PVP 23

Code: 23CE3201, 23ME3201

I B.Tech - II Semester – Regular / Supplementary Examinations
JUNE 2026

ENGINEERING MECHANICS
(Common for CE, ME)

Duration: 3 hours Max. Marks: 70

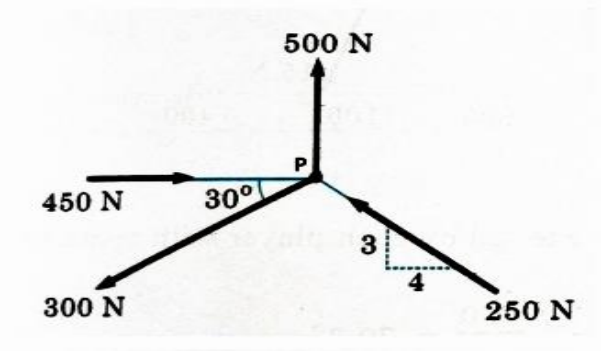
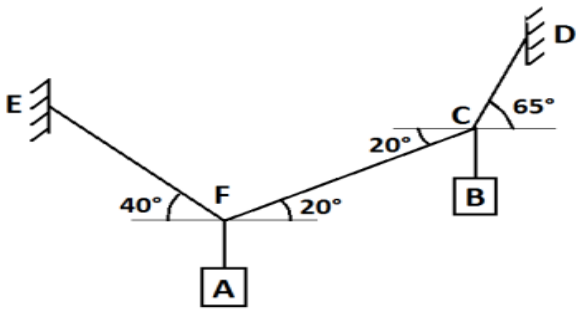
Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

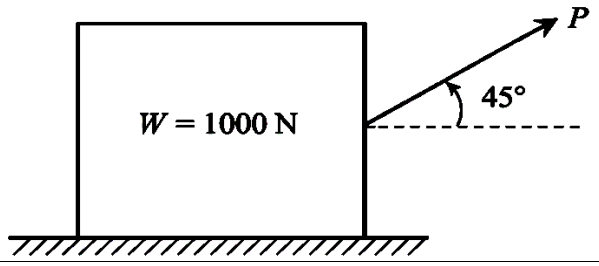
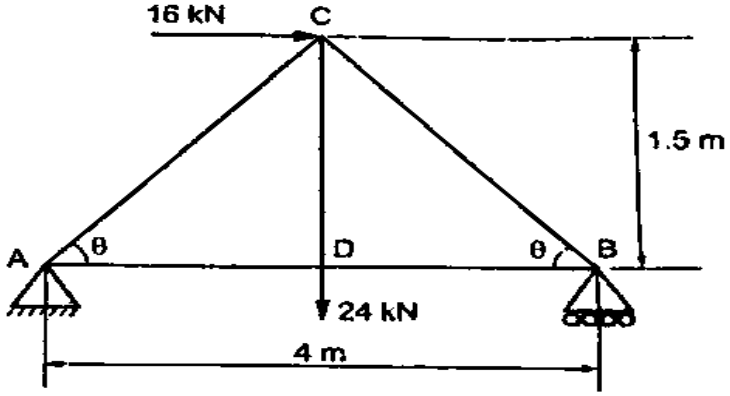
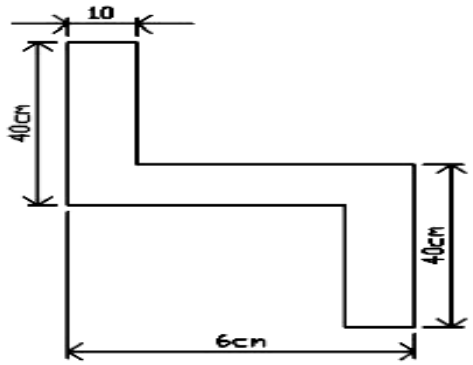
BL – Blooms Level CO – Course Outcome

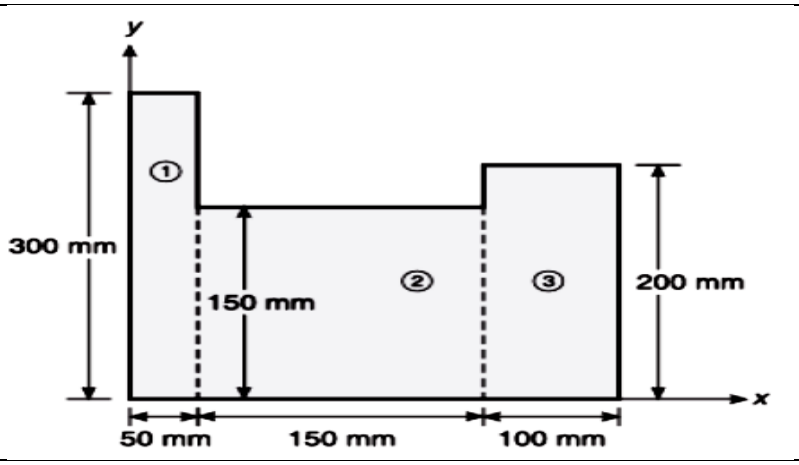
PART – A

		BL	CO
1.a)	Define Engineering Mechanics and mention its scope.	L1	CO1
1.b)	What is the moment of a force? Write its formula.	L1	CO1
1.c)	Define limiting friction and Explain its significance.	L1	CO2
1.d)	List the assumptions made in the analysis of plane trusses.	L1	CO2
1.e)	State the Perpendicular Axis Theorem and Mention where it is used.	L1	CO3
1.f)	Differentiate between area moment of inertia and polar moment of inertia.	L2	CO3
1.g)	What is the Work-Energy Principle? State its basic expression.	L1	CO4
1.h)	Why is acceleration in curvilinear motion resolved into tangential and normal components?	L2	CO4
1.i)	Explain the relationship between torque and angular acceleration in rotational dynamics.	L2	CO5
1.j)	Why is moment of inertia important in determining the rotational behavior of a rigid body?	L2	CO5

PART – B

			BL	CO	Max. Marks
		UNIT-I			
2	a)	Explain Parallelogram law of forces with a neat sketch.	L2	CO1	4 M
	b)	Find the resultant of the force acting on a particle P shown in Fig. 	L3	CO1	6 M
		OR			
3	a)	State and prove Lamis theorem.	L2	CO1	4 M
	b)	If the cords suspend the two buckets in the equilibrium position shown in Fig. Determine the weight of bucket B. Bucket A has a weight of 60 N. 	L3	CO1	6 M
		UNIT-II			
4	a)	Explain Coulomb's Laws of Dry Friction (any four points).	L2	CO2	4 M
	b)	A body weighting 1000N is lying on a horizontal plane. Determine the necessary force to move the body along the plane if the force is applied at angle of 45° to the horizontal with the coefficient of friction 0.24	L3	CO2	6 M

					
OR					
5	a)	Explain the basic steps involved in the Method of Joints.	L2	CO2	4 M
	b)	Determine the forces in the truss shown in Fig. It carries a horizontal load of 16 kN and vertical load of 24 kN 	L3	CO2	6 M
UNIT-III					
6	a)	Derive the expression for centroid of a rectangle with a neat sketch.	L2	CO3	4 M
	b)	Design Moment of Inertia about the co-ordinate axes of plane area shown in fig. Also find Polar Moment of Inertia. 	L3	CO3	6 M
OR					
7	a)	Derive an expression for Centroid of circle with a neat sketch.	L3	CO3	4 M
	b)	Determine Centroid for following figure.	L3	CO3	6 M

					
UNIT-IV					
8	a)	Explain the Work-Energy principle and write its governing equation.	L2	CO4	4 M
	b)	Explain curvilinear motion and write expressions for velocity and acceleration in rectangular components.	L3	CO4	6 M
OR					
9	a)	Illustrate the types of motion of particle with neat sketches.	L2	CO4	4 M
	b)	A motion of a particle along a stright line is given by a equation $a=t^2-2t+2$ where a=acceleration in m/s^2, t=time in sec, After 1 sec the distance travelled by the particle and the velocity of the particle where found to be 14.75m and 6.3m/sec. Find the distance travelled, velocity and acceleration of the particle after 2 seconds.	L3	CO4	6 M
UNIT-V					
10	a)	A rigid body rotates under constant torque about a fixed axis. Derive governing equations and explain the nature of motion with graphs.	L2	CO5	4 M
	b)	The armature of an electric motor has angular speed N=1800rpm at the instant when the power is cut off (i) If it comes to rest in 6sec, calculate the angular deceleration (ii) Assuming it is constant. How many complete revolutions does the armature make during this period?	L3	CO5	6 M

		OR			
11	a)	Explain kinetics of rotational motion and compare it with kinetics of rectilinear motion using equations of motion.	L2	CO5	4 M
	b)	A flywheel starts from rest and attains 120 rad/s in 20s under uniform angular acceleration. It then rotates at constant speed for 10s and finally comes to rest in 30s under uniform retardation. Find: (i) angular acceleration in each stage (ii) total angular displacement.	L2	CO5	6 M