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PACE INSTITUTE OF TECHNOLOGY & SCIENCES::ONGOLE
(AUTONOMOUS)

II B.TECH I SEMESTER END SUPPLEMENTARY EXAMINATIONS, MARCH/APRIL - 2023
ENGINEERING MECHANICS
(Common to ME,AME Branches)

Time: 3 hours

Max. Marks: 60

Note: Question Paper consists of Two parts (Part-A and Part-B)

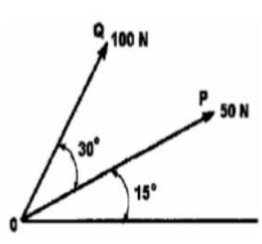
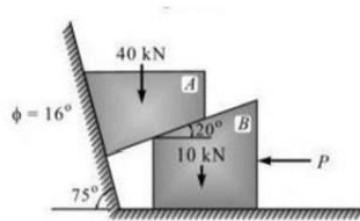
PART-A

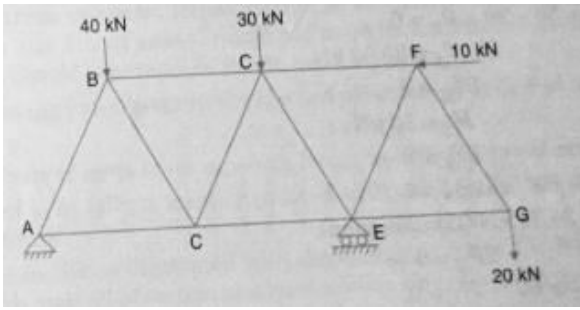
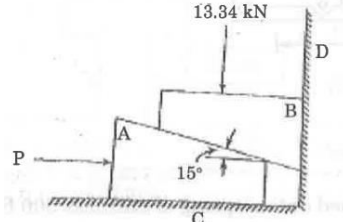
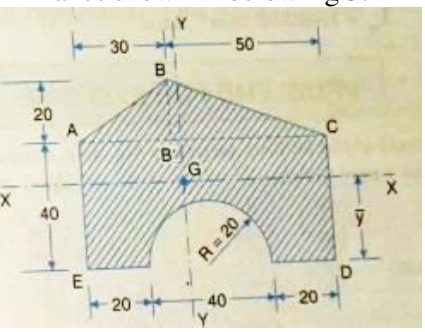
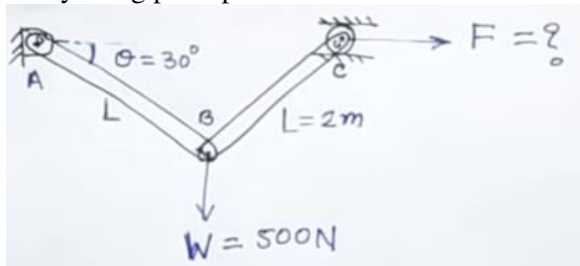
Answer all the questions in Part-A (5X2=10M)

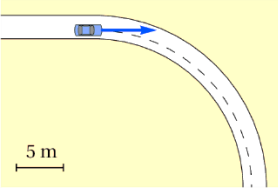
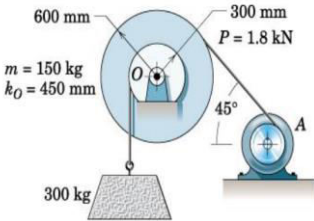
Q.No.	Questions	Marks	CO	KL
1	a) Explain coplanar and non-coplanar force systems used in mechanics.	[2M]	1	
	b) Discuss application of friction to a single body & connecting system	[2M]	2	
	c) Explain Polar Moment of Inertia.	[2M]	3	
	d) State the law of conservation of momentum.	[2M]	4	
	e) Discuss kinematics of general plane motion.	[2M]	5	

PART-B

Answer One Question from each UNIT (5X10=50M)

Q.No.	Questions	Marks	CO	KL
UNIT-I				
2.	a) Explain the different types of forces acting on a body.	[5M]	1	
	b) Two forces are acting at a point 'O' as shown in fig. below. Determine the magnitude and direction of resultant. And also find out the angle made by resultant with horizontal?	[5M]	1	
 <p style="text-align: center;">Fig. 1</p>				
OR				
3.	a) Find out force P applied on block B so as to just start the upward motion of A shown in Fig. 2	[5M]	1	
 <p style="text-align: center;">Fig. 2</p>				
	b) The resultant of two forces when they act at an angle of 60° is 14N. If the same forces are acting at right angles, their resultant is $\sqrt{136}$ N. Determine the magnitude of two forces.	[5M]	1	
UNIT-II				

4.		Analyse the truss given below in fig 3. All the members are 3 meter long.	[10M]	2	
 <p style="text-align: center;">fig 3</p>					
OR					
5.	a)	Define friction. Explain various types of friction.	[5M]	2	
	b)	Determine the smallest force P required to lift the 13.34 kN load shown in below fig 4. The coefficient of static friction between A and C and B and D is 0.3 and that between A and B is 0.4	[5M]	2	
 <p style="text-align: center;">fig 4</p>					
UNIT-III					
6.		Find the coordinates of the centroid of the shaded area with respect to the axes shown in below fig 5.	[10M]	3	
 <p style="text-align: center;">fig 5</p>					
OR					
7.		Find the 'F' by using principle of virtual work show in below fig. 6	[10M]	3	
 <p style="text-align: center;">fig. 6</p>					
UNIT-IV					

8.		A 20 kg block starting from rest slides up a 30° inclined plane under the action of a 175 N force directed along the inclined plane. The coefficient of kinetic friction between the block and the plane is 0.2. Determine the (i) speed of the block after it slides 4.5 m and the distance travelled by the block when its speed becomes 4.5 m/s.	[10M]	4	
		Explain the principle of virtual work.			
OR					
9.	a)	What are the parameters that define rectilinear motion? State the relationship between these parameters.	[5M]	4	
	b)	Discuss Absolute dependent motion analysis of two particles.	[5M]	4	
UNIT-V					
10.	a)	Discuss the relation between kinetics of linear motion and kinetics of motion of rotation.	[5M]	5	
	b)	A car driver enters a curve at 72 km/h, and slows down, making the speed decrease at a constant rate of 4.5 km/h each second. Make an estimate for the value of the radius of the curve using the scale shown in the fig 7. Find the acceleration of the car 4 seconds after the driver started to slow down	[5M]	5	
		 <p>fig 7.</p>			
OR					
11.		A concrete block shown in below fig 8 is lifted by hoisting mechanism in which the cables are securely wrapped around the respective drums. The drums are fastened together and rotate as a single unit at their mass center at O. Combined mass of drum is 150 kg, and radius of gyration at O is 450 mm. A constant tension of 1.8 kN is maintained in the cable by the power unit at A. Determine the vertical acceleration of the block and the resultant force on the bearing at O.	[10M]	5	
		 <p>fig 8.</p>			
