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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, 2010

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. Assume any missing data, if required and state that clearly in your answer.*

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1. For the simply supported beam with overhang, as shown in figure 1, plot the influence line diagrams for reaction at D (R_D), shear force at C (F_C), bending moment at C (M_C), shear force at left of B(F_B) and bending moment at B (M_B). **14**

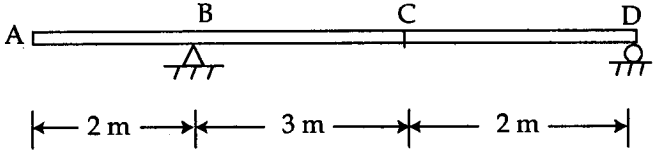

Figure - 1

2. Define the following briefly : **4x3½=14**

(a) Indeterminate structures

(b) Maxwell's reciprocal theorem

(c) Plastic hinge

(d) Shape factor

3. A three - hinged parabolic arch, as shown in figure 2, has a span of 20 m and a central rise of 5 m. It carries a concentrated load of 80 KN at a distance of 5 m from the left support. Determine the maximum bending moment in the arch. **14**

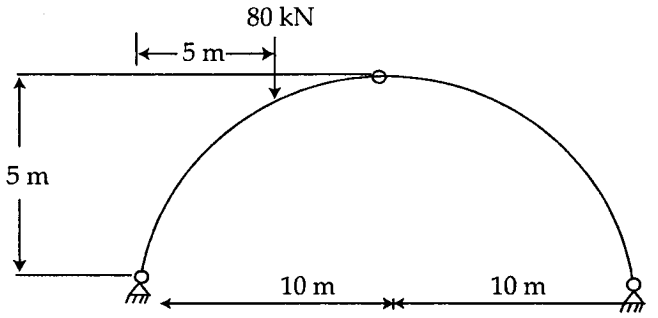

Figure - 2

4. Analyse the continuous beam, shown in figure 3, by the slope deflection method. The support B sinks down by 7.5 mm. Draw shear force and bending moment diagrams. **14**

Take EI = 48000 KNm^2.

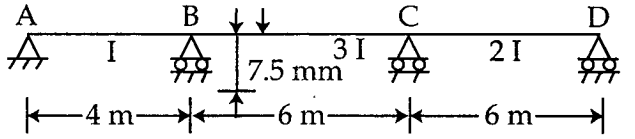

Figure - 3

5. Analyse the portal frame, shown in figure 4, by moment distribution method. The frame is fixed at A and D and has rigid joints at B and C. Draw the Bending Moment Diagram. EI for all members is the same. **14**

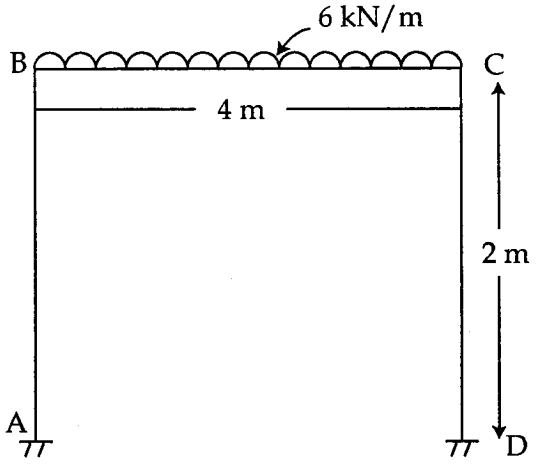

Figure - 4

6. A propped cantilever ABCD is loaded as shown in figure 5. Find the collapse load if the beam has a plastic moment capacity M_p. **14**

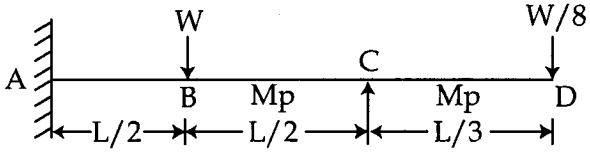

Figure - 5

7. Compare the amount of strain energy of the two bars shown in figure 6 ? Both the bars are circular in cross section. Diameters and lengths are marked in the figure. Figure is not to scale. **14**

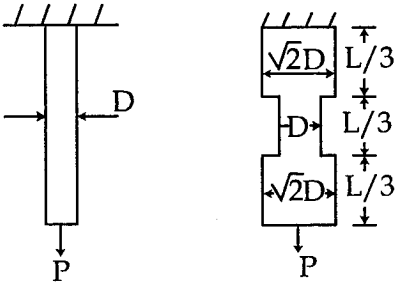

Figure - 6

8. A solid column of 50 mm diameter is required to be replaced by a hollow column whose external diameter is 1.25 times of the internal diameter. The column is long enough to fail by buckling only. Compute percent saving in material due to such replacement. **14**