PVP 23

Code: 23CE3201, 23ME3201

I B.Tech - II Semester – Regular / Supplementary Examinations
MAY 2025

ENGINEERING MECHANICS
(Common for CE, ME)

Duration: 3 hours Max. Marks: 70

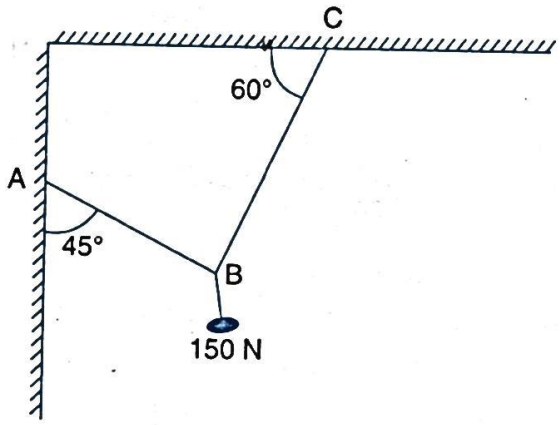
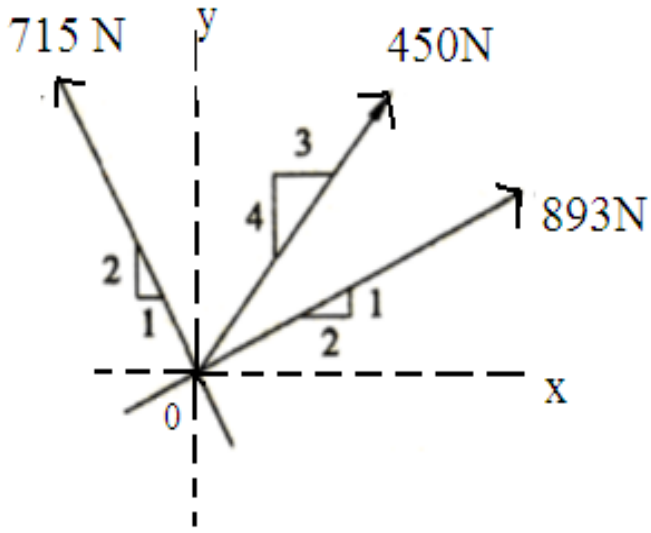
Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

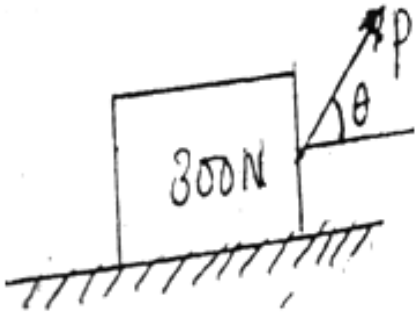
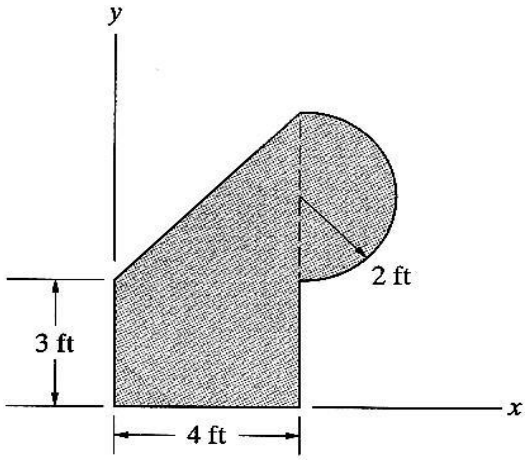
BL – Blooms Level CO – Course Outcome

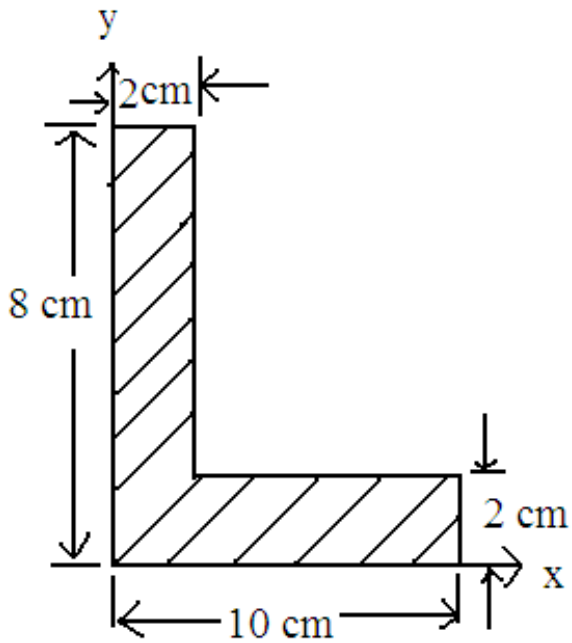
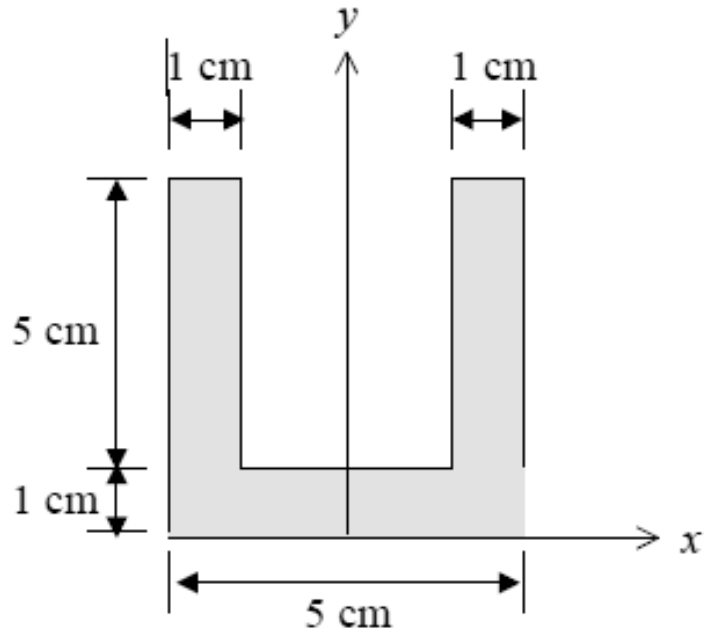
PART – A

		BL	CO
1.a)	Define the term Free body diagram.	L2	CO1
1.b)	State parallelogram law of forces.	L2	CO1
1.c)	Illustrate different types of trusses.	L2	CO2
1.d)	Distinguish between Static and dynamic friction.	L2	CO2
1.e)	State parallel axis theorem.	L2	CO3
1.f)	Define centroid.	L2	CO3
1.g)	List out some examples of linear motion.	L2	CO4
1.h)	Define curvilinear motion.	L2	CO4
1.i)	Write the units of the following quantities: i) Angular velocity ii) Angular acceleration	L2	CO5
1.j)	State D'Alembert's principle for a particle.	L2	CO5

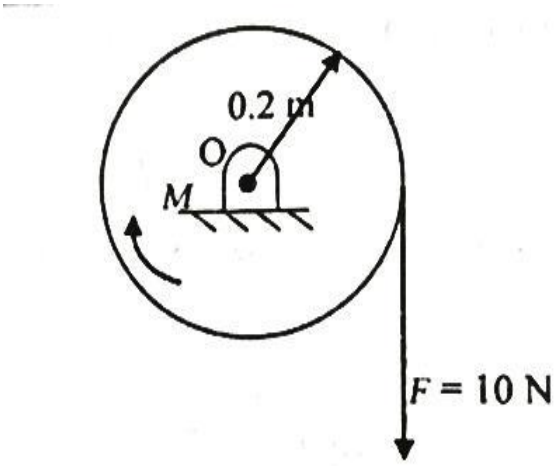
PART – B

			BL	CO	Max. Marks
UNIT-I					
2	a)	State and explicate the Lami's theorem.	L2	CO1	4 M
	b)	Compute the forces developed in the wires, supporting an electric fixture as shown in fig. 	L3	CO1	6 M
OR					
3	a)	Determine the resultant of three forces acting at point O as shown in figure. 	L3	CO1	6 M
	b)	Distinguish coplanar and non-coplanar systems of forces with sketches.	L2	CO1	4 M

UNIT-II					
4	a)	Describe and explicate about Angle of friction, Angle of repose.	L2	CO2	4 M
	b)	Determine the range of values 'θ' for which the force 'P' equal to 200N will move the 300N block resting on horizontal surface. μ = 0.8. refer Fig. 	L3	CO2	6 M
OR					
5	a)	List and brief out the laws of friction.	L2	CO2	4 M
	b)	The force required to pull a body of weight 200N on a rough horizontal plane is 100N. Determine the μ if the force is applied at an angle of 15^0 with the horizontal.	L3	CO2	6 M
UNIT-III					
6	a)	Locate the coordinates of the centroid of the plane area shown in Fig. 	L3	CO3	5 M

	b)	Determine the centroid of the area given below:  	L3	CO3	5 M
		OR			
7	Estimate the moment of inertia of the following plane figure with respect to the x and y axes.  		L3	CO3	10 M

UNIT-IV					
8	a)	A stone is thrown vertically upwards with an initial speed of 30 m/s from the ground. Evaluate i) In what time it will reach the maximum height. ii) The greatest height reached by the stone above the ground level. iii) The velocity with which the stone strikes the ground iv) Total time it is in motion.	L3	CO4	5 M
	b)	Draw the motion curves of displacement - time, velocity - time, acceleration - time. Briefly explain.	L2	CO4	5 M
OR					
9	a)	A motorist is travelling at 80kmph,when he observes a traffic light 200 m ahead of him turns red. The traffic light is limited to stay red for 10 seconds. If the motorist wishes to pass the light without stopping, just as it turns to green, determine: (i) the required uniform deceleration of the motor, and (ii) the speed of the motor as it passes the light.	L3	CO4	5 M
	b)	A motor car attains its maximum speed of 80km/hr in a span of 1.2km. It continues at the speed for a distance of 1.8km and then a uniform retardation brings it to rest in 3 min. How far does the car travel and what is the total elapsed time.	L3	CO4	5 M

UNIT-V					
10	a)	A flywheel of diameter 50 cm starts from rest with constant angular acceleration 20 rad/s^2. Determine the tangential and the normal components of acceleration of a point on its rim 3 s after the motion began.	L3	CO5	5 M
	b)	A rotor decreases uniformly from rotating speed of 1800 rpm to rest in 320 s. Determine its angular deceleration and the number of radians rotated before coming to rest.	L3	CO5	5 M
OR					
11		The 30 kg disc shown in figure, is pin supported at its center. The disc is at rest. A constant moment M of 5 N-m is applied to the disc and a constant force F of 10 N is applied at the end of a rope wrapped on the disc. Determine the number of revolutions made by the disc when its angular velocity becomes 20 rad/s. 	L3	CO5	10 M