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UE16 / 17 / 18CV101

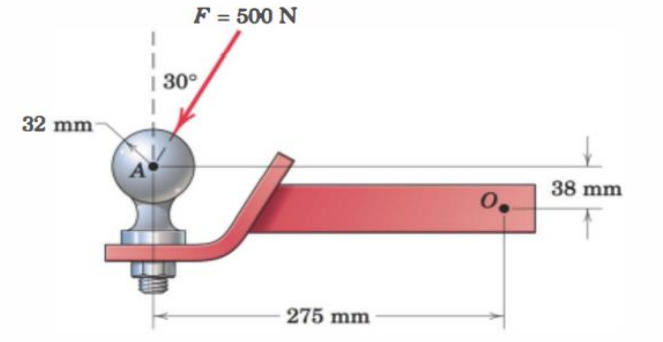
PES University, Bengaluru

(Established under Karnataka Act No. 16 of 2013)

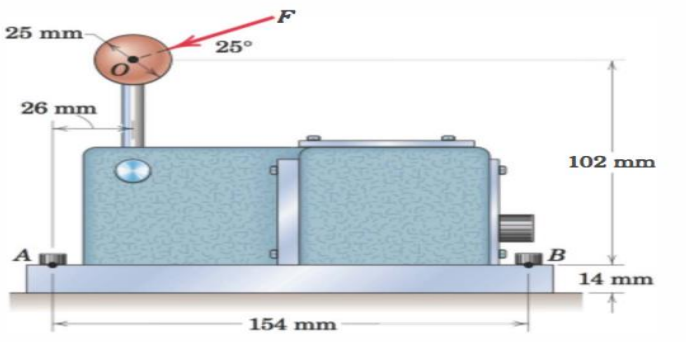
MAY 2022: END SEMESTER ASSESSMENT (ESA) B.TECH

UE16 / 17 / 18CV101 – ENGINEERING MECHANICS

Time: 3 Hrs		Answer All Questions	Max Marks: 100
1	a)	Define Resultant and illustrate with a neat sketch the determination of Resultant of a three force nonconcurrent system.	5
	b)	Determine the x-y and n-t components of the 65-kN force F acting on the simply-supported beam shown in Figure 1(b).	5
	c)	As a trailer is towed in the forward direction, the force F = 500 N is applied as shown in Figure 1(c) to the ball of the trailer hitch. Determine the moment of this force about point 'O'.	5
	d)	The 20-N force F is applied to the handle of the directional control valve as shown in Figure 1(d). Compute the equivalent force-couple system at point B.	5
2	a)	Write on System Isolation and Free Body Diagram.	6
	b)	What mass m_b will cause the system to be in equilibrium? Neglect all friction, and state any other assumptions. Refer to Fig. 2(b)	7
	c)	If the maximum tensile force in any of the truss members must be limited to 24 kN, and the maximum compressive force must be limited to 35 kN, determine the largest permissible mass 'm' which may be supported by the truss. Refer to Fig. 2(c)	7
3	a)	Determining the Center of Gravity by using the Principle of Moments.	6
	b)	Determine the height above the base of the centroid of the cross-sectional area of the beam. Neglect the fillets. Refer to Fig. 3(b)	7
	c)	Determine the moment of inertia of the shaded area about the x-axis. Refer to Fig. 3(c)	7
4	a)	What do you mean by a Beam, explain different types of beams with sketches?	6
	b)	Determine the reactions at A and B for the loaded beam. Refer to Fig. 4(b)	7
	c)	Determine the force in each member of the loaded truss. Refer to Fig. 4(c)	7
5	a)	Define the following: Dry Friction, Fluid Friction, Internal Friction, Cone of Static Friction, and Cone of Kinetic Friction.	5
	b)	The 1600-kg car is just beginning to negotiate the 16° ramp. If the car has rear-wheel drive, determine the minimum coefficient of static friction required at B. Refer to Fig. 5(b)	8
	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. Refer to Fig. 5(c)	7



1(c)



1(d)

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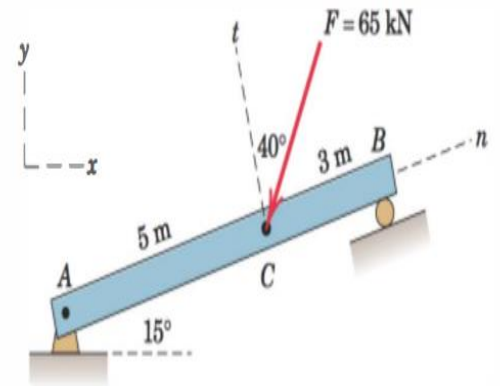
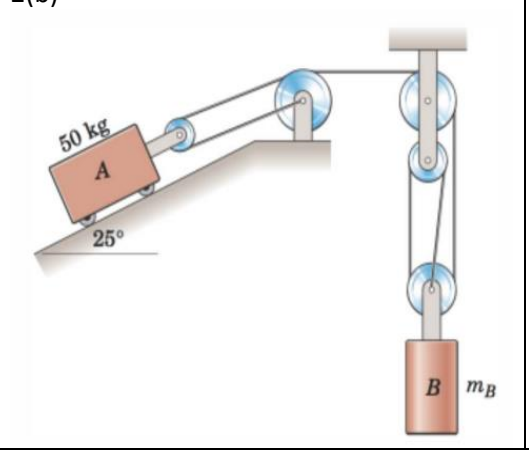
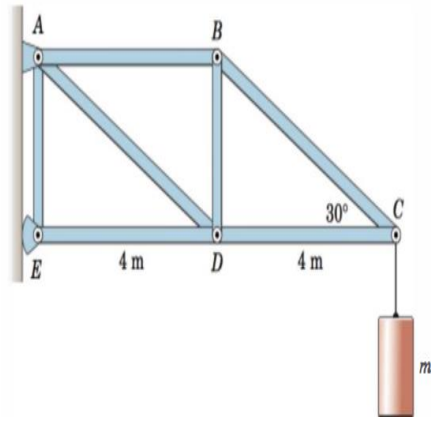


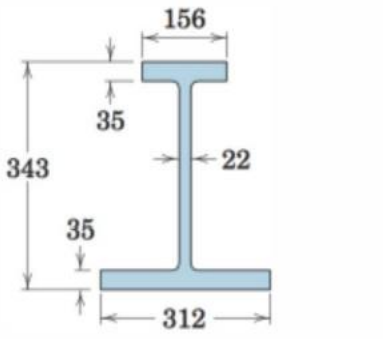
1(b)

2(b)



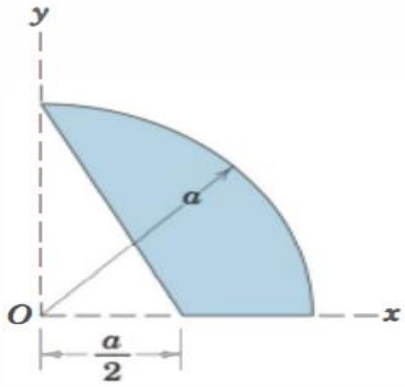


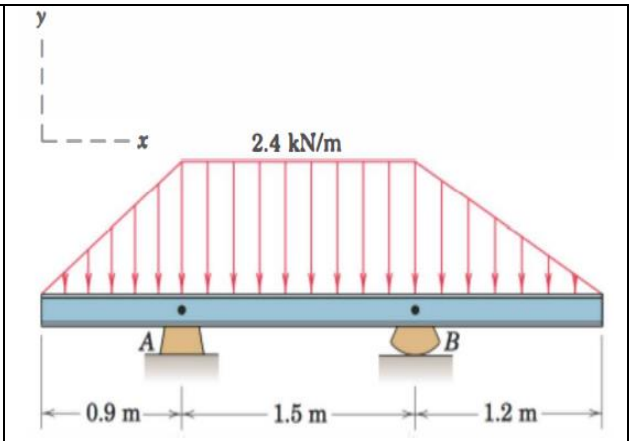
2(c)



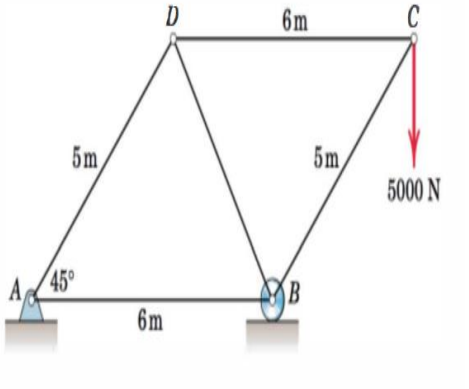
3(b)

3(c)

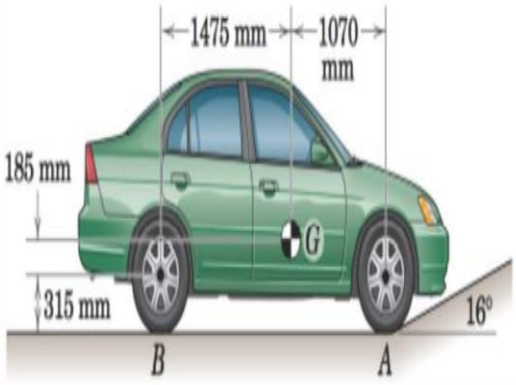




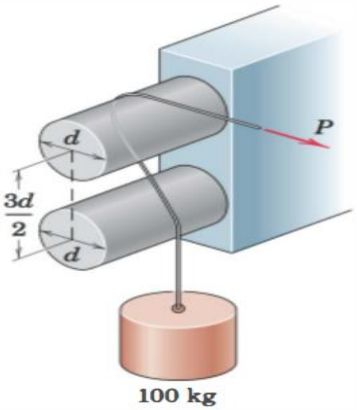
4(b)



4(c)



5(b)



5(c)