

**PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(AUTONOMOUS)**

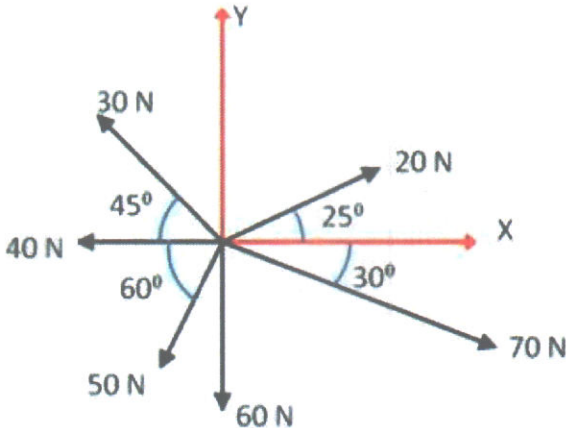
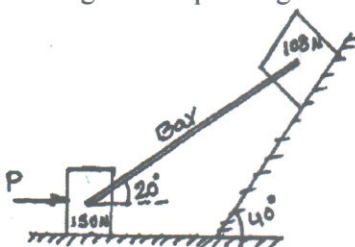
I B.Tech I Semester Supplementary Examinations, July – 2024

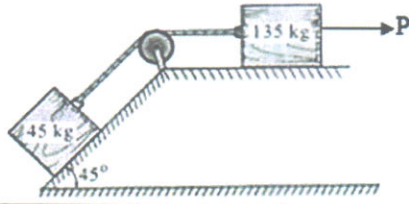
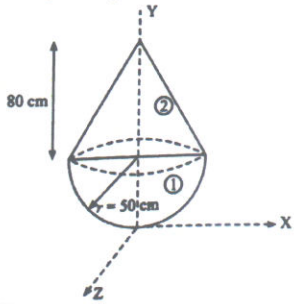
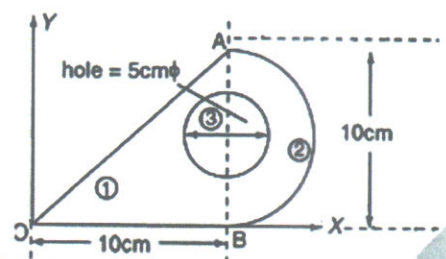
**ENGINEERING MECHANICS
(CE)**

Time: 3 hours

Max. Marks: 70

**Answer ONE Question from each Unit
All Questions Carry Equal Marks**

Q. No.	Questions	BTL	CO	Marks
UNIT – I				
1.	a) Define equilibrium of a body and give conditions of equilibrium when subjected to forces.	K1	CO1	7M
	b) Find the resultant of the system of forces shown below.	K3	CO1	7M
				
OR				
2.	a) Explain various force systems with neat sketches.	K2	CO1	7M
	b) A 108 N block is held on a 40° incline by a bar attached to a 150 N block on a horizontal plane shown in Figure. The bar which is fastened by smooth pins at each end is inclined 20° to the horizontal. The coefficient of friction between each block and its plane is 0.325. For what horizontal force P, applied to 150 N block will move to the right be impending?	K3	CO1	7M
				
UNIT – II				
3.	a) State coulomb's laws of dry friction. With neat sketch diagram.	K3	CO2	7M
	b) Explain the types of friction with examples? Also explain the significance of cone of friction.	K2	CO2	7M
OR				
4.	a) Define the free body diagram of a rigid body in equilibrium and explain its importance.	K1	CO2	7M

	b)	Determine the necessary force P acting parallel to the plane to cause motion to impend as shown in the Figure. Assume coefficient of friction as 0.25 and the pulley to be smooth.			
			K3	CO2	7M
UNIT – III					
5.	a)	State and prove Perpendicular Axis Theorem	K3	CO3	7M
	b)	Determine the centre of gravity of the following figure.			
			K3	CO3	7M
OR					
6.	a)	Determine the mass moment of inertia of a solid sphere of radius R about its diametral axis.	K3	CO3	7M
	b)	Find the moment of inertia of the area in the given figure about the axis 'AB'			
			K3	CO3	7M
UNIT – IV					
7.	a)	Drive the relation between Angular Motion & Linear Motion with diagram.	K3	CO4	7M
	b)	Explain the mechanism of instantaneous axis of rotation with diagram.	K2	CO4	7M
OR					
8.		The rotation of a fly wheel is governed by the equation $\omega = 3t^2 - 2t + 2$ Where ω is in radian per second and t is in seconds. After one second from the start the angular displacement was 4 radians. Determine the angular displacement, angular velocity and angular acceleration of the fly wheel when t = 3 seconds.	K3	CO4	14M
UNIT – V					
9.		Explain the work energy equation for translation with diagram.	K2	CO5	14M
OR					
10.	a)	State the principle of impulse-momentum for a rigid body.	K3	CO5	6M
	b)	Determine the work done by an electric motor in winding up a uniform cable which hangs from a hoisting drum if its free length is 20m and weighs 800N. The drum is rotated by the motor.	K3	CO5	8M