GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering - SEMESTER - 1/2 EXAMINATION - WINTER 2025

Subject Code: BE01000091/BE01R00091   **Date: 29-12-2025**

Subject Name: Mechanics of Solids

Time: 02:30 PM TO 05:00 PM   **Total Marks: 70**

Instructions
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
**4. Simple and non-programmable scientific calculators are allowed.**

		Marks
Q.1	**(a)** Differentiate Statics and Dynamics	**03**
	(b) Explain the terms composition of forces and resolution of forces with an example.	**04**
	(c) Find out the magnitude and direction of resultant of force system shown in figure.	**07**
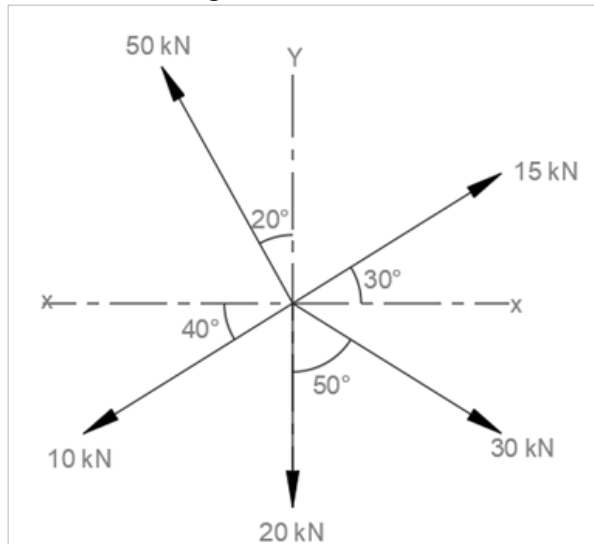
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Q.2	**(a)** State the law of polygon of forces with an example.	**03**
	(b) State and explain Lami's theorem with a diagram.	**04**
	(c) A simply supported beam 10 m long carries three-point loads at 150 kN, 100 kN and 120 kN at 2m, 4m and 7m from left support. Draw S.F. and B.M. diagram for the beam.	**07**

OR

(c) Determine the support reactions for the beam shown in below Figure. Also Calculate and plot the shear force and bending moment diagrams.   **07**
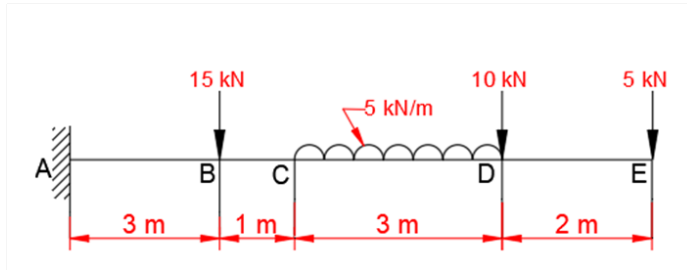

Q.3 (a) Distinguish between centroid and Center of Gravity.   **03**

(b) Classify different types of beams with neat sketches   **04**

(c) Derive the Equation of moment of Inertia about an axis passing through the Centroid of the rectangle.   **07**

OR

(a) Define stress. Also explain types of stresses.   **03**

(b) Determine support reaction for the given beam shown in figure.   **04**
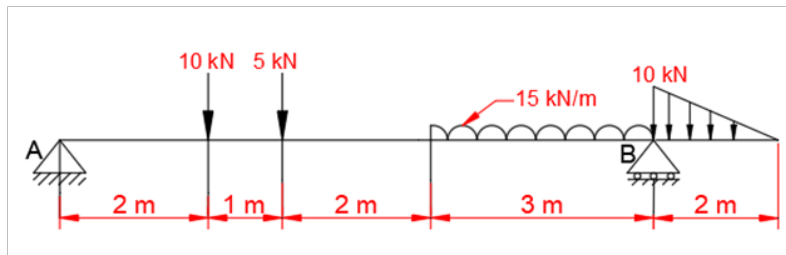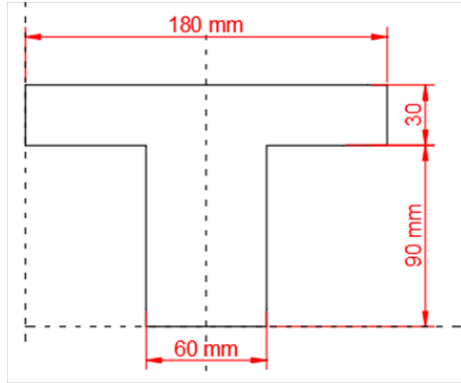

**(c)** Determine the centroid of the section shown in Figure below.   **07**
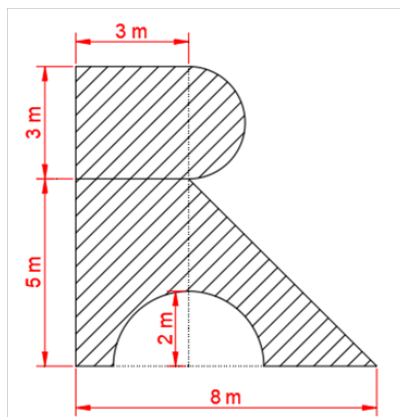
Q.4 (a) Define Elastic limit and Modulus of Elasticity.   **03**

(b) Derive with usual notations the theorem of perpendicular axis.   **04**

(c) Determine moments of inertia of a section shown in figure below about its horizontal centroidal axis.   **07**

OR

(a) Write the bending equation and explain each term of that equation.   **03**

(b) State and prove Pappu's guldinus theorem for surface area of bodies.   **04**

(c) A steel bar of 1000 mm long is acted upon by forces as shown in figure . Find the elongation of the bar. Take E = 200 Gpa.   **07**
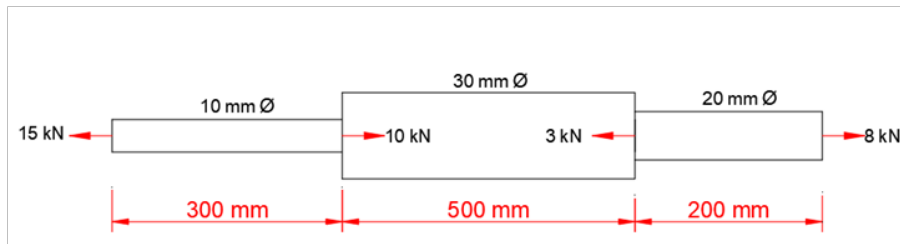
Q.5 (a) Draw shear stress distribution diagram for: i) Triangular (ii) Circular and (iii) T - section   **03**

(b) Define point of contraflexure. Give an example of where it occurs.   **04**

(c) A circular pipe of 100 mm external diameter and 80 mm internal diameter is used as a simply supported beam of 4 m span. Find the safe concentrated load that the beam can carry at the mid-point, if the permissible stress on the beam is 120 N/mm^2 **07**

OR

(a) Define Composite bar and Compound bar.   **03**

(b) Derive torsion equation with usual notations.   **04**

(c) A circular rod of diameter 50 mm and 700 mm long is subjected to a tensile force of 40 kN. The modulus of elasticity for steel is 200 kN/mm^2. Find out the stress,strain and elongation of the bar due to applied load.   **07**

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