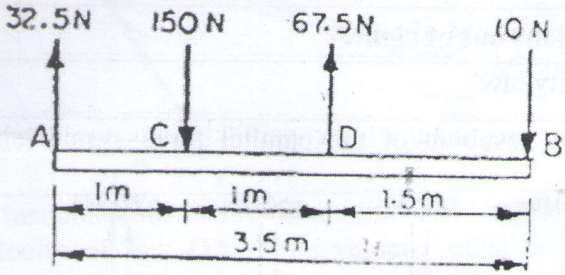
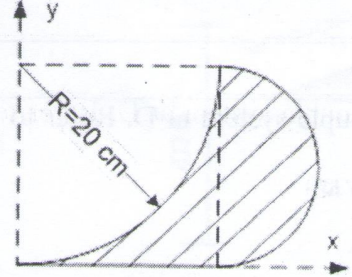
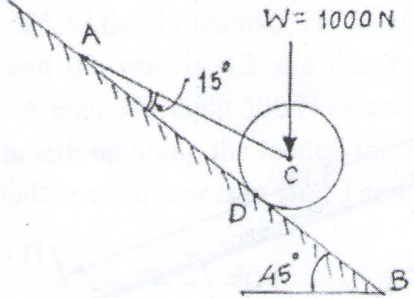
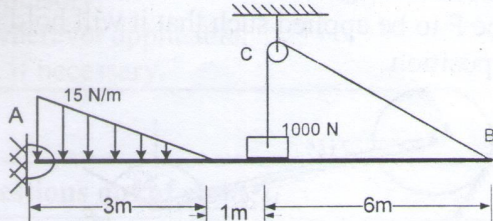
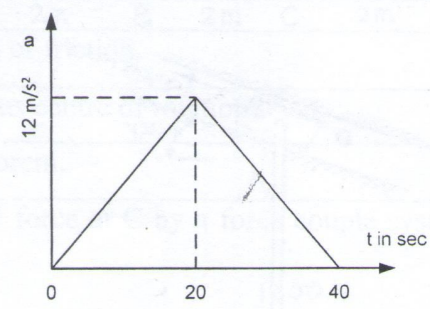
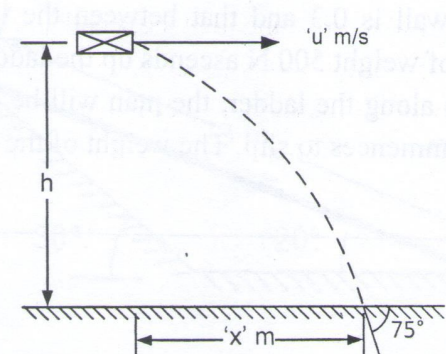


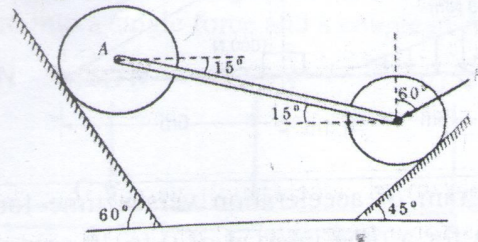
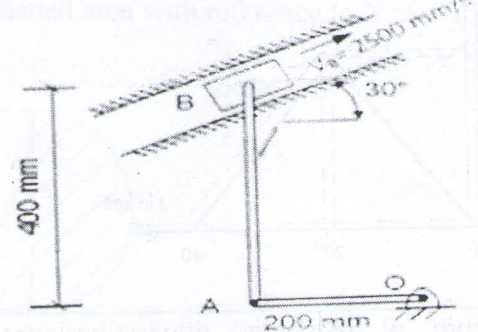
Program: FY B.Tech. All Branches Examination: FY Semester: I Course Code: BSC104 and Course Name: Engineering Mechanic Duration: 2.5 Hours Max. Marks: 60	
Instructions: (1) All questions are compulsory. (2) Draw neat diagrams wherever applicable. (3) Assume suitable data, if necessary.	
	Max. Marks CO BT level
Q1. Solve any six questions out of eight:	12
(i) State 'Transmissibility law'.	2 1 U
(ii) Find analytically the resultant of the parallel force system shown in figure.	2 1 U
(iii) State any three laws of friction.	2 3 U
(iv) What is Instantaneous centre of rotation?	2 5 U
(v) State Varignon's theorem.	2 1 U
(vi) Replace the 1200 N force at C by a force couple system at D. Refer to figure.	2 1 U
(vii) Locate only ICR for the given mechanism. The velocity of end A is 5m/s	2 5 U
(viii) What is Polygon law?	2 1 U

Scheme 4

Supplementary Exam Feb/Mar 2024

Q.2	Solve any four questions out of six.	16		
(i)	Three forces of magnitude 30 kN, 10kN and 15kN are acting at a point O. The angles made by 30 kN force, 10 kN force and 15 kN force with positive x-axis are 60° , 120° and 240° respectively. Calculate the magnitude and direction of the resultant force.	4	1	A
(ii)	Systems of parallel forces are acting on a rigid bar as shown in fig. Convert this system into a single force and a couple at A. 	4	1	A
(iii)	An automobile accelerates uniformly from rest to 72 kmph and then brakes are applied so that it decelerates uniformly to a stop. If the total time is 15 sec., what is the distance traveled.	4	4	A
(iv)	Find Centroid of shaded area with reference to X and Y axes. 	4	2	A
(v)	A roller of weight $W = 1000 \text{ N}$ rests on a smooth inclined plane. It is kept from rolling down the plane by string AC. Find the tension in the string and reaction at the point of contact D. 	4	1	A
(vi)	The motion of a particle is defined by the position co-ordinate $x = t^4 - 3t^3 + t$ where x is in m and t is in seconds. Determine position, velocity and acceleration at $t = 3 \text{ sec}$.	4	4	A

Q.3	Solve any two questions out of three.	16		
(i)	<p>A uniform beam AB hinged at A is kept horizontal by supporting & setting a 1000 N weight by using a string tied at B & passing over a smooth pulley at C. The beam also loaded as shown in figure below. Find the reactions at A & C.</p> 	8	1	A
(ii)	<p>Figure shows a diagram of acceleration versus time for a particle moving along x axis for a time interval of 0 to 40 seconds. For the same time interval plot (i) the velocity time diagram, (ii) the distance time diagram and hence find the max. speed attained and max. distance covered by the particle during the interval.</p> 	8	4	A
(iii)	<p>A box released from a helicopter moving horizontally with a constant velocity 'u' from a certain height 'h' from the ground takes 5 seconds to reach the ground hitting at an angle of 75° as shown in figure. Determine; (i) the horizontal distance 'x' (ii) the height 'h' and (iii) the velocity 'u'.</p> 	8	4	A

Q.4	Solve any two questions out of three.	16		
(i)	<p>Two cylinders, A of weight 4000 N and B of weight 2000 N rest on smooth inclines as shown in figure. They are connected by a bar of negligible weight hinged to each cylinder at its geometric center by smooth pins.</p> <p>i. Find force in connecting bar ii. Find the force P to be applied such that it will hold the system in the given position.</p> 	8	1	A
(ii)	<p>Locate the instantaneous centre of rotation of link AB. Find also the angular velocity of link OA. Take velocity of slider at B = 2500 mm/s. The link and slider mechanism is as shown in figure.</p> 	8	5	A
(iii)	<p>A uniform ladder of length 4 m rests against a rough vertical wall with its lower end on a rough horizontal floor, the ladder being inclined at 50° to the horizontal. The coefficient of friction between the ladder and the wall is 0.3 and that between the ladder and the floor is 0.5. A man of weight 500 N ascends up the ladder. Locate the maximum length up along the ladder, the man will be able to ascend before the ladder commences to slip. The weight of the ladder is 1000 N.</p>	8	3	A