

Feb / Mar 2024
 Program: B.Tech Scheme: III
 Examination: FY (All branches) Semester: I
 Course Code: BSC104 and Course Name: Engineering Mechanics
 Date of Exam: 29-02-24 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)	For the force system shown in the figure- Only resolve the 35N and 100N forces into its components along x and y directions. Clearly mention the cos and sine components for each force. (Do not show any calculations nor find the resultant)		1	U
ii)	Find the resultant of the force system shown in the figure.		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)		1	U
iv)	What is Coefficient of Restitution?		6	U
v)	State Principle of Transmissibility of a Force with example.		1	U

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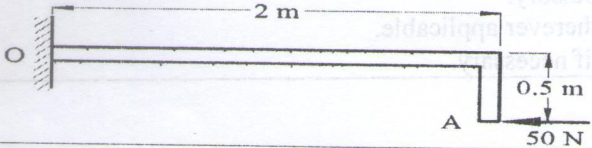
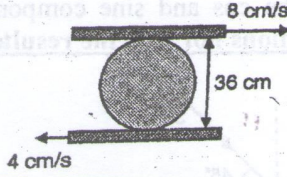
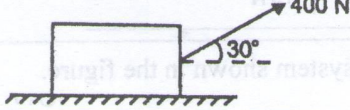
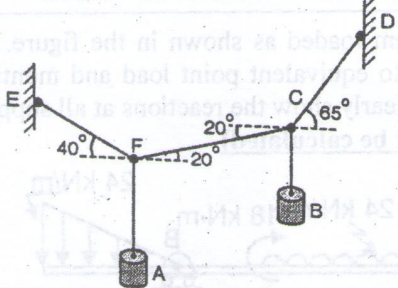
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vi)	<p>Find the moment of the 50N force about point O.</p> 	1	U
vii)	<p>A cylinder with diameter 36cm is held between two plates as shown in figure. The upper plate moves to the right with velocity 8cm/s while the lower plate moves to the left with velocity 4cm/s. Locate only ICR of the cylinder.</p> 	5	U
viii)	<p>Find the value of friction force acting on the body of weight 2000N as shown in the figure. Take coefficient of friction as 0.4.</p> 	3	U
Q.2	<p>Solve any four questions out of six.</p>	16	
i)	<p>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.</p> 	1	Ap
ii)	<p>The acceleration of the train, starting from rest, at any instant is given by the expression $a = \left[\frac{8}{v^2 + 1} \right]$ m/sec², 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.</p>	4	Ap

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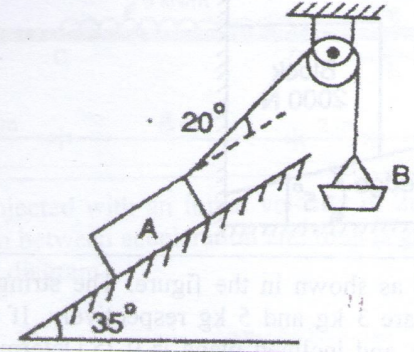
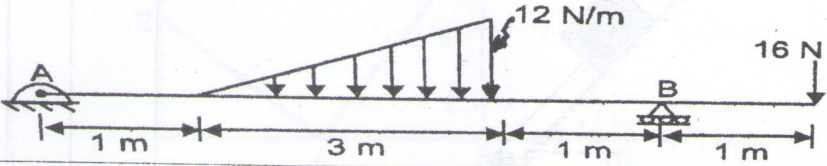
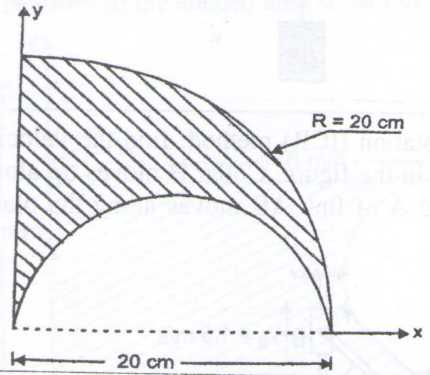
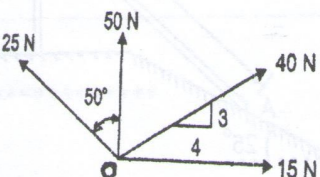
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iii)	<p>Block A of weight 2000N is kept on an inclined plane at 35°. It is connected to weight B by an inextensible string passing over a smooth pulley. Determine the weight of pan B so that B just moves down. Assume $\mu = 0.2$</p> 		3	Ap
iv)	<p>Determine the reactions for the beam shown in the figure.</p> 		1	Ap
v)	<p>Locate the centroid of the shaded area.</p> 		2	U
vi)	<p>Four concurrent forces act at a point as shown in the figure. Find their resultant.</p>		1	U

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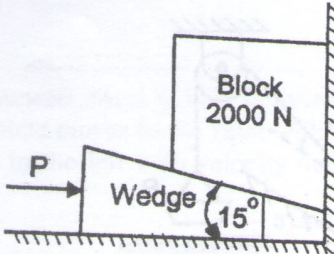
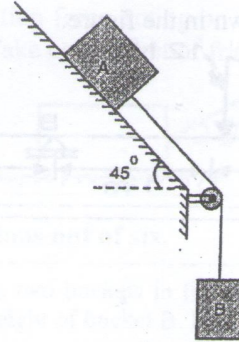
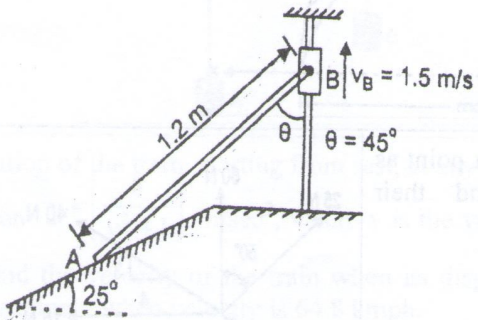
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Q.3	Solve any two questions out of three.	16		
i)	<p>Taking $\mu = 0.25$ for all contact surfaces, find minimum force 'P' required to raise 2000N block up.</p> 		3	Ap
ii)	<p>Two blocks A and B connected as shown in the figure. The string is inextensible. 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.</p> 		6	Ap
iii)	<p>Using Instantaneous centre of rotation (ICR) method, find the velocity of point A for the instant shown in the figure. Collar B moves up along the vertical rod, whereas the end A of link AB moves along the plane which is inclined at 25°.</p> 		5	Ap

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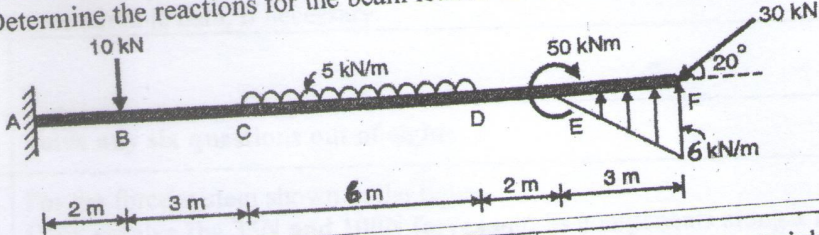
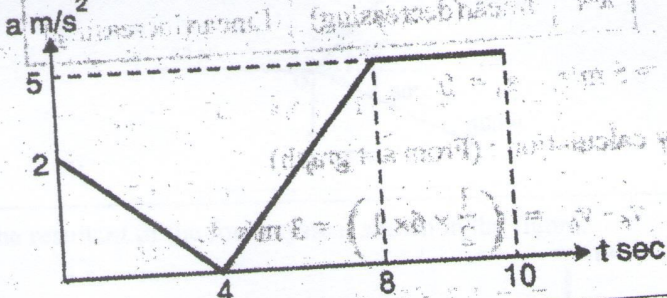
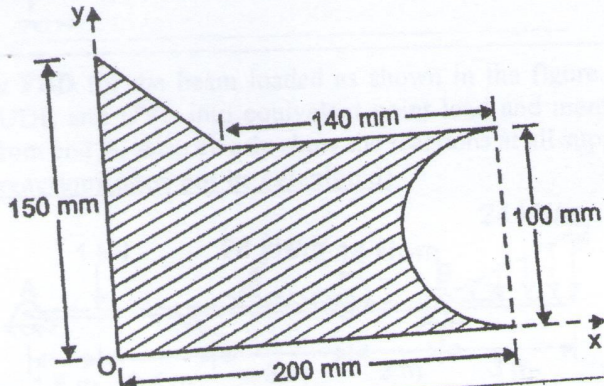
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Q.4	Solve any two questions out of three.	16		
i)	Determine the reactions for the beam loaded as shown in the figure. 	1	Ap	
ii)	A particle is projected with an initial velocity of 2m/s along a straight line. The relation between acceleration and time is given in the diagram. Draw v-t and s-t diagram. 	5	Ap	
iii)	Determine the centroid of the shaded area shown in the figure. 	2	U	
