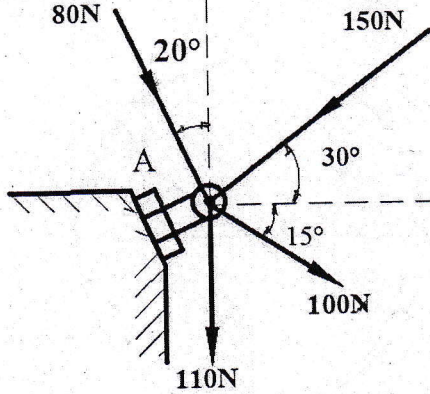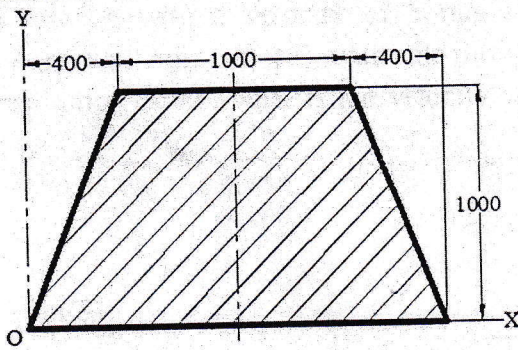|	
Nov. – Dec. 2024 B. Tech. Program: All Branches Scheme: III Regular Examination: FY Semester: I Course Code: BSC104 and Course Name: Engineering Mechanics	
Date of Exam: 20/01/2025	Duration: 2.5 Hours	Max. Marks: 60

Instructions:
(1) All questions are compulsory.
(2) Draw neat diagrams wherever applicable.
(3) Assume suitable data, if necessary.
(4) Use $g = 9.81$ m/s²

Q. No.	Question	Max. Marks	CO	BT level
Q.1	Solve any **TWO** questions out of three: (05 marks each)	10		
a)	Four forces acts on a bolt 'A' as shown. Determine their resultant. 		CO1	BT2
b)	Locate the centroid of the shaded area as shown in figure below. 		CO2	BT2
c)	Define angle of repose and angle of friction and prove that they are equal.		CO3	BT1

Nov. – Dec. 2024
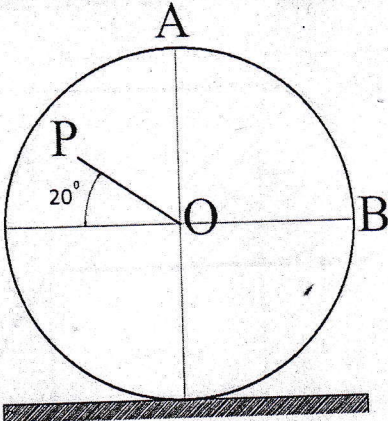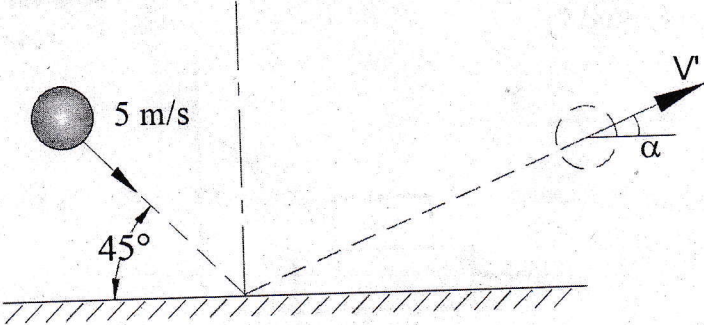B. Tech. Program: All Branches   Scheme: III
Regular Examination: FY   Semester: I
Course Code: BSC104   and Course Name: Engineering Mechanics
Duration: 2.5 Hours   Max. Marks: 60

Date of Exam: 20/01/2025

Q.2	Solve any **TWO** questions out of three: (05 marks each)	10		
a)	The acceleration of the train, starting from rest, at any instant is given by the expression $a = \left[\dfrac{8}{v^2 + 1}\right]$ 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.		CO4	BT2
b)	A wheel is rolling along a straight path without slipping. Determine the velocity of points A,B & P. distance OP= 600mm, angular velocity of wheel is 4 rad/s, velocity of center is 4m/s.		CO5	BT3
c)	A billiard ball moving with a velocity of 5 m/s strikes smooth horizontal plane at an angle of 45° with the horizontal. If the coefficient of restitution is 0.6, what is the velocity with which the ball rebounds?		CO6	BT2

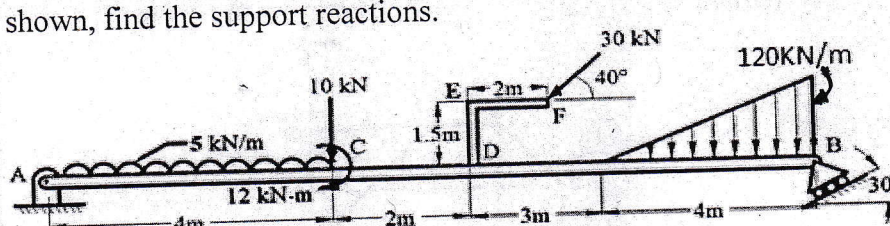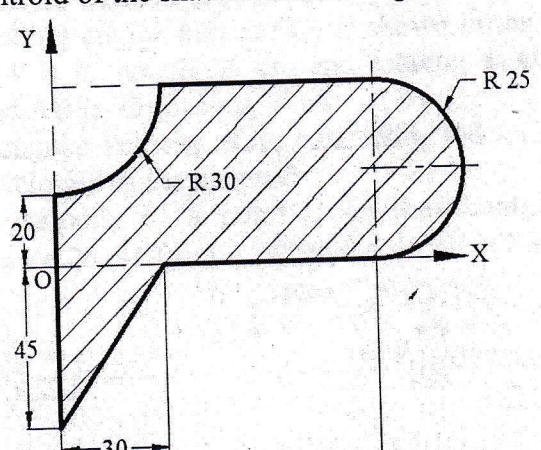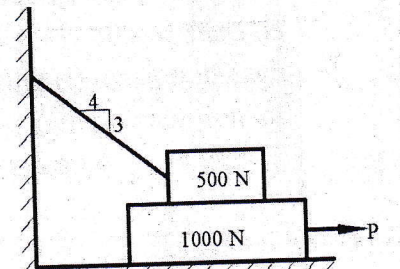|	Nov. – Dec. 2024 B. Tech. Program: All Branches Scheme: III Regular Examination: FY Semester: I Course Code: BSC104 and Course Name: Engineering Mechanics	
Date of Exam: 20/01/2025	Duration: 2.5 Hours	Max. Marks: 60

Q.3	Solve any **TWO** questions out of three. (10 marks each)	20		
a)	Figure shows a beam AB hinged at A and roller support at B. The L shaped portion DEF is welded at D to the beam AB. For the loading shown, find the support reactions.		CO1	BT3
b)	Locate the centroid of the shaded area w.r.t. given axes as shown.		CO2	BT2
c)	(i) What are the laws of friction? (3 marks) (ii) The upper block is tied to a vertical wall by a wire. Determine the horizontal force P required to pull the lower block. Take $\mu = 0.3$ for all surfaces. (7 marks)		CO3	BT1, BT3

Nov. – Dec. 2024
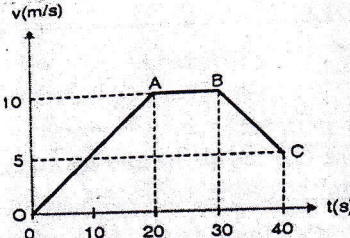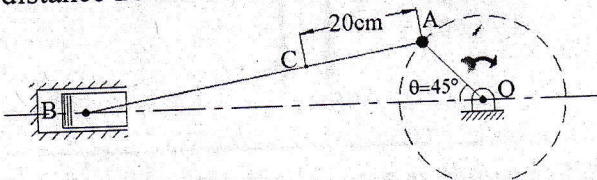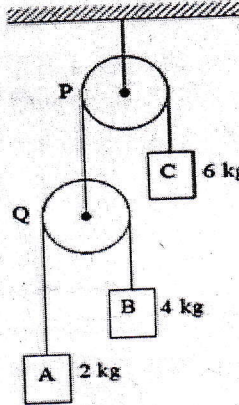B. Tech. Program: All Branches   Scheme: III
Regular Examination: FY   Semester: I
Course Code: BSC104   and Course Name: Engineering Mechanics
Duration: 2.5 Hours
Max. Marks: 60

Date of Exam: 20/01/2025

Q.4	Solve any **TWO** questions out of three. (10 marks each)	20		
a)	(i) Derive the equation of path of projectile. (3 marks) (ii) v-t graph for a particle moving along a straight line is given below. Draw x-t & a-t graph. (7 marks) 		CO4	BT1, BT3

b)	(i) Define ICR and write its properties. (3 marks)
	(ii)A reciprocating engine mechanism is shown in the figure below. The crank OA is of length 15 cm and rotating at 600 r.p.m. The connecting rod AB is 70 cm long. Find:
	   a) the angular velocity of the connecting rod
	   b) the velocity of the piston B
	   c) The velocity of a point C on the connecting rod at a distance 20 cm from A, when $\theta = 45°$. (7 marks)
	
			CO5	BT1, BT3

c)	In the system of pulleys, masses and connecting inextensible cables, (shown in figure) the pulleys and cables are considered massless and frictionless. Mass of A = 2kg mass of B = 4 kg and mass of C = 6 kg. If the system is released from rest find (i) tension in each of the three cables, (ii) acceleration of each of the three masses. 		CO6	BT3

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