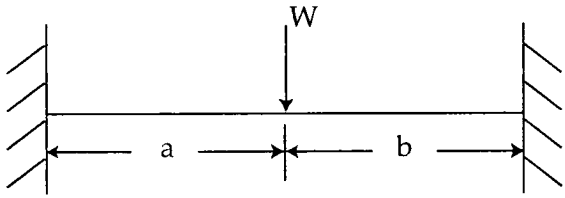

Figure - 1

4. A portal frame ABCD is fixed at A & D, and is loaded as shown in Figure - 2. Treating Joints B and C as rigid, calculate the moments at A, B, C and D by Moment Distribution method. Also draw the bending moment diagram. **14**

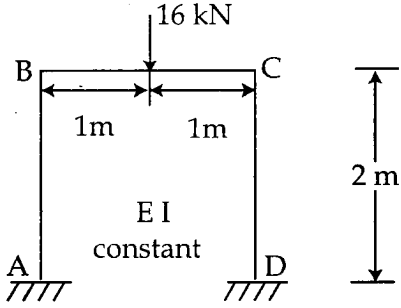

Figure. 2

5. What is meant by strain energy ? Derive an expression to calculate it for a circular shaft of diameter D and length L. One end of the shaft is fixed while the other one is free and is subjected to a tensile force P. Assume material parameters suitably, if required. **14**

6. A solid column of diameter 50 mm is required to be replaced by a hollow column whose external diameter is 1.25 times internal diameter. The column is long enough to fail by buckling alone. Show that external and internal diameter of the hollow circular column is 57.04 mm and 45.6 mm respectively. **14**

7. A fixed beam of span 'L' carries a uniformly distributed load 'W' kN on the left half portion as shown in Figure - 3. Determine the value of 'W'at collapse. The plastic moment of resistance of the beam is M_p. **14**

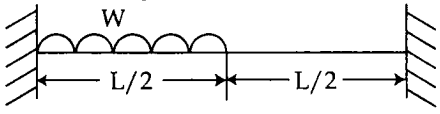

Figure - 3

8. In a simply supported beam of span 'L', carrying a uniformly distributed load of 'W' kN/m, if a central prop is introduced at the same level as the end supports, show that the reaction on the prop is $\frac{5\,W\,l}{8}$. **14**

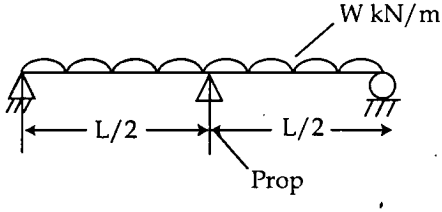

Figure - 4