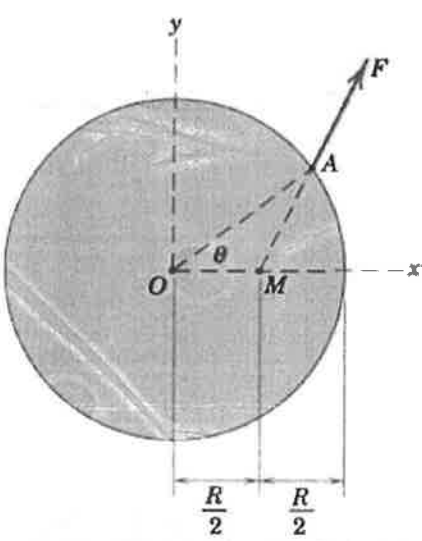
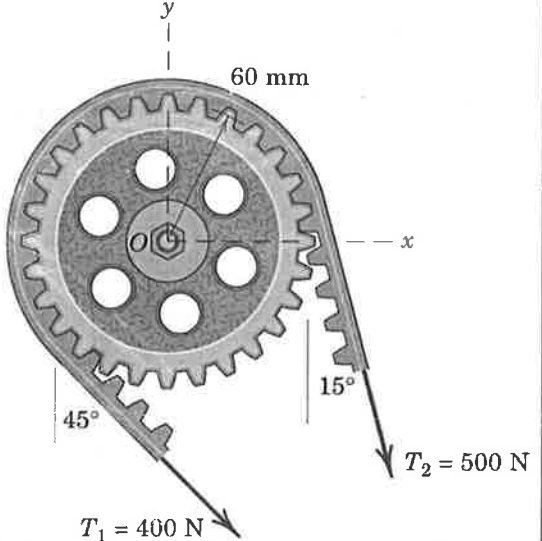


**MAY 2022 : END SEMESTER ASSESSMENT B Tech I/II SEMESTER**

**UE19CV101 – ENGINEERING MECHANICS STATICS**

Time: 3 Hours	Answer All Questions	Max Marks: 100
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1	a)	Define Force and State its Characteristics.	04
	b)	The force $F$ acts along line $MA$ , where $M$ is the midpoint of the radius along the $x$ -axis as shown in figure 1.b Determine the equivalent force-couple system at $O$ if $\theta = 40^\circ$ .	08
	c)	As part of a design test, the camshaft-drive sprocket is fixed, and then the two forces shown are applied to a length of belt wrapped around the sprocket as shown in figure 1.c. Find the resultant of this system of two forces and determine where its line of action intersects both the $x$ and $y$ -axes.	08
		<div style="display: flex; justify-content: space-around; align-items: center;">   </div> <div style="display: flex; justify-content: space-around; align-items: center;"> <p><b>Figure 1. b</b></p> <p><b>Figure 1. c</b></p> </div>	
2	a)	What do you understand by the terms 'Roller Support', 'Hinge Support', and 'Fixed Support'?	05
	b)	To test the deflection of the uniform 100-kg beam the 50-kg boy exerts a pull of 150 N on the rope rigged as shown in figure 2.b. Compute the force supported by the pin at the hinge O.	07
	c)	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 as shown in figure 2.c	08

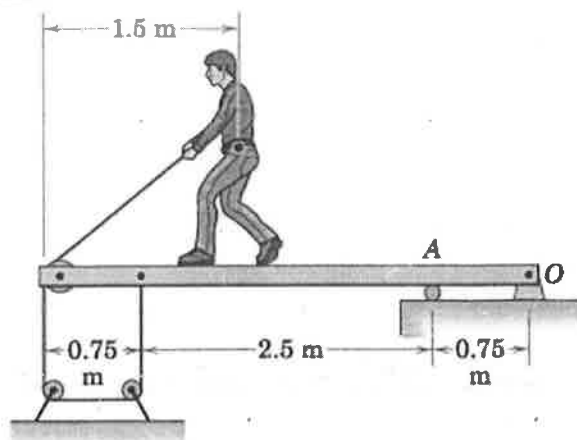


Figure 2. b

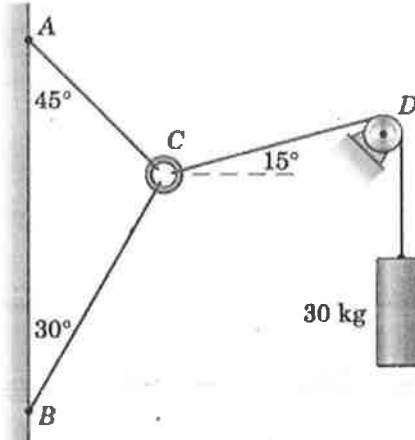


Figure 2. c

3 a) What are the different types of beams? Explain with sketches. 05

b) Determine the force and moment reactions at A for the cantilever beam subjected to the loading as shown in figure 3.b 07

c) Each member of the truss is a uniform 8-m bar with a mass of 400 kg. Calculate the average tension or compression in each member due to the weights of the members as shown in figure 3.c 08

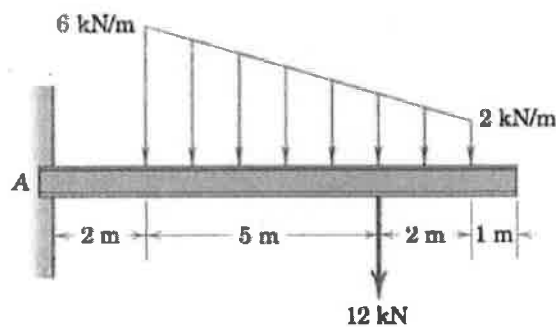


Figure 3. b

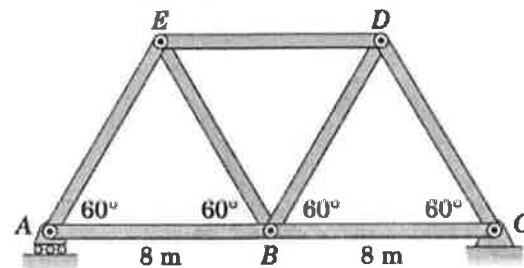


Figure 3. c

4 a) Determine the moment of inertia of a circle about its centroidal x, y and polar z axis 05

b) Determine the x and y-coordinates of the centroid of the shaded area. 07

c) Calculate the moment of inertia of the shaded area about the x-axis as shown in figure 4.c 08

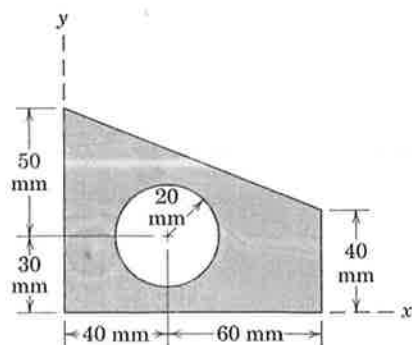


Figure 4. b

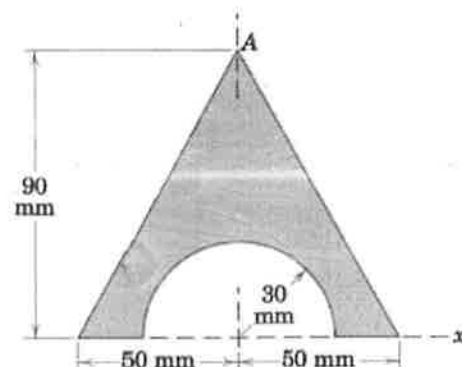
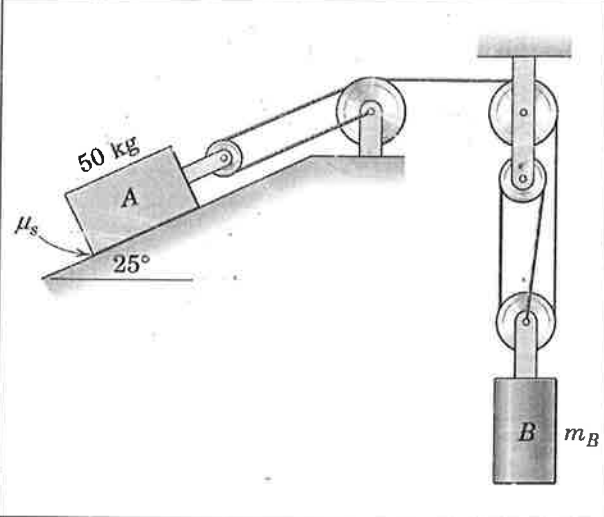
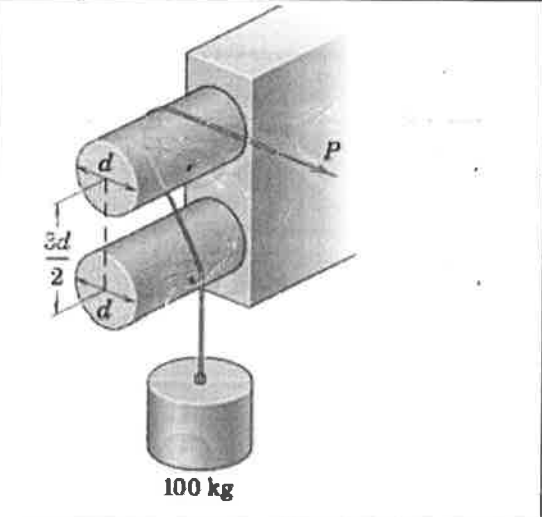


Figure 4. c

5	a)	With the help of sketches explain the theory of dry friction.	05
	b)	If the coefficient of static friction between block A and the incline is $\mu_s = 0.30$ , determine the range of cylinder masses $m_B$ for which the system will remain in equilibrium. Neglect all pulley friction.	07
	c)	Calculate the horizontal force P required to raise the 100-kg load. The coefficient of friction between the rope and the fixed bars is 0.40 as shown in figure 5.c	08
			
			
		<p style="text-align: center;"><i>Figure 5. b</i></p> <p style="text-align: center;"><i>Figure 5. c</i></p>	

