



**ACE**  
Engineering College  
(with a Difference in Excellence)

An AUTONOMOUS Institution

Question Paper Code:

ME301ES

ACE-R20

**Semester Supplementary Examination**  
**II B. Tech- I Semester- SEPTEMBER-2022**  
**ENGINEERING MECHANICS**  
(Electrical & Electronics Engineering)

Time: 3 Hours

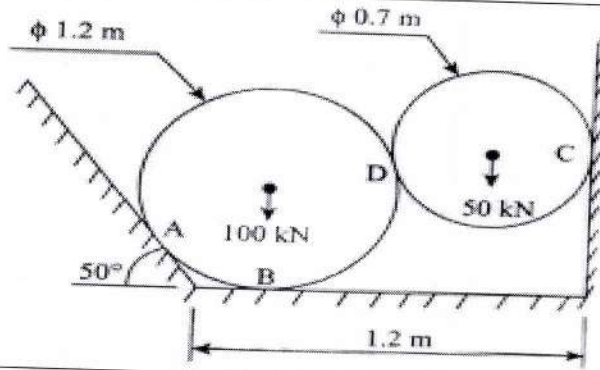
Max. Marks: 70

H. T. No

Answer any 5 Questions out of 8 Questions from the following

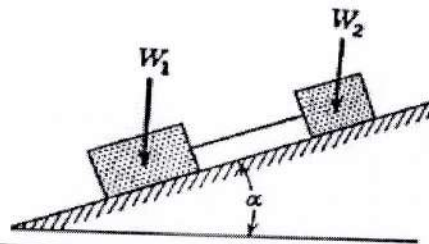
M=Marks;

Q.No	Question	M
1. a)	<p>A system of four forces acting on a body is as shown in Figure. Determine the resultant.</p> <p>(a)</p>	7
b)	<p>Three cables are joined at the junction ring C. Determine the tensions in cables AC and BC caused by the weight of the 30-kg cylinder.</p>	7
2. a)	<p>State the equations of equilibrium to determine the resultant of a system with neat sketch.</p>	4
b)	<p>Two cylinders are kept in a channel as shown in figure. Determine the reactions at all the contact points A, B, C and D. Assume the contact Surfaces are smooth.</p>	10



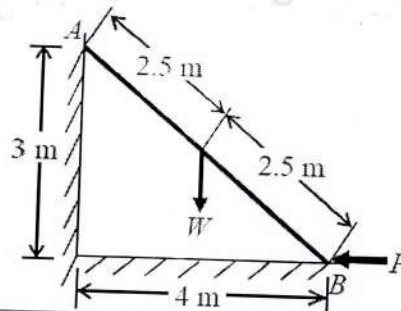
3. a) Analyze the angle of inclination of the plane for which sliding will impend of two blocks of weight  $W_1$  and  $W_2$  rests on rough inclined plane and connect by string as shown in figure. If the coefficient of friction are  $\mu_1 = 0.2$  and  $\mu_2 = 0.3$  respectively.

7



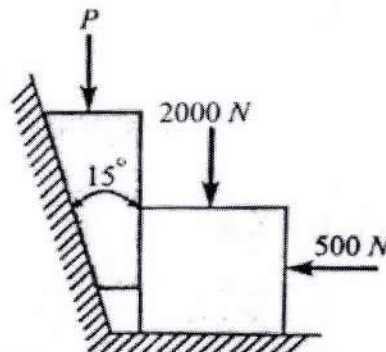
b) A ladder  $AB$  of length 5 m and weight ( $W$ ) 600 N is resting against a wall. Assuming frictionless contact at the floor ( $B$ ) and the wall ( $A$ ), Find out the magnitude of the force  $P$  (in Newton) required to maintain equilibrium of the ladder.

7



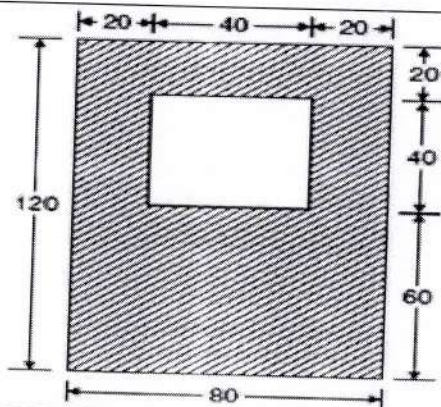
4. Determine the force  $P$  required to start the wedge up the wall shown in figure. The angle of friction of all contact surfaces is 15 degrees assuming coefficient of friction for all surfaces is 0.2.

14



5. a) For the shaded area as shown in figure, determine the Moment of Inertia of an area of plane figure about their centroidal axes. All units are in centimeters.

8



5.b)	Find the mass moment of inertia of a solid cylinder of radius $r$ , height $h$ and mass $m$ about centroidal $x$ and $y$ axes.	6
6. a)	Derive the equations of a body following rectilinear motion.	7
b)	Determine the force exerted by the floor of the lift on a passenger of 75kg mass, when the lift is (i) accelerating upwards at $1 \text{ m/s}^2$ and (ii) accelerating downwards at $0.9 \text{ m/s}^2$ .	7
7. a)	A gun coils a bullet 15g and shot a wooden block of mass 2.5kg horizontally. The bullet gets embedded in the block and displaces it through a distance 1.5m on a rough horizontal surface with Co-efficient of friction 0.3. What will be the velocity of the bullet?	7
b)	A block of 2 kg mass rests on a rough horizontal surface, whose coefficient of kinetic friction is 0.2. It is acted by a horizontal force of 10 N for 5 sec and then it is removed. Determine how far it would travel before coming to rest, assuming the frictional resistance to be uniform. Also, determine the total distance travelled from rest.	7
8. a)	Explain work energy principle in detail.	6
b)	Two weights A and B are connected by the arrangement as shown in the Fig. Neglecting friction and inertia of the pulleys and the cord, find the acceleration of the weight B.	8

