G 440

(Pages : 3)

Reg. No.....

Name.....

B.TECH. DEGREE EXAMINATION, MAY 2014

Sixth Semester

Branch : Civil Engineering

STRUCTURAL ANALYSIS—III (C)

(Old Scheme—Prior to 2010 Admissions)

[Supplementary/Mercy Chance]

Time : Three Hours

Maximum : 100 Marks

1. Analyse the frame shown in Figure 1 using portal method.

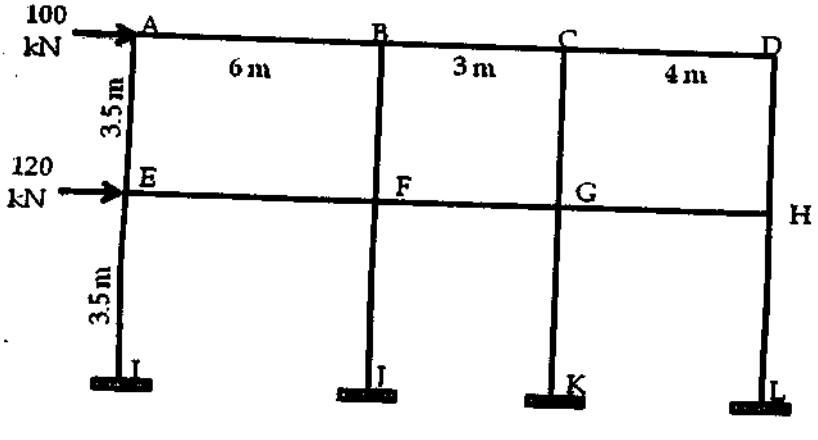

Figure 1.

(20 marks)

Or

2. Analyse the frame shown in Figure 2 using cantilever method. All columns have the same cross sectional area.

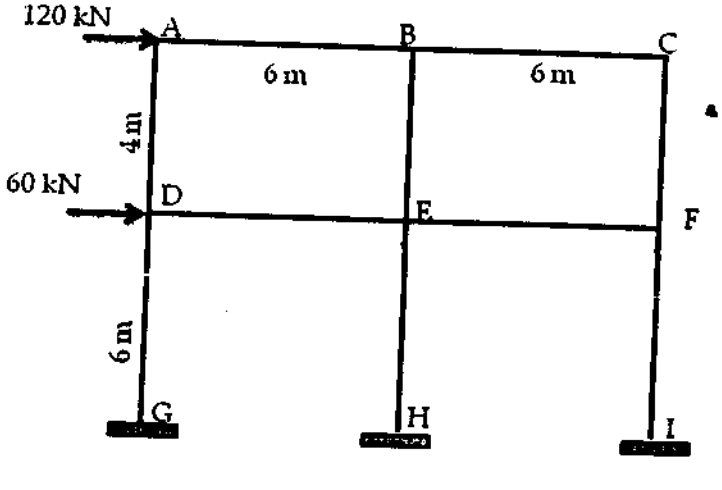

Figure 2.

(20 marks)

Turn over

3. Analyse the beam shown in Figure 3 using Kani's method.

EI is constant

Figure 3.

(20 marks)

Or

4. A beam in a horizontal plane curved in plan in the form of a quadrant of a circle of radius R and having a uniform cross section is fixed at one end and free at the other as shown in Figure 4. It carries a vertical concentrated load W at the free end. Compute the shear force, bending moment and twisting moment at A and B. Also draw the Shear Force Diagram, Bending Moment Diagram and Twisting Moment diagram.

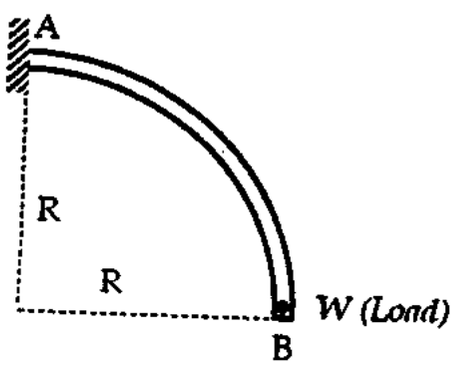

Figure 4.

(20 marks)

5. Define and explain octahedral stresses. Derive expressions for octahedral normal stress and octahedral shear stress.

(20 marks)

Or

6. The displacement field in a solid body is given by :

$$u = \left\{\left(3x^2 z + 60x\right) i + \left(5z^2 + 20xy\right) j + \left(6z^2 + 2xyz\right) k\right\} \times 10^{-3} \text{mm}.$$

Evalaute the components of strain tensor at a point P whose co-ordinates are (3, 4, 0.5) mm. Also, determine the principal strains and the principal axes.

(20 marks)

7. Find the normal stresses and shear stress on a cantilever loaded with a concentrated load at the end, using stress function approach.

(20 marks)

Or

8. Write notes on plane stress problems and plane strain problems. Give examples. Write the constitutive relations for plane stress and plane strain problems.

(20 marks)

9. (a) Derive the shape factor for a triangular cross section. (10 marks)

(b) A simply supported beam of span 6 m is to be designed for an ultimate UDL of 25 kN/m. Find the required plastic moment capacity M_p and platic section modulus Z_p of a section using platic theory, assuming σ_y = 250 MPa.

(10 marks)

Or

10. Find the collapse load for the frame shown in Figure 5. Plastic moment capacities of the column is $2M_p$ and that of the beam is M_p.

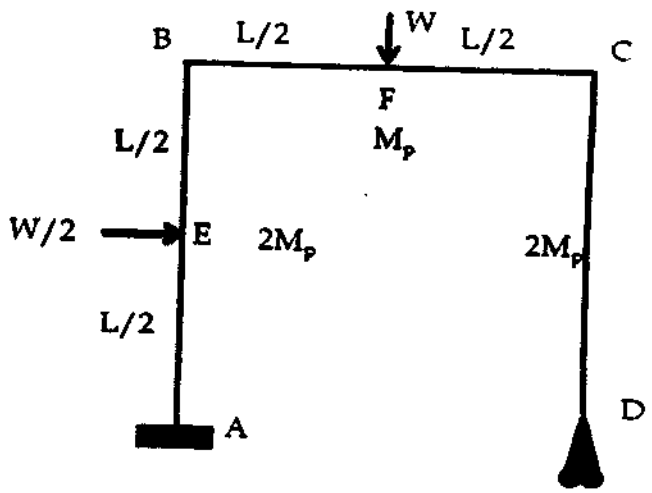

Figure 5.

(20 marks)

[5 × 20 = 100 marks]