K. J. Somaiya Institute of Technology, Sion, Mumbai-22 (Autonomous College Affiliated to University of Mumbai)

Subject Code: BSC104 Subject Name: Engineering Mechanics Date: 05-07-2023

May – June 2023

Program: FY B.Tech. All Branches Examination: FY Semester: I

Course Code: BSC104 and Course Name: Engineering Mechanics

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.
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		Max. Marks	СО	BT level
Q.1	Attempt any six out of eight:-	12		
i)	A force of 200 N is acting on a block as shown in figure. Find the components of force along the horizontal and vertical axis. Y 200 N	2		U
ii)	Find the centroid of the shaded area with respect to O as shown in figure.	2	2	U
	2m o			
iii)	Determine the moment of 100 N force shown in figure about A,B,C and D C 4 m A 3 m B	2	1	U
iv)	Explain with neat sketches angle of repose and cone of friction.	2	3	R
v)	A car travels with an initial velocity of 10 m/s and runs with a uniform acceleration of 0.5 m/s ² . Find the distance travelled by the car in 8 th second.	2	4	An

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ıbjer	ct Code: BSC104 Subject Name: Engineering McCharles		-	D	
Γ	Explain instantaneous centre of rotation.	2	5	R	
-	speed of V _m m/s at certain time	2	1	An	1
ii)	t ₁ second and then comes to hait in t ₂ second. 25° with horizontal level.	2	4	An	a
11)	A ball is thrown with an initial velocity of 25 m/s at 43 with normal and time taken to reach highest Determine the maximum height reached by the ball and time taken to reach highest height.	16		-	_
.2	Attempt any four out of six:-	-	2	U	-
)	Determine centroid of the shaded portion with respect to O.	4	2		,
	20 mm				2
	I form P as shown in figure. If the	4	3		1
ii)	A block of weight 800 N is acted upon by a horizontal force P as shown in Figure 2.25, 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.	T Kath			
	P				
	28				_
iii	A smooth sphere weighing 500 N is resting in a through as shown in figure. Determine	e 4	1		
	the reactions at points of contact.				
	W=500 N B 8				
	Amountain .	of 4	1	4	
i	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.)1			

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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 m/s 2 , determine whether there is collision.	4	4	U
vi)	The rectilinear motion of a particle is defined by a = $10 \text{ v}^{1/2}$. At the instant t=2 seconds velocity is 100 m/s and displacement is 100 m. determine the displacement at t = 4 seconds.		5	An
Q.3	Attempt any two out of three:-	16		
i)	Two identical rollers each of weight 500 N are supported by an inclined plane making an angle of 30° 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 θ .	8	3	A
	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

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