

Code: 23CE3201, 23ME3201

**I B.Tech - II Semester – Supplementary Examinations
DECEMBER 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.

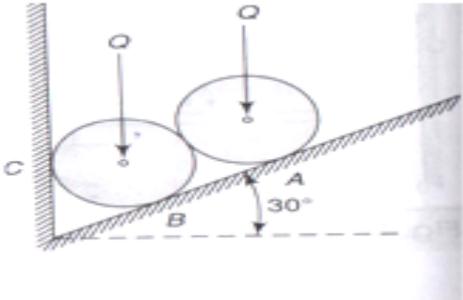
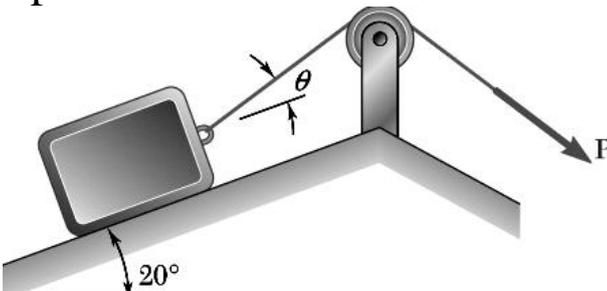
4. All parts of Question paper must be answered in one place.

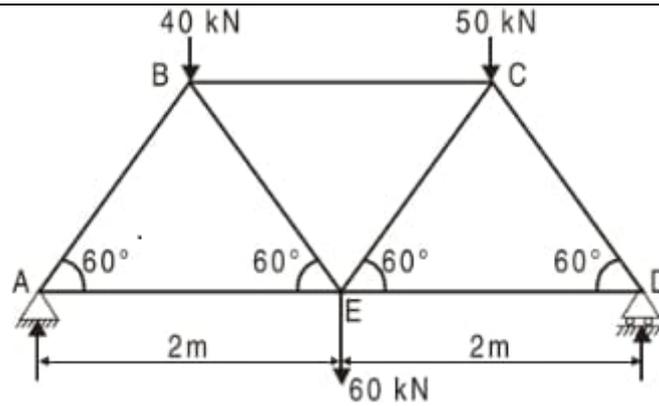
PART – A

1.a)	State Lami's theorem.
1.b)	Define the term (i) Resultant of a force (ii) Resolution of a force.
1.c)	Elucidate about limiting friction and coefficient friction.
1.d)	List out the assumptions made in the analysis of truss.
1.e)	State perpendicular axis theorem.
1.f)	Define centre of gravity.
1.g)	What do you mean by curvilinear motion.
1.h)	Define rectilinear motion.
1.i)	Differentiate between linear and angular motion.
1.j)	Define the term rotation.

PART – B

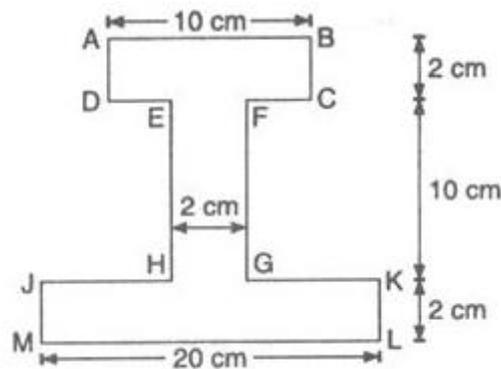
			Max. Marks
UNIT-I			
2	a)	Determine the resultant of the three forces acting on a hook as shown in fig. <div style="text-align: center; margin-top: 10px;"> </div>	6 M

	b)	State and prove Varignon's theorem.	4 M
OR			
3	a)	Elucidate the term 'force' and list its characteristics with examples.	4 M
	b)	Two identical rollers, each of weight $Q = 600\text{ N}$, are supported by an inclined plane and a vertical wall as shown in Fig. Assuming smooth surfaces, Compute the reactions induced at the points of support A, B and C. 	6 M
UNIT-II			
4	a)	Explain 'frictional force' and 'cone of friction'.	4 M
	b)	Calculate the magnitude and direction of the friction force when $P = 80\text{ N}$ and $\theta = 20^\circ$ and $\mu = 0.3$, if the weight of the block is 200 N shown in figure is impending upwards. 	6 M
OR			
5		Determine the forces in all the members of the truss system shown in fig. and indicate the magnitude and nature of forces on the diagram of the truss. All inclined members are at 60° to horizontal and length of each member is 2 m .	10 M



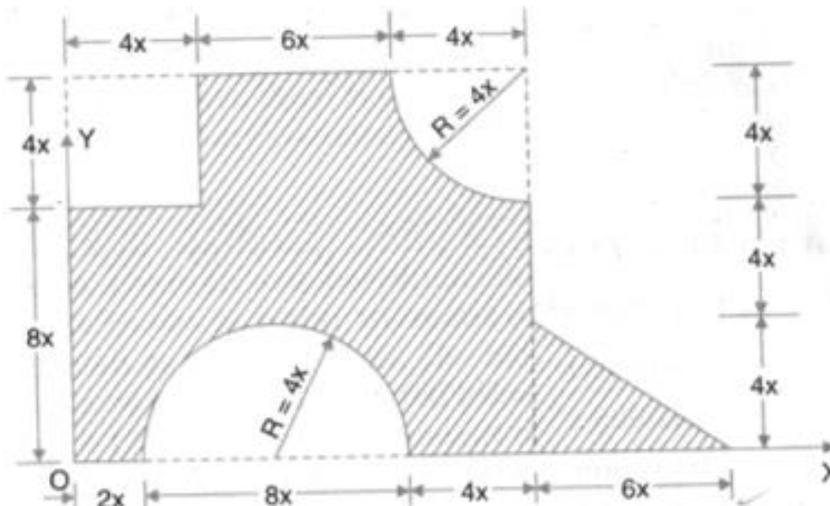
UNIT-III

- 6 Determine the coordinates of the centroid of the plane area shown in fig. with respect to its base. Also compute the Area moment of inertia about its base. 10 M



OR

- 7 Determine the coordinates of the centroid of the plane area shown in fig. with reference to the axes shown. Take $x=40\text{mm}$. Also compute the area moment of inertia of the shaded area about x axis. 10 M



UNIT-IV			
8	a)	If a stone falls past a window of 2.45 m height in a half second, find the height from which the stone fell.	5 M
	b)	A pilot flying his bomber at a height of 2000m with, uniform horizontal velocity of 600 kmph wants to strike a target. At what distance from the target, should he release the bomb?	5 M
OR			
9	a)	Illustrate the types of motion of a particle with the help of neat sketch.	4 M
	b)	A car starts from rest and with constant acceleration achieves a velocity of 15 m/s when it travels a distance of 200 m. Determine the acceleration of the car and the time required.	6 M
UNIT-V			
10	a)	At a given instant, a shaft is rotating at 50 rpm about a fixed axis and 20 s later, it is rotating at 1050 rpm. Determine the average angular acceleration in rad/s^2 .	5 M
	b)	A flywheel of 550 mm diameter is brought uniformly from rest up to a speed of 350 rpm in 20 s. Find the velocity and the acceleration of point on its rim 3 s after starting from rest.	5 M
OR			
11		A cord is wrapped around a homogenous disc of radius 500 mm and mass 15kg. If the cord is pulled upward with a force T of magnitude 200 N, determine (i) the acceleration of the center of the disc, (ii) the angular acceleration of the disc and (iii) the acceleration of the cord.	10 M