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

B.E. Civil Engineering ,Second Year ,First Semester Exam 2024

SUBJECT – Structural Mechanics I

Time : Three hours Full Marks : 100

(50 Marks for each Part)

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} = 90MPa, τ_{al} = 80MPa, and the angle of rotation of the free end is limited to 2.5°. For steel, G = 85 GPa and for aluminum, G = 30 GPa.For steel shaft dia=175mm and for aluminum shaft dia= 125mm. CO1

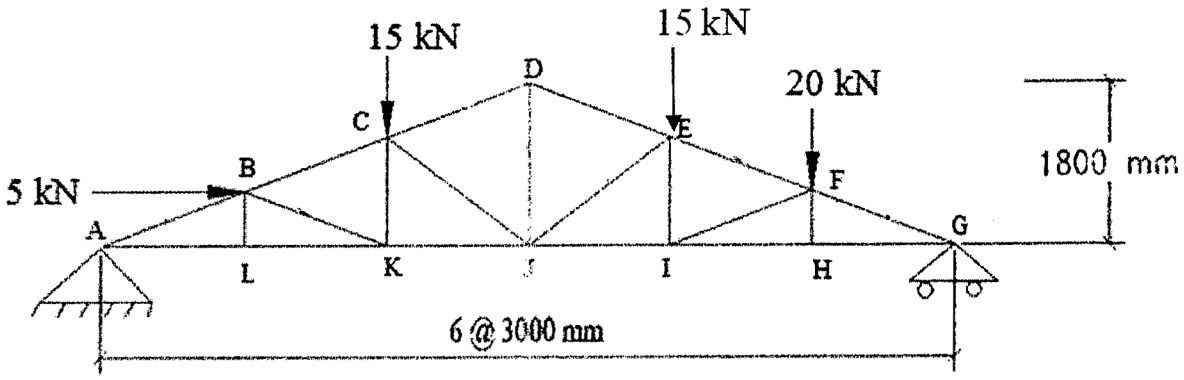

Figure -I

[Turn over

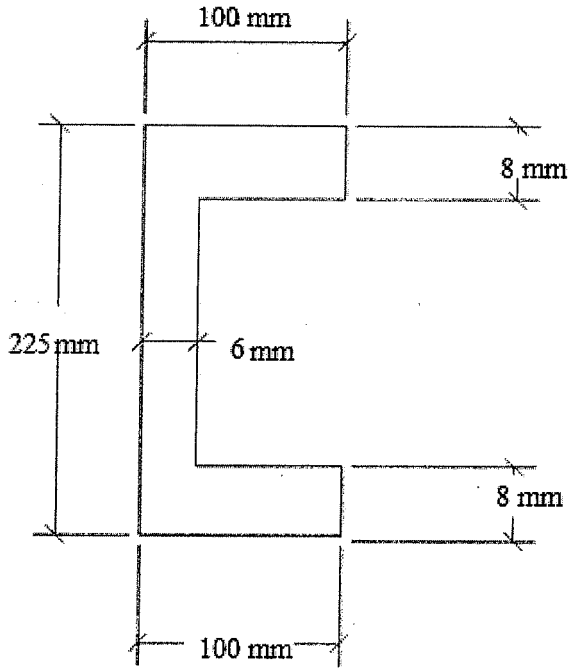

Figure -II

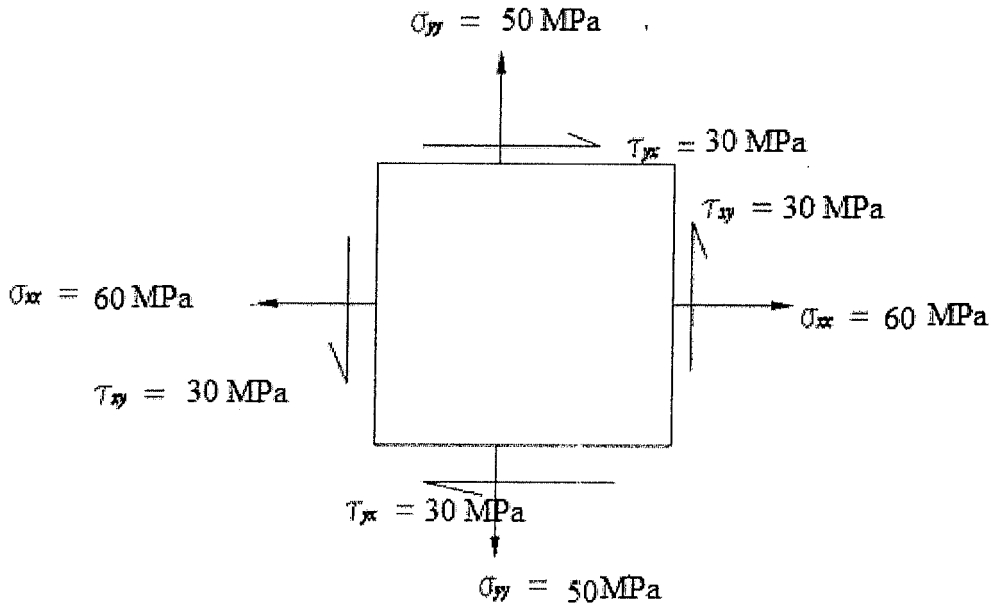

Figure –III

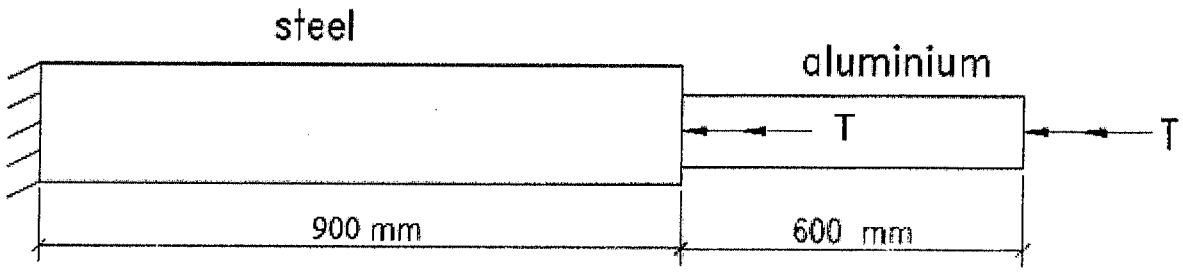

Figure –IV

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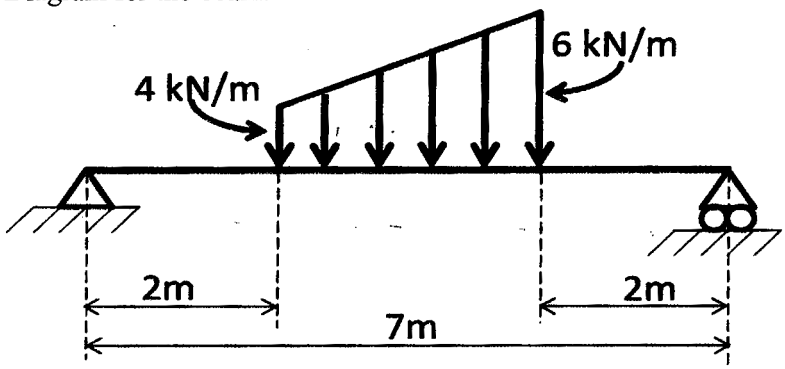
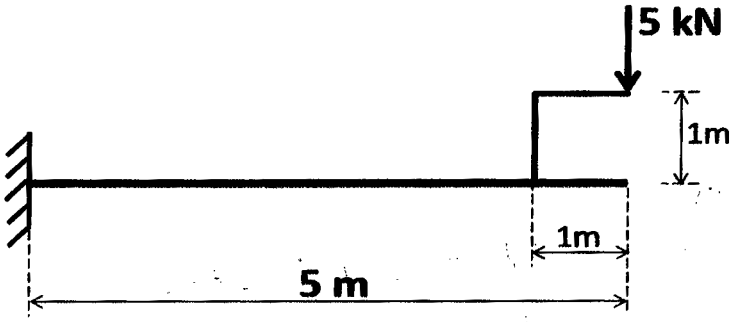
Name of the Examinations: B.E. CIVIL ENGINEERING SECOND YEAR FIRST SEMESTER - 2024

Subject : STRUCTURAL MECHANICS I

Time: 3 Hours (Total) Part: II 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	(a) Derive the expression for axial deformation of a prismatic bar subjected to Axial Compressive loading considering the stress strain relationship of the material as linearly elastic. (6 Marks) (b) Discuss Modulus of Resilience and Strain Energy using examples of stress strain curve of Elasto-plastic material and ideal rigid material using neat sketches. (8 marks) (c) Define Ductility, Brittleness and Malleability. (6 marks).	20	CO 2
2	Consider the beam from Figure: 01 and draw Shear Force Diagram and Bending Moment Diagram for the beam.  Figure: 01 (No Scale)	15	CO 3
3	Consider the beam from Figure: 02. The beam is prismatic having solid rectangular cross section of breadth 100mm and depth 200mm. Draw bending stress distribution diagram for the point with maximum bending moment. Also Find out amount of bending stress at the same point at 50mm depth from the upper edge.  Figure: 02 (No Scale)	15	CO 4