CT-401/SA/4th Sem/2017/M

STRUCTURAL ANALYSIS

Full Marks – 70

Pass Marks – 28

Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer any *five* questions.

1. A three hinged circular arch hinged at the springing and crown points has a span of 40m and central rize of 8m. It carries a uniformly distributed load of 29 kN/m over the left half of the span together with a concentrated load of 100 kN at the right quarter span point. Find the reactions at the supports, normal thrust and shear at a section 10m from the left support. 14

2. Determine the vertical and horizontal deflection at the free end of the beam shown in Figure 1. Given E = 200 kN/mm^2 and I = 30×10^7 mm^4. 14

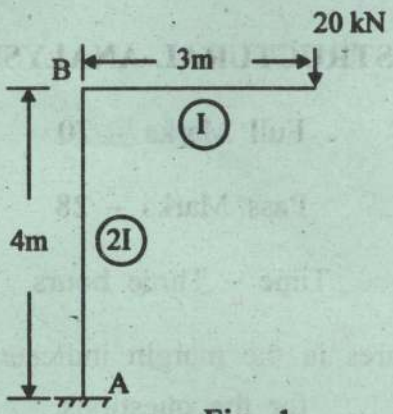

Fig. 1

3. Determine the rotation at supports and deflection at mid span and under the loads in the simply supported beam shown in Figure 2. 14

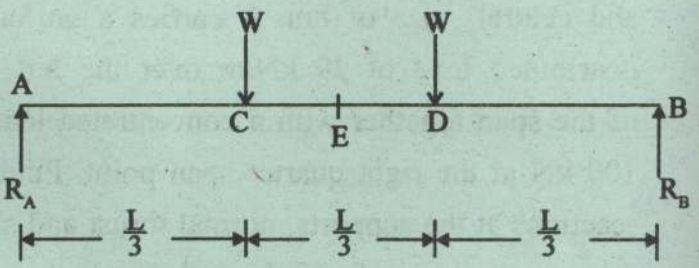

Fig. 2

4. Determine the horizontal displacement of the roller end D of the portal frame shown in Fig. 3, when P = 5 kN and EI is 8000 kNm^2 throughout. 14

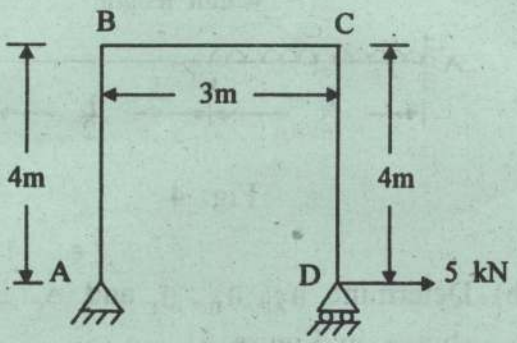

Fig. 3

5. Discuss the following : 3½×4=14

(i) Determinate and indeterminate structures

(ii) Moment area theorem

(iii) Hooke's law

(iv) Strain energy.

6. Four point loads 10, 20, 20 and 15 kN have centre to centre spacing of 2m between consecutive loads and they traverse a girder of 30m span from left to right with 15 kN load lending. Calculate the maximum bending moment and their force at 8m from the left support. 14

7. (a) Find the rotation and deflection at the free end in the cantilever beam shown in Fig. 4. 7

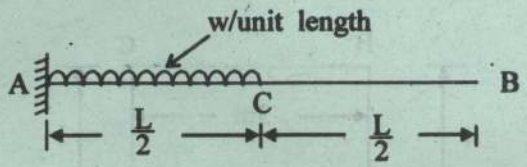

Fig. 4

(b) Determine θ_A, θ_B, θ_C and Δ_C in the beam shown in Figure 5. 7

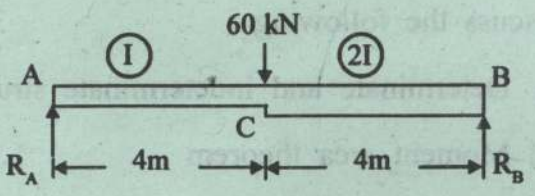

Fig. 5