

USN

Course Code 1 B C I V 2 0 5

Second Semester B.E. Degree Examinations, July 2026

ENGINEERING MECHANICS

Duration: 3 hrs

Max. Marks: 100

Note: 1. Answer any FIVE full questions choosing ONE full Question from each Module.
2. Missing data, if any, may be suitably assumed

<u>Q. No</u>	<u>Question</u>	<u>Marks</u>	<u>(RBTL:CO: PI)</u>
Module-1			
1. a.	Explain the basic idealization of engineering mechanics.	10	(2 :1: 1.2.1)
b.	What are the types of force system? Explain non-current force system.	10	(2 :1: 1.2.1)

(OR)

2. a.	Five coplanar forces are acting at a point as shown in Fig. Q2(a). Determine the resultant in magnitude and direction.	10	(3 :1: 2.1.4)
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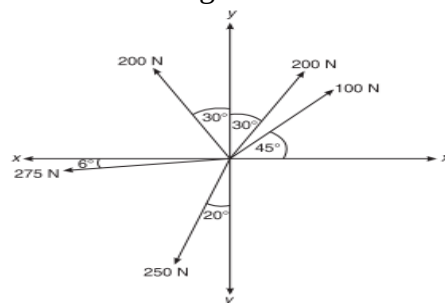


Fig. Q2(a)

b.	Determine the magnitude, direction and position of the resultant force with reference to the point A for the non-coplanar force system shown Fig. Q2(b).	10	(3 :1: 2.1.4)
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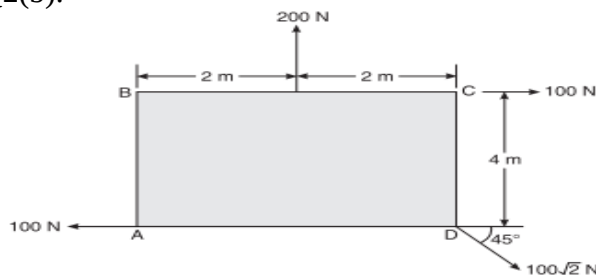


Fig. Q2(b)

Module-2

3. a.	Two spheres each of radius 100 mm and weight 5 kN are in a rectangular box as shown in Fig. Q3(a). Calculate the reactions at all the points of contact.	10	(3 :1: 2.1.4)
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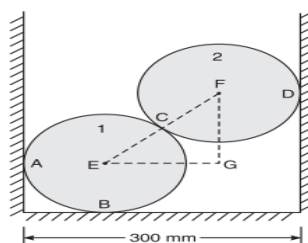


Fig. Q3(a)

b.	State and prove Lami's theorem.	10	(3 :1: 2.1.4)
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Note: (RBTL - Revised Bloom's Taxonomy Level: CO - Course Outcome: PI- Performance Indicator)

(OR)

4. a. Explain types of supports and loads with neat sketch. 10 (2 :2: 1.2.1)
b. Calculate the support reactions for the beam shown in Fig. Q4(a). 10 (3 :1: 2.1.4)

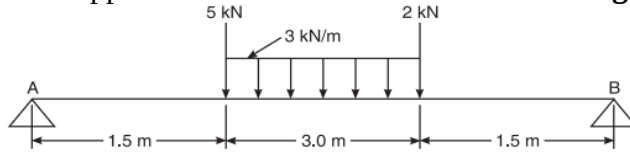


Fig. Q4(a)

Module-3

5. a. Define friction. Explain the types of friction. 10 (2 :3: 1.2.1)
b. A ladder 5 m long rests on a horizontal ground and leans against a smooth wall at an angle of 70° with the horizontal as shown in Fig. Q5(b). The weight of the ladder is 900 N and a man weighing 750 N stands on the ladder 1.5 m from the bottom of the ladder. Calculate the coefficient of friction between the ladder and the ground. 10 (3 :3: 2.1.4)

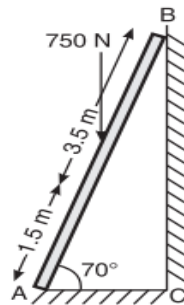


Fig. Q5(b)
(OR)

6. a. What is angle of repose? Derive the relation between angle of repose and coefficient of friction. 10 (2 :3: 1.2.1)
b. Determine the necessary force P acting parallel to the plane, as shown in Figure 5, in order to cause motion to impend. Take $\mu = 0.25$. 10 (3 :3: 2.1.4)

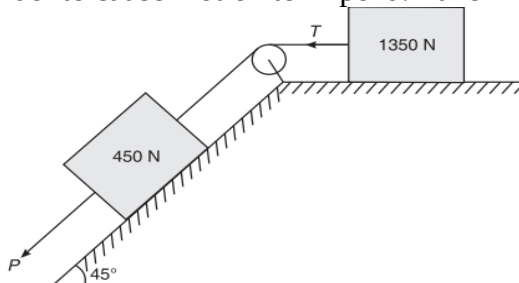


Fig. Q6(b)

Module-4

7. a. Locate the centroid of the triangle about the base 'AB'. 10 (3 :4: 2.1.4)
b. Find the centroid as shown in Fig. Q7(b). 10 (3 :4: 2.1.4)

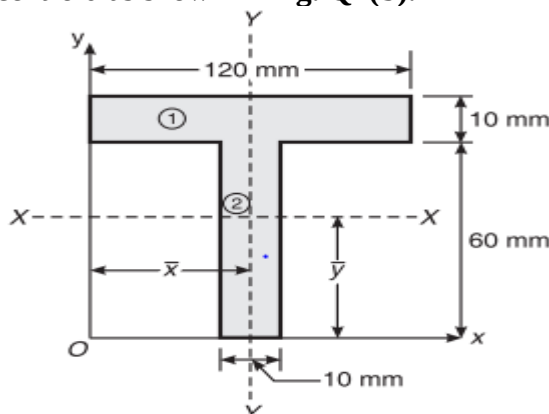


Fig. Q7(b)

(OR)

8. a. State and prove parallel axis theorem. 10 (3 :4: 2.1.4)
b. Find the centroid as shown in Fig. Q8(b). 10 (3 :4: 2.1.4)

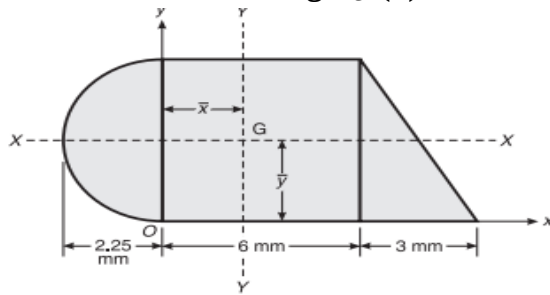


Fig. Q8(b)

Module-5

9. a. Derive a moment of inertia of triangle section. 10 (3 :5: 2.1.4)
b. Find the moment of inertia along the horizontal axis and vertical axis passing through the centroid of a section shown in Fig. Q9(b). 10 (3 :5: 2.1.4)

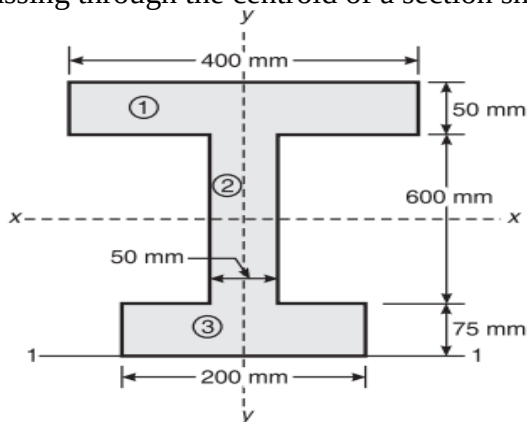


Fig. Q9(b)

(OR)

- 10 a. Find the polar moment of inertia of the plane lamina of Figure 10 about point O 20 (3 :5: 2.1.4)

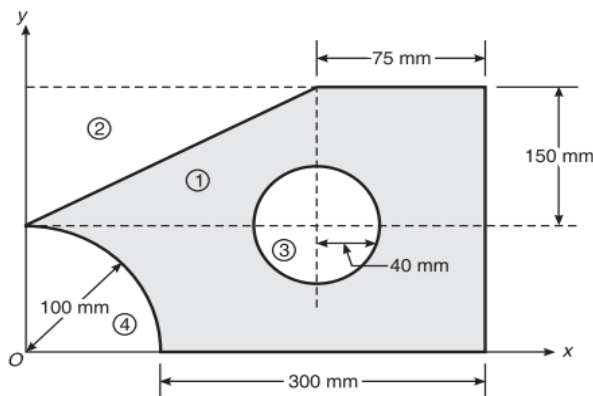


Fig. Q10(b)

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