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KAMALA INSTITUTE OF TECHNOLOGY & SCIENCE, SINGAPUR
23CE28ES205

I B. Tech. II Semester Regular/Supplementary Examinations, JULY-2025

ENGINEERING MECHANICS

(ME)

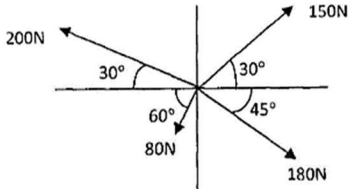
Time: 3 Hours

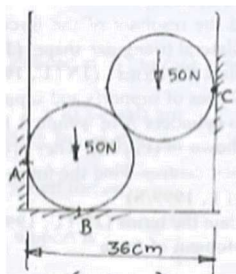
Max. Marks: 60

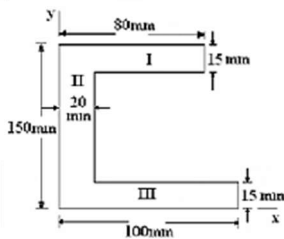
Note: Question paper consists of Part-A & Part-B.

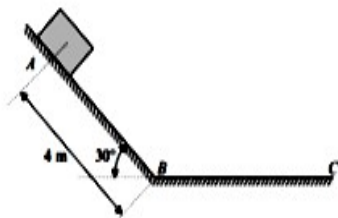
i) **Part-A** for 10M, ii) **Part-B** for 50marks

- Part A** is compulsory, consists of 10 sub questions from all units carrying equal marks.
- Part-B** consists of **10 questions** (numbered from 2 to 11) carrying **10marks** each. From each unit there are 2 questions and the students should answer one of them. Hence the student should answer **5 questions** from **Part-B**.

PART-A		(10Marks)	
Q. No	Questions	Marks	BTL
1.a)	Define Couple.	1	1
1.b)	What is a Free Body Diagram?	1	2
1.c)	Define static friction.	1	1
1.d)	Why is centroid an important parameter?	1	2
1.e)	Define centre of gravity.	1	1
1.f)	What is the significance of moment of inertia ?	1	2
1.g)	What do you mean by spatial force?	1	1
1.h)	What is the difference between distance and displacement?	1	2
1.i)	Define kinetics and distinguish it from kinematics.	1	1
1.j)	When will you use work-energy principle?	1	2
PART-B		(50Marks)	
Q.No	Questions	Marks	BTL
2. a)	Explain the following: a) Resultant of force b) Conditions of equilibrium for spatial systems.	5M	2
b)	Determine the resultant of concurrent forces shown in the figure below. 	5M	4
OR			
3. a)	Two spheres, each of weight 50 N and radius 10 cm rests in a horizontal channel of width 36 cm as shown in Fig. Find the reactions on the points of contact A, B, C.	5M	4



b)	What do you mean by coplanar concurrent force system? Explain with suitable example.	5M	2
4. a)	What are the laws of friction? Explain them briefly.	5M	2
b)	A screw jack has square threads 50mm means diameter and 10mm pitch the load on the jack revolves with the screw. The coefficient of friction at the screw thread is 0.05. Find the tangential force required at the end of 300 mm lever to lift a load of 6000N.	5M	3
OR			
5. a)	State and explain theorems of Pappus.	5M	2
b)	Find the centroid of the plane lamina shown in figure. 	5M	3
6. a)	Derive the formulae for MI of Rectangle about its base?	5M	2
b)	State and Explain Parallel axis theorem?	5M	2
OR			
7. a)	Define and explain radius of gyration for mass moment of inertia.	3M	2
b)	Calculate the mass moment of inertia of a solid sphere of mass 'm' and radius 'r' about any of its axis.	7M	3
8. a)	Explain the kinematic equations of rectilinear motion and derive expressions for displacement, velocity, and acceleration.	5M	2
b)	A particle moves along a straight line with acceleration given by: $a(t) = 6t - 2$ If the initial velocity at $t = 0$ is 4 m/s and initial position is 2 m, determine: a) The velocity at $t = 3$ s. b) The position at $t = 3$ s.	5M	4
OR			
9. a)	State and prove the work-kinetic energy theorem. Illustrate its application in solving dynamic problems.	5M	2
b)	A block of 5 kg mass slides down an inclined plane from rest. How far along the horizontal plane, will it reach before coming to rest? The coefficient of kinetic friction between the block and the inclined plane is 0.15 and that between the block and the horizontal plane is 0.2. (By using work-energy principle)	5M	4



UNIT V

10.a)	State and explain D'Alembert's principle in plane motion and connected bodies.	3M	2
b)	Two bodies A and B of mass 80 kg and 20 kg are connected by a thread and move along a rough horizontal plane under the action of a force 400 N applied to the first body of mass 80 kg as shown in Fig. 	7M	4
OR			
11.a)	Describe the types of rigid body motion with suitable examples.	3M	2
b)	Two bodies A and B are connected by a thread and move along a rough horizontal plane ($\mu = 0.3$) under the action of force of 400 N applied to the body B. Determine the acceleration of the two bodies and tension in the thread using D'Alembert's principle	7M	4

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