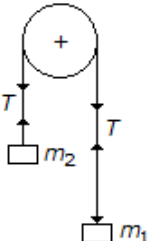
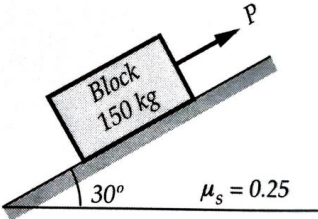
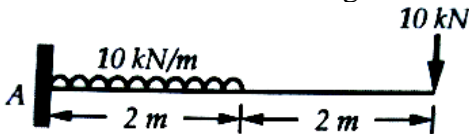
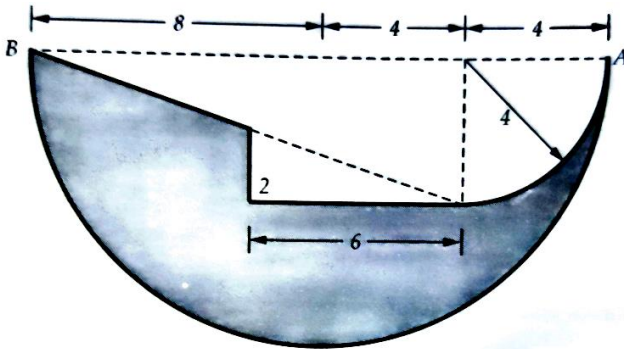
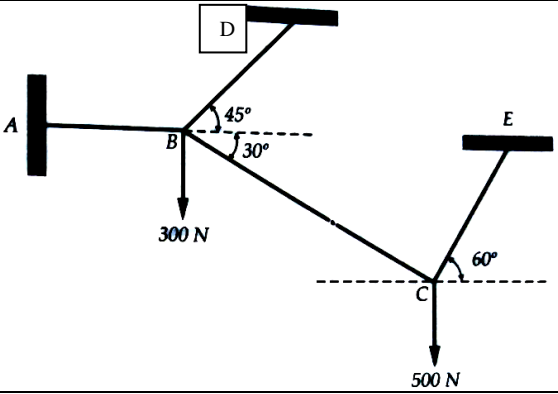
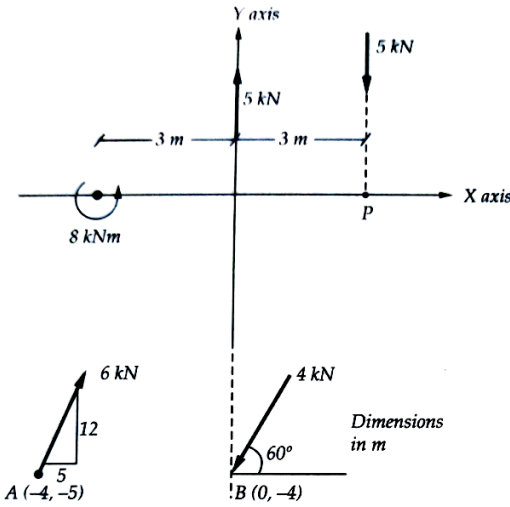
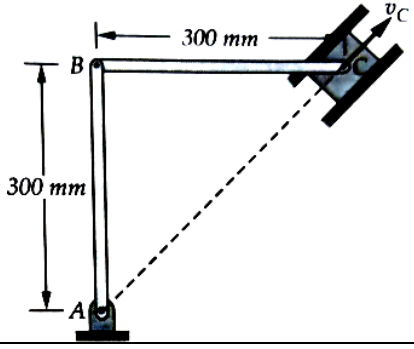
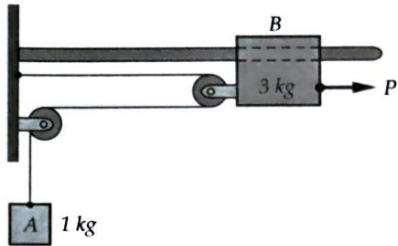


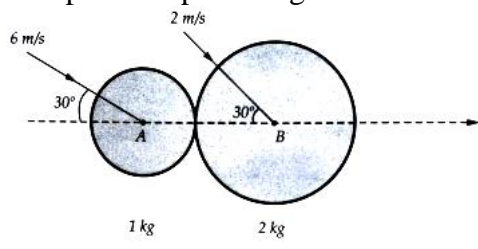
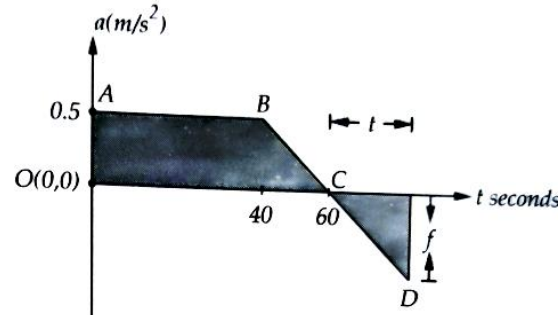
Semester: September 2021 – Feb 2022 Examination: ESE Examination		
Programme code: 01 Programme: B.TECH	Class: FY	Semester: I (SVU 2020)
Name of the Constituent College: K. J. Somaiya College of Engineering	Name of the Department ETRX/EXTC/MECH	
Course Code: 116U06C104	Name of the Course: Engineering Mechanics	
Duration : 1 Hour 45 Minutes	Maximum Marks : 50	
Instructions: 1)Draw neat diagrams 2) Assume suitable data if necessary		

Q. No		Marks
Q.1A	Multiple choice questions (1 mark each)	10
	1. What is the position of a particle A, if it moves along a path $y = 2x^3 / 3$ with uniform velocity of 15 m/s? (Assume $v_x = v_y$) a. (0.33, 0.5) b. (0.235, 0.707) c. (0.577, 20.33) d. (0.707, 0.235)	1
	2. A car moves along a circular arc at a speed of 30 m/s, if speed of the car is increased at the rate of 50 m/s^2 , what is the resultant acceleration of the car? (Radius of arc = 15 m) a. 78.10 m/s^2 b. 58.10 m/s^2 c. 60.23 m/s^2 d. 33.16 m/s^2	1
	3. Two cars X and Y move on adjacent roads in opposite directions. If velocity of car X and Y is 80 km/hr and 60 km/hr respectively, then what will be the relative velocity of car X w.r.t. Y? a. 70 km/hr b. 100 km/hr c. 140 km/hr d. 120 km/hr	1
	4. During elastic impact, the relative velocity of the two bodies after impact is _____ the relative velocity of the two bodies before impact. a. equal to b. equal and opposite to c. less than d. greater than	1
	5. If the masses of both the bodies, as shown in the below figure, are reduced to 50 percent, then tension in the string will be	1

	 <p>a. same b. half c. double d. none of above</p>	
	<p>6. If two concurrent forces A and B acting on a point are 200 N and 300 N. What is the magnitude of resultant force, if it makes an angle of 50° with each force?</p> <p>a. 471.08 N b. 455.12 N c. 400.56 N d. 300 N</p>	1
	<p>7. Which of the following laminas do not have centroid at its geometrical centre?</p> <p>a. Circle b. Equilateral triangle c. Right angled triangle d. None of the above</p>	1
	<p>8. A block is displaced by 3 m when a force of 200 N is applied on it on an inclined surface which is at an angle of 50° with the horizontal. What is the work done?</p> <p>a. 385.67 Nm b. 459.62 Nm c. 933.00 Nm d. 600 Nm</p>	1
	<p>9. The radial component of velocity for a particle moving in circular path is _____</p> <p>a. constant b. radius itself c. variable d. zero</p>	1
	<p>10. What is the maximum distance traveled by a block moving upwards on an inclined plane of 30° with velocity of 20 m/s, if coefficient of friction is 0.23 between the block and inclined plane?</p> <p>a. 29.19 m b. 22.56 m c. 17.32 m d. 17.00 m</p>	1
Q.1B	Attempt any FIVE questions out of the following (Any 5)	10
	<p>1. A block of mass 150kg is resting on plane inclined at 30° with horizontal as shown in figure. Determine minimum value of P required to maintain equilibrium. Take $\mu_s = 0.25$.</p>	2

		
	2. State and explain varignon's theorem with suitable example.	2
	3. A force $F=9i + 6j - 15k$ acts through the origin. What is the magnitude of the force and the angle it makes with X, Y and Z axis.	2
	4. The motion of particle moving in a straight line is given by the expression $s = t^3 - 3t^2 + 2t + 5$. Where s is in meters and t is in seconds. Determine a) velocity and acceleration after 4 seconds b) maximum or minimum velocity.	2
	5. A motorist travelling at a speed of 72km/h suddenly applies brakes and come to stop after skidding 30m. Determine a) Time required by car to stop and b) The coefficient of friction between tires and road surface.	2
	6. Find reactions for cantilever beam shown in fig. fixed at A.	2
		
	7. A 40kg block A connected to a 60kg block by a spring of constant $k=180\text{N/m}$. The blocks are placed on a smooth horizontal surface and are at rest when spring is stretched 2m. If they are released from rest determine speeds of block at the instant spring become unstretched.	2
Q.2	<p>A thin lamina with uniform thickness is shown in fig. Locate the centroid with respect to point A.</p> 	10
Q.3	(A) Figure shows system of cables in equilibrium condition under two vertical loads of 300N and 500N. Determine forces developed in the different segments.	5

		
	OR	
	<p>(A) Replace the force and couple system shown in fig by an equivalent single force and moment at point 'P'</p> 	5
Q.3	<p>(B) The slider block C is moving at 1.2 m/s up the incline as shown in fig. Determine angular velocity of links AB and BC and velocity of point B at the instant shown.</p> 	5
	OR	
	<p>(B) The system shown in fig. is initially at rest. Neglecting friction, determine a) The force P required if the velocity of collar B is to be 5 m/s after 2 seconds. b) The corresponding tension in the cable.</p> 	5

Q.4	<p>A ball of mass 1kg moving with a velocity of 6m/s strikes another ball of mass 2kg moving with velocity of 2m/s. At the instant of impact the velocities of two balls are inclined at 30° to the line joining their centers as shown in fig. If the coefficient of restitution is 0.5 find the velocity and direction of two balls after impact. Also calculate loss in KE due to impact and percentage of loss.</p> 	10
OR		
	<p>The fig. shows a-t diagram for a car which starts from rest and comes to halt after time (60+t) seconds. Find the value of 't' and 'f' shown in diagram. Find velocity and distance travelled at all time and plot v-t and s-t curve.</p> 	10