O.P.Code: 23CE0102	R23	h.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech I Year II Semester Supplementary Examinations Decemebr-2025

ENGINEERING MECHANICS

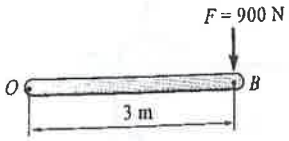
(Common to CE & ME)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	Resolve the force F = 900 N acting at B into a couple and a force at O as shown in the Figure.	CO1	L2	2M



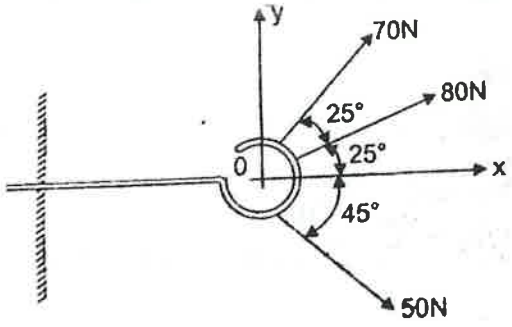
	b	Discuss briefly the application of moment of force.	CO1	L2	2M
	c	Briefly explain Free Body Diagram.	CO2	L2	2M
	d	Explain the term virtual work? List its applications.	CO2	L2	2M
	e	State and explain parallel axis theorem	CO3	L2	2M
	f	List when the product of inertia will be zero for an area.	CO3	L2	2M
	g	Explain the terms Rectilinear and Curvilinear motion.	CO4	L2	2M
	h	What is Impulse? Write Impulse Momentum equation.	CO4	L2	2M
	i	A pulley 2 m in diameter is keyed to a shaft which makes 240 rpm. Find the linear velocity of a particle on the periphery of the pulley.	CO5	L2	2M
	j	Explain plane motion with an example.	CO5	L2	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

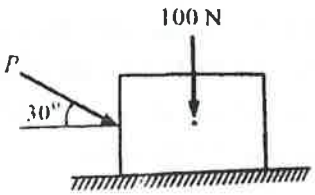
2		Determine the resultant and its inclination with the horizontal axis of three forces acting on a hook as shown in Figure.	CO1	L3	10M



2.

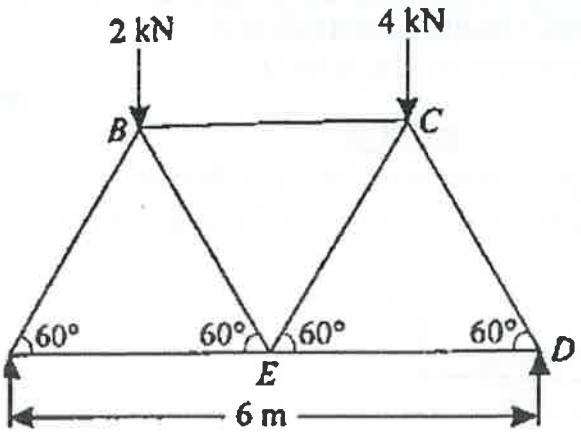
OR

3		Determine the frictional force developed on the block shown in Figure.6 when (i) P = 40 N (ii) P = 80 N . Coefficient of static friction between the block and floor is μs = 0.3 and μk = 0.25 and (iii) Also find the value of P when the block is about to move.	CO1	L3	10M



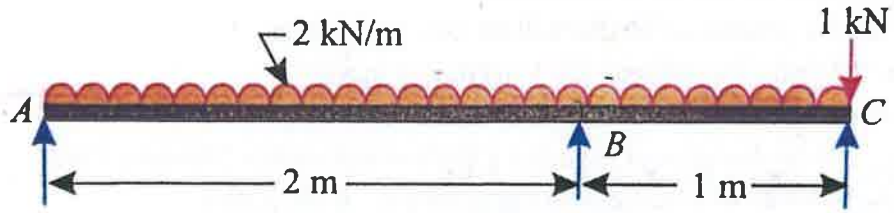
UNIT-II

4	Using the method of joints, find the axial forces in all the members of a truss with the loading shown in Figure	CO2	L3	10M



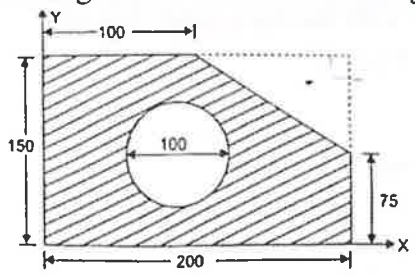
OR

5	An overhanging beam ABC of span 3 m is loaded as shown in Figure. Using the principle of virtual work, find the reactions at A and B.	CO2	L3	10M



UNIT-III

6	Determine the coordinates xc and yc of the centre of a 100 mm diameter circular hole cut in a thin plate so that this point will be the centroid of the remaining shaded area shown in Figure. All dimensions are in mm.	CO3	L3	10M



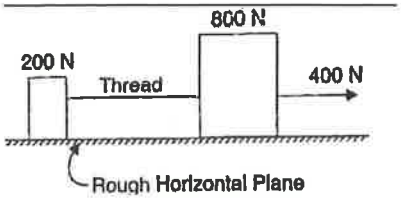
OR

7	Determine the moment of inertia of a solid sphere of radius R about its diametral axis.	CO3	L3	10M

UNIT-IV

8	Three marks 'A', 'B', and 'C' at a distance of 100 m each are made along a straight road. A car starting from rest and with uniform acceleration passes the mark 'A' and takes 10 seconds to reach 'B' and further 8 seconds to reach the mark 'C'. Calculate (i) the magnitude of acceleration of the car (ii) the velocity of the car at 'A', (iii) the velocity of car at B and (iv) the distance of the mark 'A' from the starting point.	CO4	L3	10M

OR

9	Two weights 800 N and 200 N are connected by a thread and move along a rough horizontal plane under the action of force 400 N applied to the first weight of 800 N as shown in Figure. The coefficient of friction between the sliding surfaces of the weights and the plane is 0.3. Determine the acceleration of the weights and the tension in the thread using D' Alembert's principle. 	CO4	L3	10M

UNIT-V

10	Derive the following equations of motion of a body moving a circular path with uniform angular acceleration: (i) $\omega = \omega o + \alpha t$ (ii) $\theta = \omega o\, t + \frac{1}{2} \alpha t2$ (iii) $\omega 2 - \omega o2 = 2\alpha\theta$.	CO5	L3	10M

OR

11	Derive the relationship between the linear motion of geometric centre and angular motion of a wheel rolling without slipping.	CO5	L3	10M

*** END ***