This question paper contains 3 printed pages.

3051 *Your Roll No.....*

MEC

Paper – CE.506

ADVANCED THEORY OF STRUCTURES

J

Time : 3 hours Maximum Marks : 100

(Write your Roll No. on the top immediately on receipt of this question paper)
Attempt any five questions. All questions carry equal marks.
Assume suitable missing data if any.

Q1: Analyze the frame shown in figure 1 using computer oriented direct stiffness method and obtain partitioned joint stiffness matrix and Combined Joint Load Vector corresponding to global axes system having origin at O. Take ℓ = 4 m.

20 marks

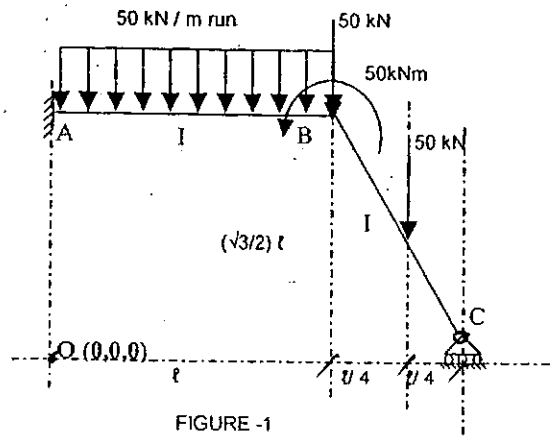

FIGURE -1

Q2: Draw Influence line diagram for moment M_{BC} for a given frame as shown in figure 2. Attempt the basic solution using Stiffness method. Obtain ILD ordinates at quarter span points in each span.

20 marks

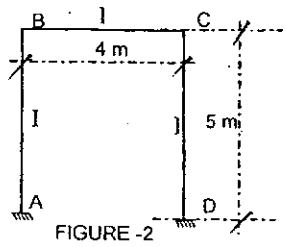

FIGURE -2

Q3: Analyze the frame shown in figure 3 using Kani's method and draw BMD.

20 marks

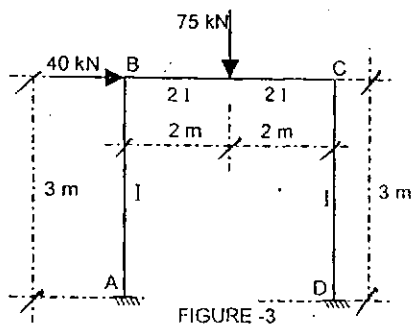

FIGURE -3

Q4: Analyze the frame shown in figure 4 using Naylor's Method of Moment Distribution and draw BMD.

20 marks

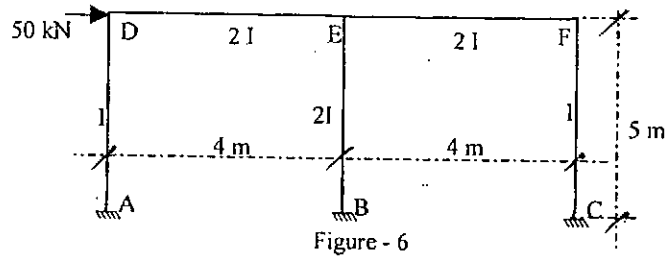

Figure - 6

Q5: Analyze the frame shown in figure 5 using Cantilever Method and draw BMD and SFD for the beam. Take Column cross sectional area of AD and DG = A; of BE and EH =2A; and of CF and FJ = A.

20 marks

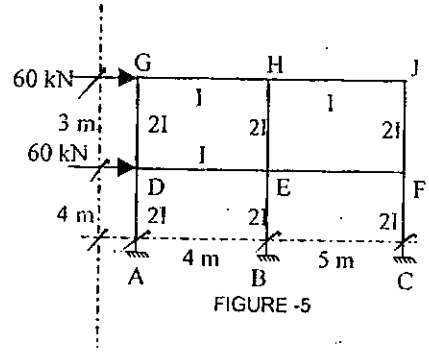

FIGURE -5

Q6: Find the axial force in the redundant bar X of the truss shown in figure 6 due to the action of a vertical load P = 10 kN, a uniform rise in temperature of 60 Degree Celsius and an error in the length of the redundant bar X by an amount ΔL = -5 mm (too short). Each bar has cross sectional area A_i = 625 mm^2, E = 2 × 10^5 MPa and Coe. of thermal expansion $\alpha = 11.7 \times 10^{-6}$mm/mm/DegreeCalsius.

20 marks

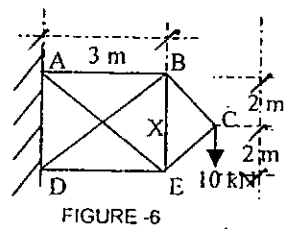

FIGURE -6

Q7: Analyze a two span symmetric semi circular beam ACB curved in plan as shown in figure 7 with radius R = 12 m, has fixed support at A and B and continuous support at mid span point C. It is subjected to a udl of w = 20 kN/m vertically downward. Draw BMD, SFD and TMD. Take EI, GJ constant for both the spans and (GJ/EI) = 0.8.

20 marks

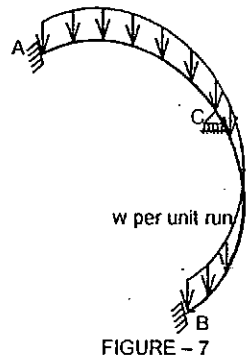

FIGURE – 7

Q8(a): Develop Rotation matrices for 3-D frame member.

08 marks

Q8(b): Locate the shear center for the thin walled section having thickness t and center line radius r as shown in figure 8 assuming that the thickness is constant throughout.

12 marks

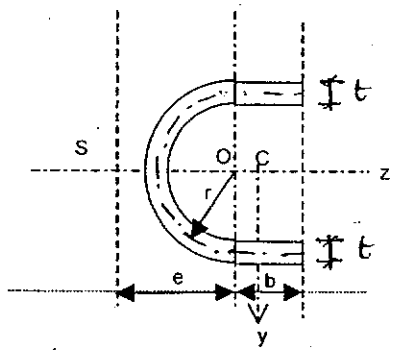

FIGURE - 8