

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

Nov - Dec 2023

Program: B.Tech

Scheme: III

Examination: FY (All Branches)

Semester: I

Course Code: BSC104

and

Course Name: Engineering Mechanics

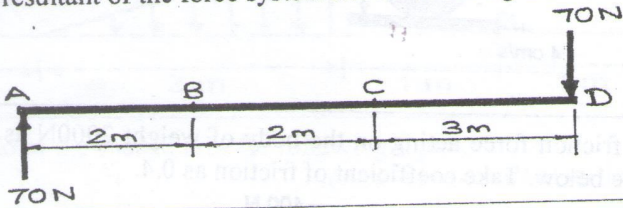
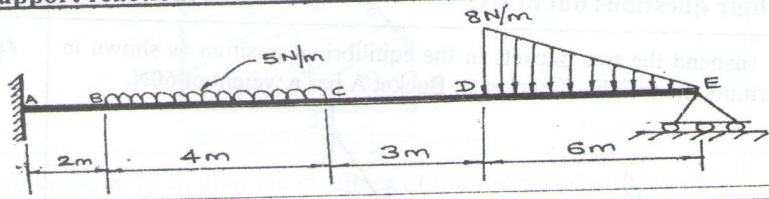
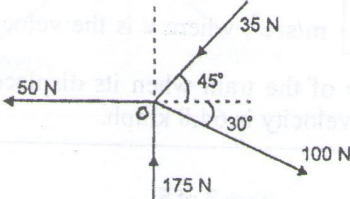
Date of Exam: 26/12/2023

Duration: 2.5 Hours

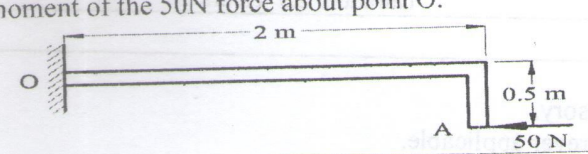
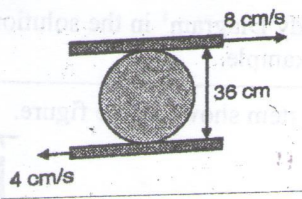
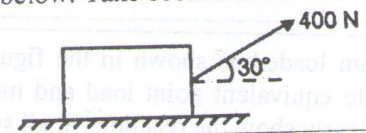
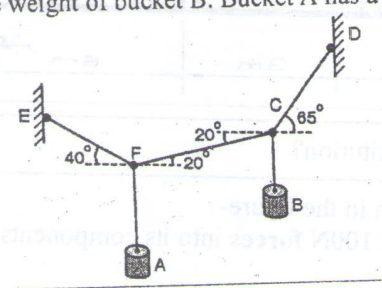
Max. Marks: 60

Instructions:

- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

		Max. Marks	CO	BT level
Q 1	Solve any six questions out of eight:	12		
i)	Explain the concept of 'Free Body Diagram' in the solution of problems in mechanics with at least one example.	2	1	U
ii)	Find the resultant of the force system shown in the figure. <div style="text-align: center;">  </div>	2	1	U
iii)	Draw only FBD for the beam loaded as shown in the figure. Convert the given UDL and UVL into equivalent point load and mention their positions from end A. Also clearly show the reactions at all supports. (Support reactions need not be calculated) <div style="text-align: center;">  </div>	2	1	U
iv)	What is Coefficient of Restitution?	2	6	U
v)	For the force system shown in the figure- Only resolve the 35N and 100N forces into its components along x and y directions. (Do not show any calculations nor find the resultant) <div style="text-align: center;">  </div>	2	1	U

Nov – Dec 2023	
Program: <u>B.Tech</u>	Scheme: <u>III</u>
Examination: <u>FY (All Branches)</u>	Semester: <u>I</u>
Course Code: <u>BSC104</u> and	Course Name: <u>Engineering Mechanics</u>
Date of Exam: 26/12/2023	Max. Marks: 60
Duration: 2.5 Hours	

vi)	Find the moment of the 50N force about point O. 	2		1	U
vii)	A cylinder with diameter 36cm is held between two plates as shown in figure. The upper plate moves to the right with velocity 8cm/s while the lower plate moves to the left with velocity 4cm/s. Locate only ICR of the cylinder. 	2		5	U
viii)	Find the value of friction force acting on the body of weight 2000N as shown in the figure below. Take coefficient of friction as 0.4. 	2		3	U
Q.2	Solve any four questions out of six.	16			
i)	If the cords suspend the two buckets in the equilibrium position as shown in figure. Determine the weight of bucket B. Bucket A has a weight of 60N. 	4		1	Ap
ii)	The acceleration of the train, starting from rest, at any instant is given by the expression $a = \left[\frac{8}{v^2 + 1} \right] \text{ m/sec}^2$, where v is the velocity of the train in m/sec. Find the velocity of the train when its displacement is 20 m and its displacement when velocity is 64.8 kmph.	4		4	Ap

Nov - Dec 2023

Program: B.Tech

Scheme: III

Examination: FY (All Branches)

Semester: I

Course Code: BSC104

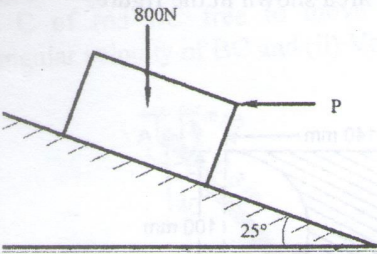
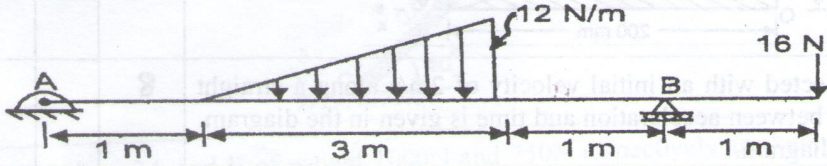
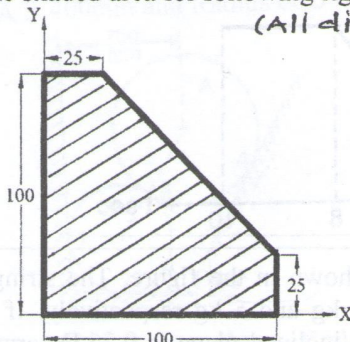
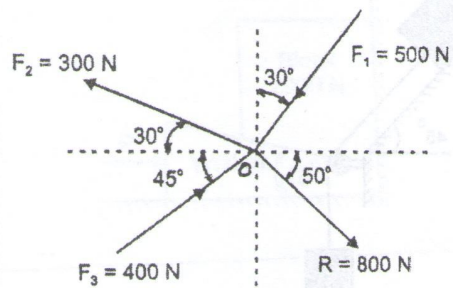
and

Course Name: Engineering Mechanics

Date of Exam: 26/12/2023

Duration: 2.5 Hours

Max. Marks: 60

iii)	<p>A support block is acted upon by two forces as shown in figure. If $\mu = 0.35$, determine the force P required to start the block moving up the plane.</p> 	4	3	Ap
iv)	<p>Determine the reactions for the beam shown in the figure.</p> 	4	1	Ap
v)	<p>Locate centroid of the shaded area for following figure. (All dimensions in mm)</p> 	4	2	U
vi)	<p>Find the force F_4 so as to give the resultant of the force system shown in figure.</p> 	4	1	U

Nov - Dec 2023		
Program: <u>B.Tech</u>	Scheme: <u>III</u>	
Examination: <u>FY (All Branches)</u>	Semester: <u>I</u>	
Course Code: <u>BSC104</u>	and	Course Name: <u>Engineering Mechanics</u>
Date of Exam: 26/12/2023	Duration: 2.5 Hours	Max. Marks: 60

Q.3	Solve any two questions out of three.	16		
i)	Determine the centroid of the shaded area shown in the figure. <div style="text-align: center; margin-top: 10px;"> </div>	8	2	U
ii)	A particle is projected with an initial velocity of 2m/s along a straight line. The relation between acceleration and time is given in the diagram. Draw v-t and s-t diagram. <div style="text-align: center; margin-top: 10px;"> </div>	8	4	Ap
iii)	Two blocks A and B connected as shown in the figure. The string is inextensible. Mass of A and B are 3 kg and 5 kg respectively. If the coefficient of friction between A and inclined plane is 0.25. Determine the tension on the strings and accelerations of A and B. <div style="text-align: center; margin-top: 10px;"> </div>	8	6	Ap

Nov - Dec 2023

Program: B.Tech

Scheme: III

Examination: FY (All Branches)

Semester: I

Course Code: BSC104

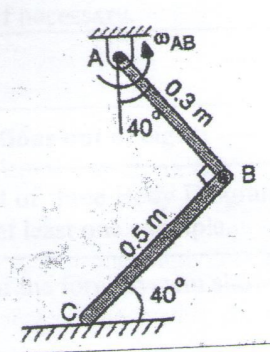
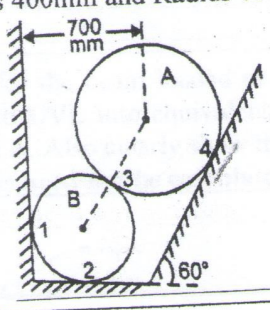
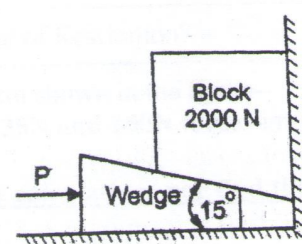
and

Course Name: Engineering Mechanics

Date of Exam: 26/12/2023

Duration: 2.5 Hours

Max. Marks: 60

Q.4	Solve any two questions out of three.	16		
i)	<p>A rod AB has an angular velocity of 2 rad/sec., counter clockwise as shown in figure. End C of rod BC free to move on a horizontal surface. Determine (i) angular velocity of BC and (ii) Velocity of C.</p> 	8	5	Ap
ii)	<p>Two spheres A and B of weight 1000N and 750N respectively are kept as shown in the figure. Determine the reactions at all contact points 1, 2, 3 & 4. Radius of A is 400mm and Radius of B is 300mm.</p> 	8	1	Ap
iii)	<p>Taking $\mu = 0.25$ for all contact surfaces, find minimum force 'P' required to raise 2000N block up.</p> 	8	3	Ap
