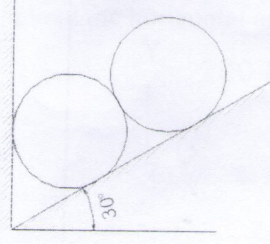
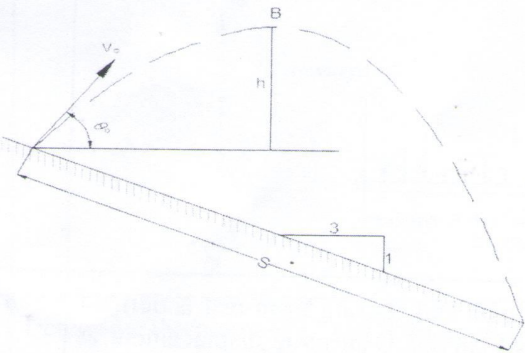
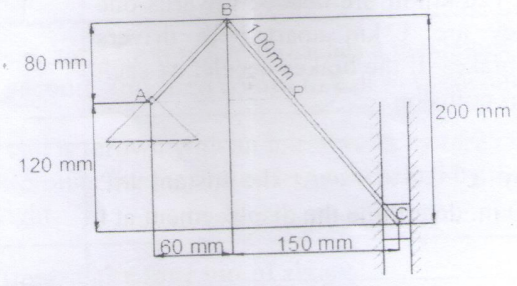
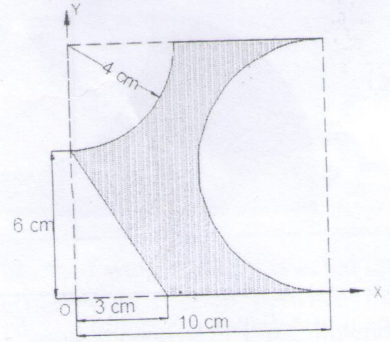
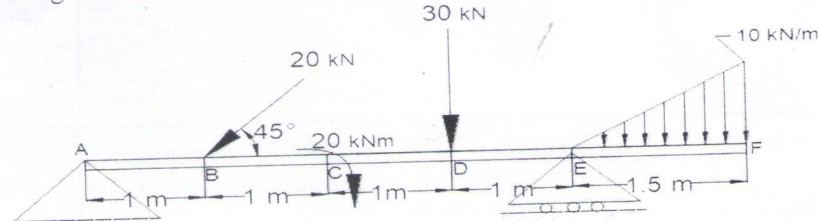
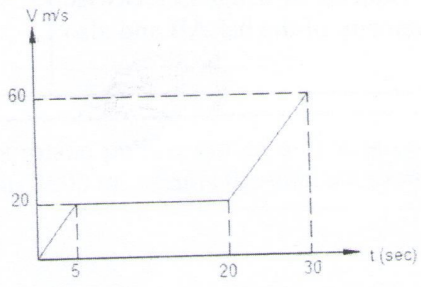




vi)	Explain instantaneous centre of rotation.	2	5	R
vii)	A car starts from rest and reaches a maximum speed of $V_m$ m/s at certain time $t_1$ second and then comes to halt in $t_2$ second. Draw v-t and x-t graphs.	2	1	An
viii)	A ball is thrown with an initial velocity of 25 m/s at $45^\circ$ with horizontal level. Determine the maximum height reached by the ball and time taken to reach highest height.	2	4	An
Q.2 <b>Attempt any four out of six:-</b>		16		
i)	Determine centroid of the shaded portion with respect to O.	4	2	U
ii)	A block of weight 800 N is acted upon by a horizontal force P as shown in figure. If the coefficient of friction between the block and incline are $\mu_s = 0.35$ and $\mu_k = 0.25$ , determine the value of P for impending motion up the plane.	4	3	A
iii)	A smooth sphere weighing 500 N is resting in a trough as shown in figure. Determine the reactions at points of contact.	4	1	A
iv)	An airplane pulling out of a dive at constant speed of 1200 km/hr describe an arc of radius 2000 m. what is the total acceleration.	4	4	A

v)	Two trains one travelling at 90 km/hr and other at 120 km/hr are headed towards one another along a straight level track. When they are 3 km apart both drivers simultaneously see the other's train and apply their brakes. If the brakes decelerate each train at the rate of $1 \text{ m/s}^2$ , determine whether there is collision.	4	4	U
vi)	The rectilinear motion of a particle is defined by $a = 10v^{1/2}$ . At the instant $t=2$ seconds velocity is 100 m/s and displacement is 100 m. determine the displacement at $t = 4$ seconds.	4	5	An
Q.3	<b><u>Attempt any two out of three:-</u></b>	16		
i)	Two identical rollers each of weight 500 N are supported by an inclined plane making an angle of $30^\circ$ to the horizontal and vertical wall as shown in figure. Find the reactions at the support points.  	8	1	A
ii)	In the given figure a ball is thrown down the incline and strikes it at a distance $S = 200$ m. If the ball rises to a maximum height $h = 19.6$ m, above the point of release compute its initial velocity and inclination $\theta$ .  	8	3	A
iii)	Bar BC in the mechanism shown in figure has angular velocity of 5 rad/s clockwise when it is in the position shown. Determine the angular velocity of the bar AB and also the linear velocity of the point P on the bar BC.	8	5	An

				
Q.4	<b>Attempt any two out of three:-</b>	16		
i)	Determine centroid of the shaded area. 	8	2	U
ii)	A beam ABCDEF hinged at A and supported on rollers at E and carries load as shown in figure. Determine reactions at support. 	8	1	A
iii)	The motion of a particle moving along a straight path and starting from rest is defined by v-t curve shown in figure. Draw the a-t and s-t curves. Determine displacement at t=30 s. 	8	4	An

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