Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – May/June 2026

Date: 18- 05-2026 **Time:** 09:30am – 12:30pm

School: SOE	**Program:** Mechanical	
Course Code: MEC2500	**Course Name:** ENGINEERING MECHANICS	
Semester: II	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5	CO6
Marks	10	20	20	16	18	16

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

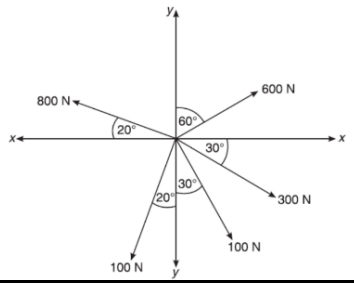
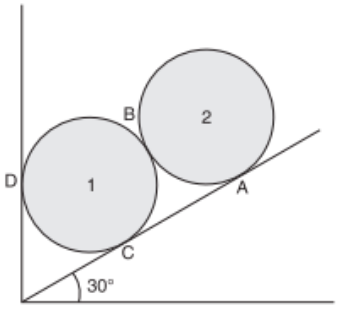
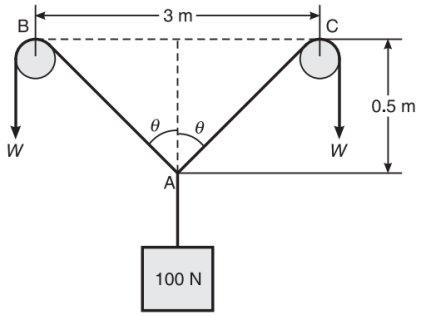
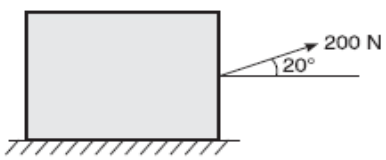
Part A

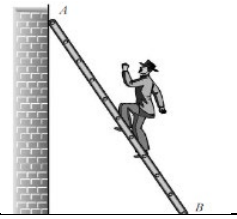
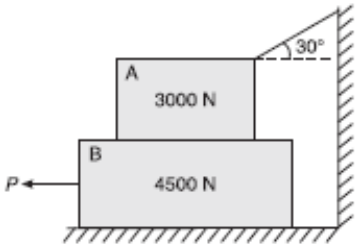
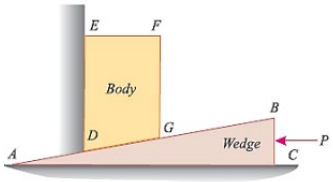
Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

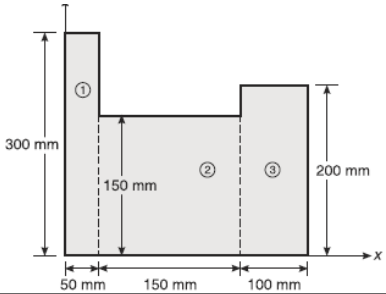
1.	What is limiting friction?	**2 Marks**	**L2**	**CO1**
2.	Define angle of repose.	**2 Marks**	**L2**	**CO1**
3.	What is the difference between centroid and center of gravity?	**2 Marks**	**L2**	**CO1**
4.	Define centroid of a plane area.	**2 Marks**	**L2**	**CO1**
5.	What is meant by free body diagram (FBD)?	**2 Marks**	**L2**	**CO1**
6.	State Newton's Second Law of Motion and its mathematical form.	**2 Marks**	**L2**	**CO3**
7.	Define rectilinear motion.	**2 Marks**	**L2**	**CO3**
8.	State the Work–Energy Principle.	**2 Marks**	**L2**	**CO6**
9.	Name any two coordinate systems used in motion analysis.	**2 Marks**	**L2**	**CO5**
10.	State Newton's Third Law of Motion.	**2 Marks**	**L2**	**CO5**

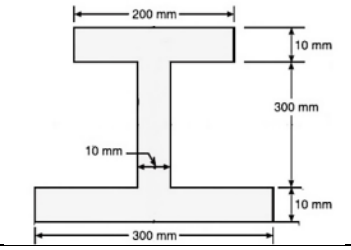
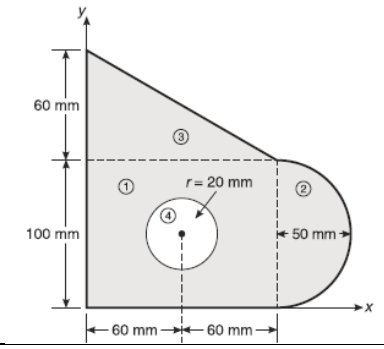
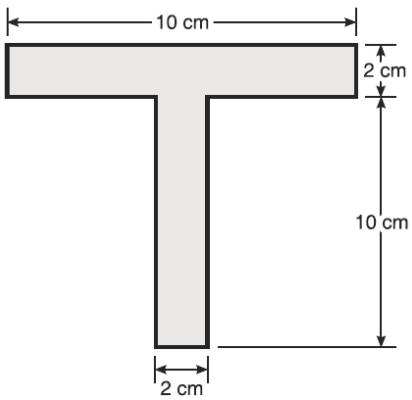
Part B

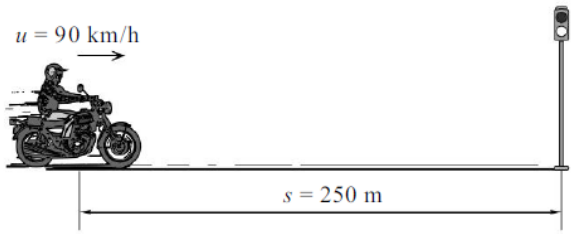
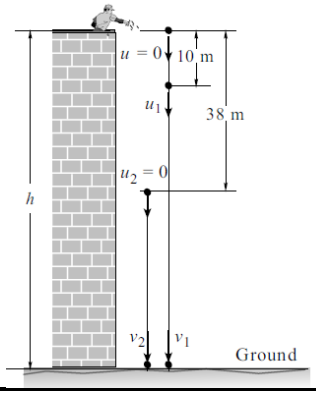
Answer the Questions. **Total Marks 80M**

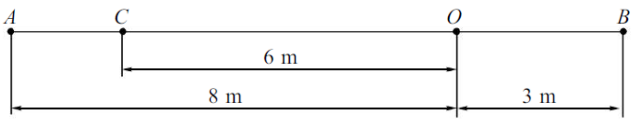
11.	**a.**	How are forces classified in engineering mechanics? Illustrate each type with real-life applications.	**10 Marks**	**L3**	**CO2**
		Or			
12.	**b.**	Determine the magnitude and direction of the resultant of the coplanar force system. shown in in Fig.12 b **Fig.12 b** 	**10 Marks**	**L3**	**CO1**
13.		Two identical rollers, each weighing 400 N, are placed in a trench as shown in Figure13. Assuming that all contact surfaces are smooth, determine the reactions at contact points A, B, C, and D. Fig.13 	**10 Marks**	**L3**	**CO2**
		Or			
14.		Find the value of W, which is required to maintain equilibrium configuration as shown in Figure.14 Fig14.a 	**10 Marks**	**L3**	**CO2**
15.	**a.**	A block shown in fig 15.a is just moved by a force of 200N. The weight of block is 600N. Determine the co-efficient of static friction between the block and the floor. **Fig 15. a** 	**8 Marks**	**L3**	**CO3**

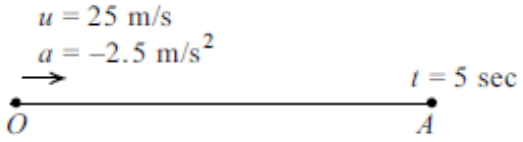
	b.	A uniform ladder weighing 100N and 5metres long has lower end B resting on the ground and upper end A resting against a vertical wall as shown in Fig15.b.. The inclination of the ladder with horizontal is 60°. If the co efficient of friction at all surfaces of contact is 0.25, determine how much distance (up along the ladder) a man weighing 600N can ascent without causing it to slip. **Fig15.b** 	**8 Marks**	**L3**	**CO3**
		Or			
16.	**a.**	A block weighing 4500 N resting on horizontal surface supports another block of 3000 N as shown in Figure 16. a. Find the horizontal force P required to just move the block to the left. Take the coefficient of friction for all contact surfaces as 0.3. **Fig16.a** 	**8 Marks**	**L3**	**CO3**
	b.	A block weighing 1500N, overlying a 10° wedge on a horizontal floor and leaning against a vertical wall, is to be raised by applying a horizontal force to the wedge. Shown in fig 16.b Assuming the co efficient of friction between all the surface in contact to be 0.3.Determine the minimum horizontal force required to raise the block. Fig 16.b 	**8 Marks**	**L3**	**CO3**

17.	**a.**	Locate the centroid of the composite area given below fig 17.a Fig 17.a 	**8 Marks**	**L3**	**CO4**

	b.	Determine the Moment of Inertia about its Centroidal axes as shown in fig 17.b **Fig17.b**  	**8 Marks**	**L3**	**CO4**
		Or			
18.	**a.**	Determine the centroid of the composite area given below fig 18.a **Fig 18.a**  	**8 Marks**	**L3**	**CO4**
	b.	Determine the Moment of Inertia about its Centroidal axes as shown in fig 18.b  **fig 18.b**	**8 Marks**	**L3**	**CO4**

19.	**a.**	Define the following terms i) Acceleration ii) Displacement	**7 Marks**	**L1**	**CO6**
	b.	A motorist is travelling at 90 kmph, when he observes a traffic light 250 m ahead of him turns red shown in fig 19.b. The traffic light is timed to stayed for 12 sec. If the motorist wishes to pass the light without stopping, just as it turns green. Determine (i) the required uniform deceleration of the motor and (ii) the speed of the motor as it passes the traffic light. Fig 19.b 	**7Marks**	**L4**	**CO6**
		Or			
20.	**a.**	Define the following terms i) Kinetics ii) Kinematics iii) Projectile motion iv) Rotational motion.	**7 Marks**	**L1**	**CO6**
	b.	A stone is dropped from the top of a tower. When it has fallen a distance of 10 m, another stone is dropped from a point 38 m below the top of the tower. If both the stones reach the ground at the same time, calculate (i) the height of the tower and(ii) the velocity of the stones when they reach the ground Fig20.b 	**7 Marks**	**L4**	**CO6**

21.	**a.**	Define the following i) Centroidal Rotation ii) Non-centroidal Rotation iii) Translation motion	**7 Marks**	**L1**	**CO5**
	b.	A particle travels along a straight line path such that in 4 sec it moves from an initial position SA = -8 m to position SB = +3 m. Then in another 5 sec it moves from SB to SC = -6 m. Determine the particle's average velocity and average speed during 9 sec interval.  **Fig 21.b**	**7 Marks**	**L4**	**CO5**

		Or			
22.	**a.**	Define the following: i) Speed ii) Velocity iii) Distance	**7 Marks**	**L1**	**CO5**
	b.	A particle starts moving along a straight line shown in fig 22.b with initial velocity of 25 m/s, from O under a 2-uniform acceleration of -2.5 m/s^2 . Determine **(i)** velocity, displacement and the distance travelled at t = 5 sec, **(ii)** (ii) how long the particle moves in the same direction? What are its velocity, displacement and distance covered then ?  **Fig 22.b**	**7 Marks**	**L4**	**CO5**