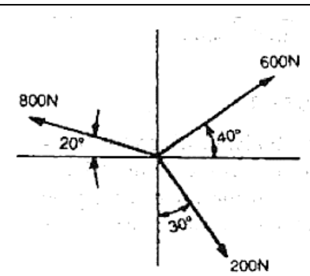
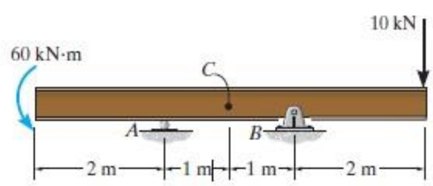
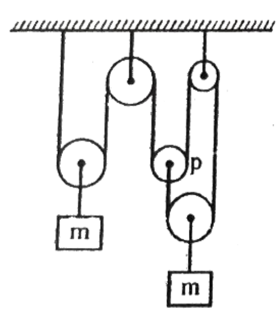
Name: **Enrolment No:**	

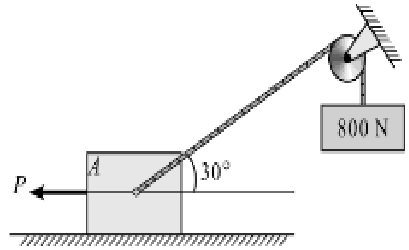
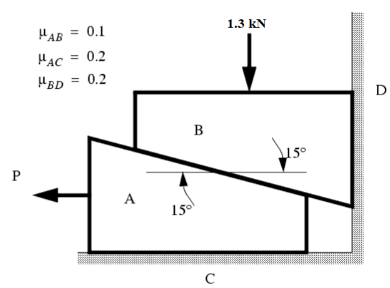
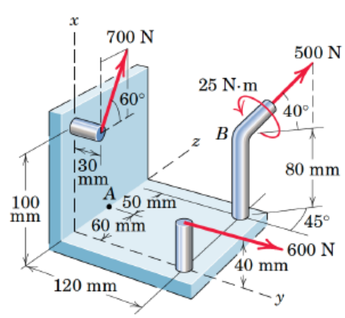
End Semester Examination, May 2023

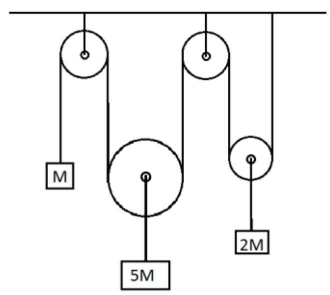
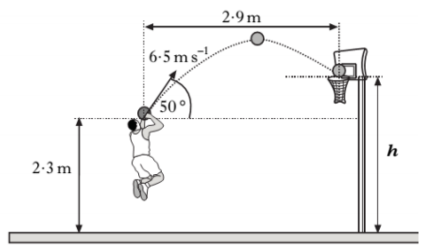
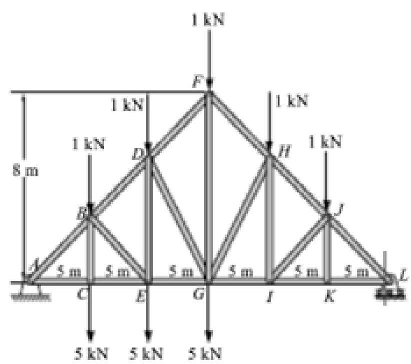
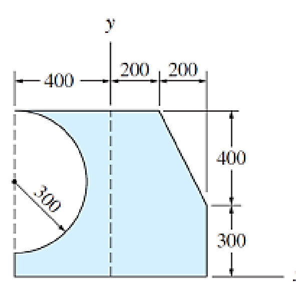
Course: Engineering Mechanics **Semester: II**
Program: B. Tech ADE, ME, Mechatronics **Time : 03 hrs.**
Course Code: MECH1002 **Max. Marks: 100**
No. of pages: 4

Instructions: ***All questions are compulsory. The question paper is consisting of 11 questions divided into 3 section A, B and C. Section A comprises of 5 questions of 4 marks each, Section B comprises of 4 questions of 10 marks each and Section C comprises of 2 questions of 20 marks each.***

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Determine the resultant of the following force system? 	**4**	**CO1**
Q 2	Determine the reactive forces at point A and B. 	**4**	**CO1**
Q 3	Determine acceleration of center of pulley ‘p’. All pulleys are massless, and string is light and inextensible. 	**4**	**CO1**

Q 4	Block A shown in figure weighs 2000N. The chord attached to A passes over a fixed drum and supports a weight of 800N. The value of coefficient of friction between A and horizontal plane is 0.25 and between the rope and fixed drum is 0.1. Determine value of P if motion is impending toward left.  	**4**	**CO1**
Q 5	The equation of motion of a particle moving in a straight line is given by: $$S = 21t + 5t^2 - 3t^3$$ Determine i) The velocity and acceleration at start **(2 Marks)** ii) The time when the particle reaches its maximum velocity **(1 Marks)** iii) The maximum velocity of the particle **(1 Marks)**	**4**	**CO1**
SECTION B **(4Qx10M= 40 Marks)**			
Q 6	The two wedges are stacked as shown, and load is applied. Evaluate the minimum force P required to pull the bottom wedge out?  	**10**	**CO2**
Q 7	Convert all the forces and moment of force system shown in the figure in vector form.  	**10**	**CO2**

Q 8	In a system, a pulley is attached to a block of mass 5M. Also, the pulley contains a chord on both sides, attached with a block of mass M on one side and with a pulley further attached to a mass 2M on the other side. There is no friction anywhere. Determine the initial acceleration of block of mass 5M. 	**10**	**CO2**
Q 9	A basketball player throws a ball with initial velocity 6.5 m/s at an angle 50^{0} to the horizontal. The ball is 2.3 m above the ground when released. Calculate i) The height of the basket **(5 Marks)** ii) Time taken by the ball to reach the basket. **(5 Marks)** 	**10**	**CO3**
SECTION-C **(2Qx20M=40 Marks)**			
Q 10	For the truss shown in the figure: (a) Identify the zero-force member without any calculation. **(2 Marks)** (b) Evaluate the support reaction. **(8 Marks)** (c) Evaluate the force in the member DF, DG and GI by method of section. **(10 Marks)** 	**20**	**CO3**
Q 11	Determine area moment of inertia of composite area shown in figure about the centroidal axis.  Dimensions in mm **OR**	**20**	**CO2**

	Determine the coordinates of the centroid of the composite area shown in the figure below with respect to origin. Also, determine the moment of inertia of this composite area about its centroidal x-axis.