Ref. No.: Ex/CE/PC/B/T/214/2024(S)

B.E. Civil Engineering ,Second Year ,First Semester Supplementary Examination 2024

SUBJECT – Structural Mechanics I

Time : Three hours (50 Marks for each Part) Full Marks : 100

Use separate answer script for each Part

PART I (50 Marks)

Answer any two questions

(Each question carries 25 marks)

1. Analyze the truss as shown in the Figure I given below and tabulate the member forces. CO6

2.Locate the shear center of the given channel section as shown in the Figure II below. CO4

3. Draw the Mohr circle and calculate the major principal stress, minor principal stress, maximum shear stress and also draw the planes of maximum shear stress for the Figure III as given below. CO5

4. A compound shaft consisting of a steel segment and an aluminum segment is acted upon by two torques as shown in Figure IV below. Determine the maximum permissible value of T subject to the following conditions: Permissible shear stresses are τ_{st} = 100MPa, τ_{al} = 90MPa, and the angle of rotation of the free end is limited to 2.5°. For steel, G = 85 GPa and for aluminum, G = 32 GPa.For steel shaft dia=175mm and for aluminum shaft dia= 125mm. CO1

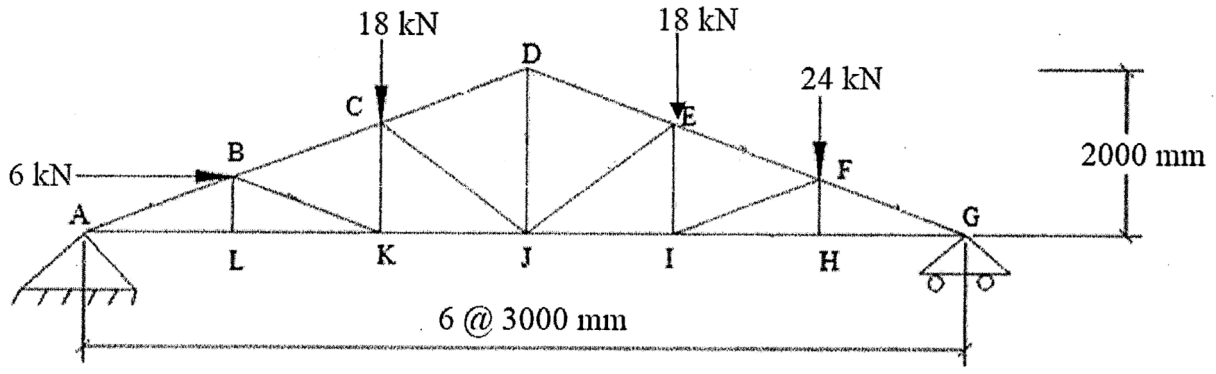


Figure -I

[Turn over

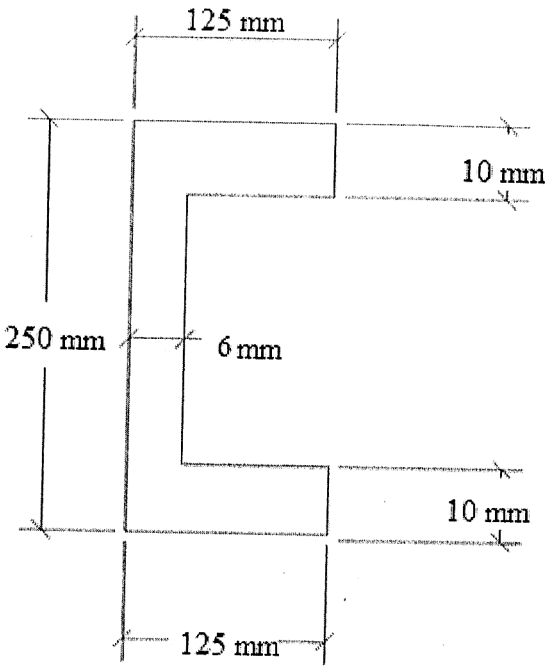


Figure -II

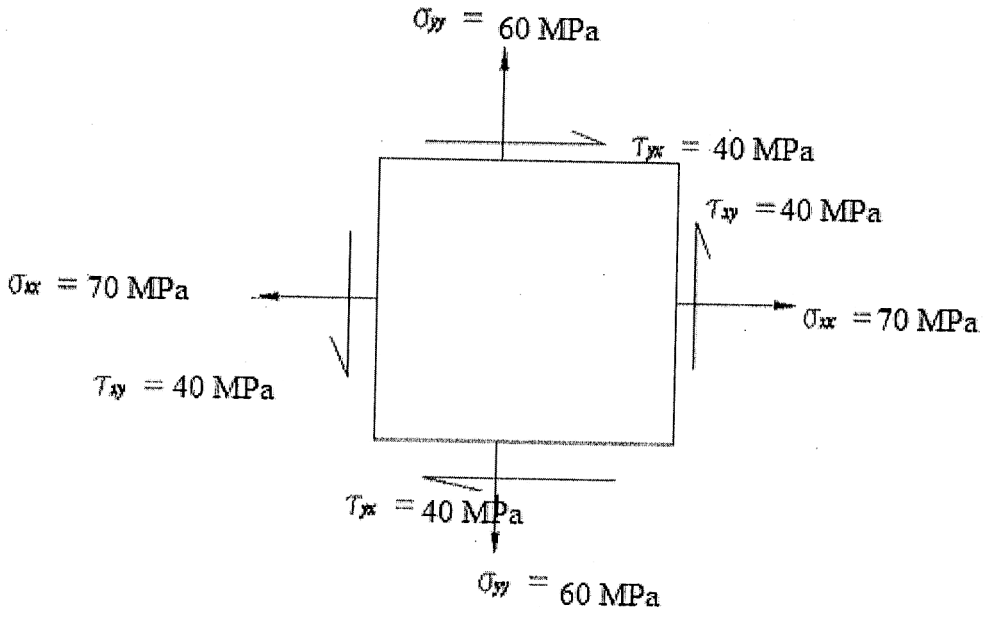
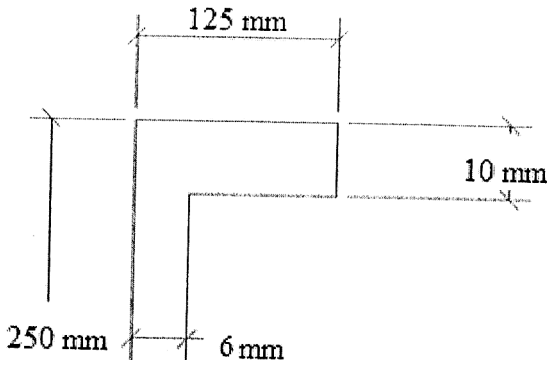


Figure –III


125 mm
10 mm
250 mm
6 mm

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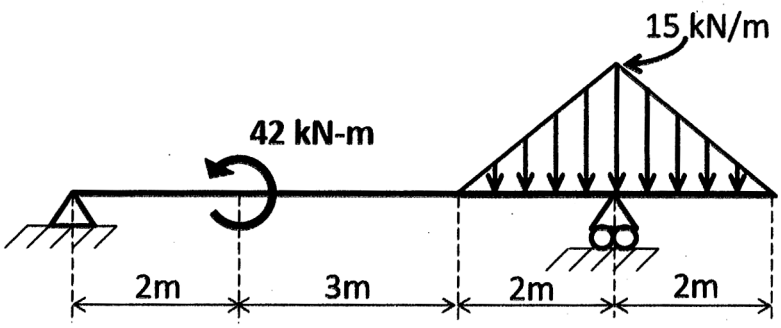
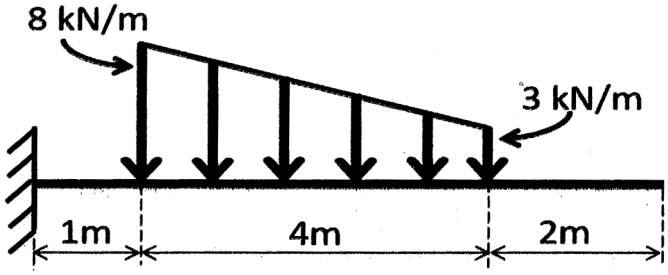
Name of the Examinations: B.E. CIVIL ENGINEERING SECOND YEAR FIRST SEMESTER SUPPLEMENTARY EXAM 2024

Subject : STRUCTURAL MECHANICS I

Time: 3 Hours (All parts) Part: II (50 Marks) Full Marks:100

Instructions:	
I	Use Separate Answer scripts for each part.
II	All notations represent their standard relevant meaning.
III	If you feel that any data or condition is/are missing in any question, please assume relevant inputs and mention the same.

Sl No	Question	Marks	CO
1	Consider 2 elements which are made of elasto-plastic materials of different bulk modulus and same poisson's ratio. If the elements are exposed to various applications of load, among the two elements. what comparable change can be highlighted in terms of Modulus of Resilience and strain energy stored in the material? Explain using any suitable application of load case(s) of your own choice. (12 marks) Which parameter/quantity/condition helps understanding if a material to be used in civil engineering applications is to be considered as ductile material or brittle material? Explain using examples. (8 marks)	20	CO2
2	Consider the beam from Figure: 01 and draw Shear Force Diagram and Bending Moment Diagram for the beam.  Figure: 02 (Not to Scale)	15	CO3
3	Consider the beam from Figure: 02 The solid rectangular beam of 450 mm depth is prismatic and having area moment of inertia of the cross section as 2.278×10^9 mm^4. Draw bending stress distribution diagram for the point with maximum bending moment. Also Find out amount of bending stress at the same point at 300 mm depth from the upper edge.  Figure: 02 (Not to Scale)	15	CO4