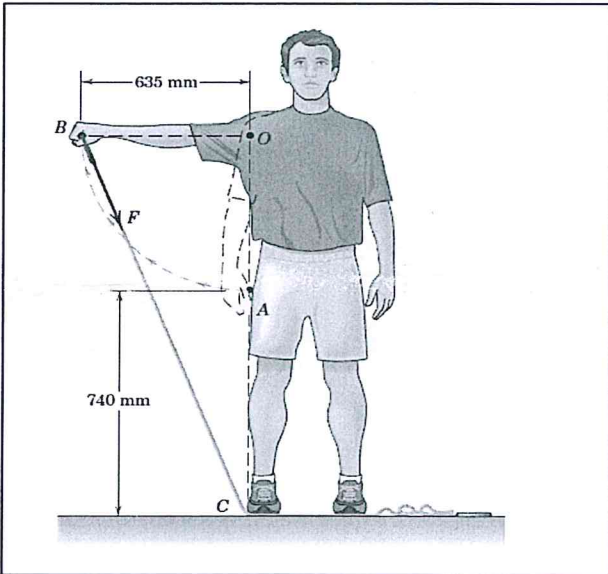
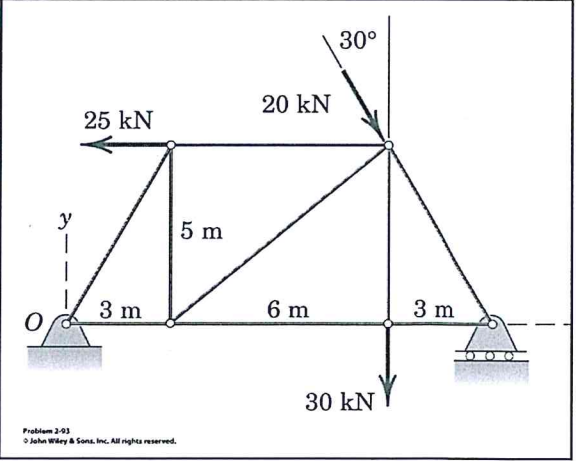


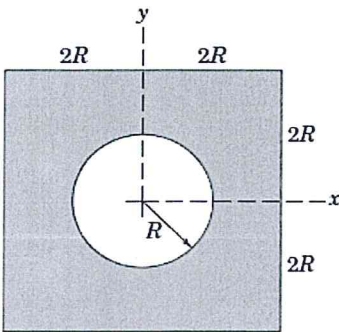
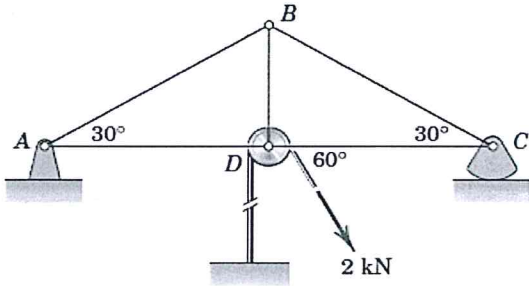
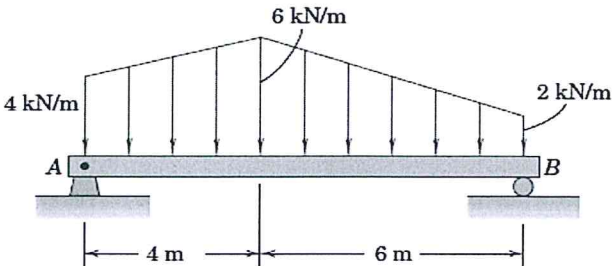
May 2019: End Semester Assessment – B.Tech - II SEMESTER

UE18CV101- Engineering Mechanics

**Note: i) Please refer figure which is adjacent to corresponding numerical
ii) There are 4 pages including this page**

Time: 3 Hrs		Answer All Questions	Max Marks: 100
1)	a)	With neat diagrams, explain: i) non-rectangular components of a force ii) Projection of a force.	4
	b)	<p>An exerciser begins with his arm in the relaxed vertical position OA, at which the elastic band is unstretched. He then rotates his arm to the horizontal position OB. The elastic modulus of the band is 60 N/m that is, 60 N of force is required to stretch the band each additional meter of elongation. Determine the moment about O of the force which the band exerts on the hand B.</p> 	8
	c)	<p>Determine the resultant R of the three forces acting on the simple truss. Specify the points on the x- and y-axes through which R must pass.</p> 	8

2)	<div data-bbox="252 271 1559 315"> <p>a) With relevant equations, explain equilibrium condition. 4</p> </div> <div data-bbox="252 315 1559 936"> <p>b) 8</p> <div data-bbox="325 367 831 904" style="border: 1px solid black; padding: 10px; margin-bottom: 10px;"> <p>While digging a small hole prior to planting a tree, a homeowner encounters rocks. If he exerts a horizontal 225-N force on the prybar as shown, what is the horizontal force exerted on rock C? Note that a small ledge on rock C supports a vertical force reaction there. Neglect friction at B. Complete solutions (a) including and (b) excluding the weight of the uniform 18-kg prybar.</p> </div> <div data-bbox="874 367 1458 927"> </div> </div> <div data-bbox="252 936 1559 1435"> <p>c) 8</p> <div data-bbox="325 965 831 1375" style="border: 1px solid black; padding: 10px; margin-bottom: 10px;"> <p>The uniform bar OC of length L pivots freely about a horizontal axis through O. If the spring of modulus k is unstretched when C is coincident with A, determine the tension T required to hold the bar in the 45° position shown. The diameter of the small pulley at D is negligible.</p> </div> <div data-bbox="858 965 1358 1397"> </div> </div>
3	<div data-bbox="252 1487 1559 1532"> <p>a) Distinguish between Centre of Mass and Centre of Gravity 4</p> </div> <div data-bbox="252 1532 1559 1993"> <p>b) 8</p> <div data-bbox="309 1554 815 1733" style="border: 1px solid black; padding: 10px; margin-bottom: 10px;"> <p>Determine the distance 'H' from the bottom of the base plate to the centroid of the built-up structural section shown.</p> </div> <div data-bbox="826 1554 1453 1980"> <p style="text-align: center;">Dimensions in millimeters</p> </div> </div>

c)	<p>Determine the percent reduction in the polar moment of inertia of the square plate due to the introduction of the circular hole.</p>		8
a)	<p>With explanation derive an equation for which a truss will be statically determinate internally</p>		4
b)	<p>Determine of the force in each member of the loaded truss</p>		8
c)	<p>Calculate the support reactions at A and B for the beam subjected to the two linearly varying load distributions.</p>		8

5	<p>a) Explain the terms:</p> <p>a. Coefficient of static friction</p> <p>b. Coefficient of kinetic friction</p>	4
	<p>b)</p> <p>The three identical rollers are stacked on a horizontal surface as shown in the adjacent fig. If the coefficient of static μ friction is the same for all pairs of contacting surfaces, find the minimum value of μ for which the rollers will not slip. Assume there is no contact between two bottom rollers.</p>	8
	<p>c)</p> <p>A garden hose with a mass of 1.2 kg/m is in full contact with the ground from B to C. What is the horizontal component of the force which the gardener must exert in order to pull the hose around the small cylindrical guard at B? The coefficient of friction between the hose and the ground is 0.50, and that between the hose and the cylinder is 0.40. Assume that the hose does not touch the ground between A and B.</p>	8

