Name: **Enrolment No:**	

Supplementary Examination, December 2023

Course: Engineering Mechanics **Semester: III**

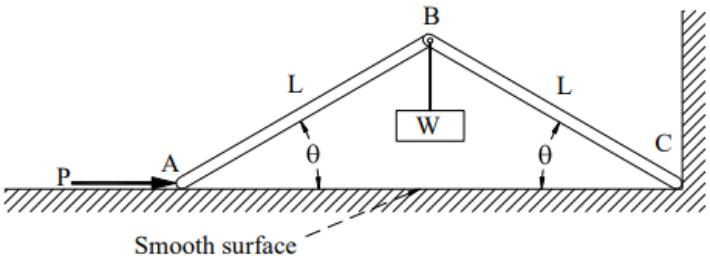
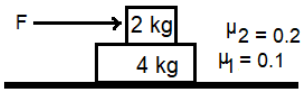
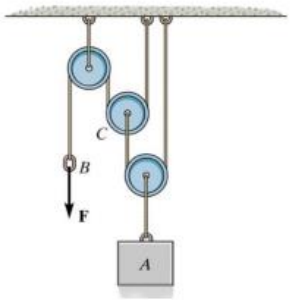
Program: B. Tech ADE and Mechanical **Time : 03 hrs.**

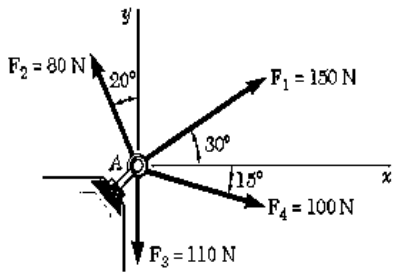
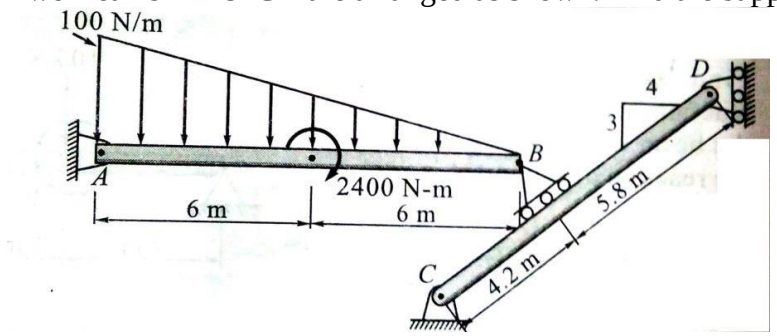
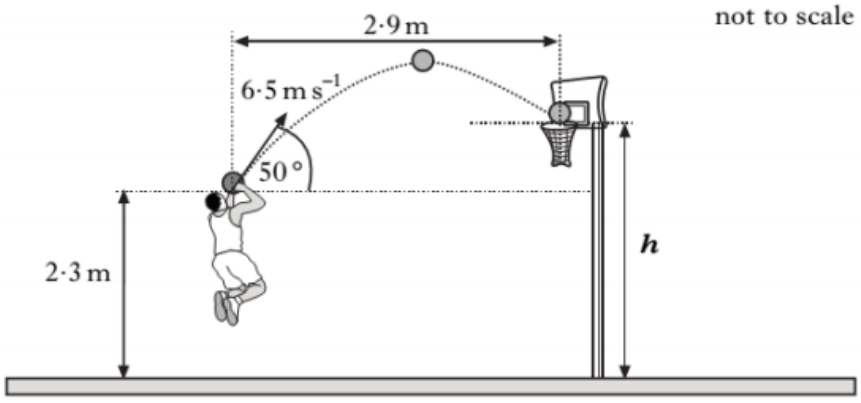
Course Code: MECH2031 **Max. Marks: 100**

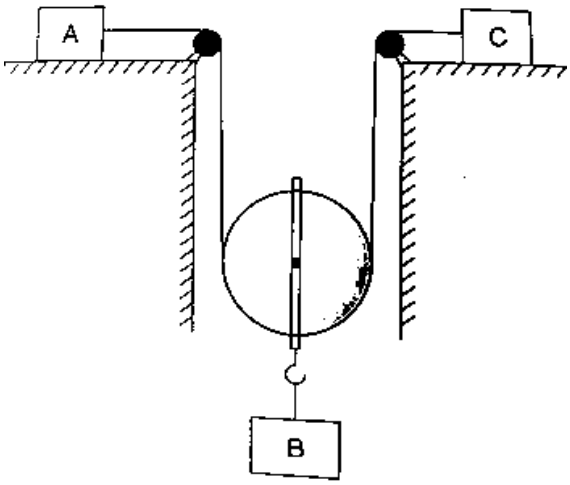
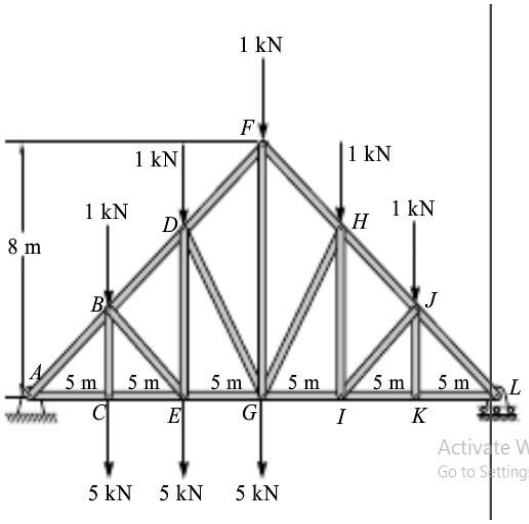
No. of pages: 3

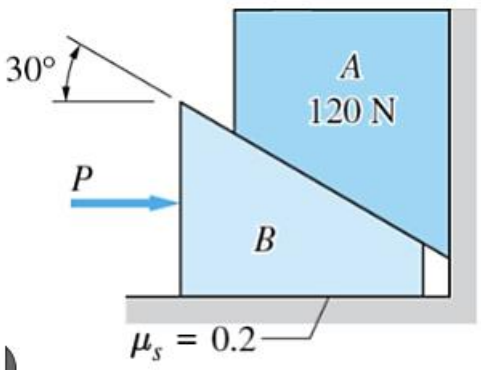
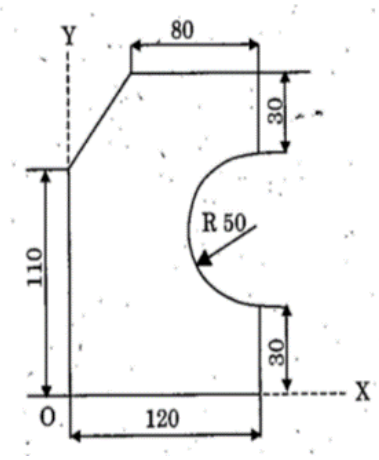
Instructions: ***All questions are compulsory. The question paper is consisting of 11 questions divided into 3 section A, B and C. Section A comprises of 5 questions of 4 marks each, Section B comprises of 4 questions of 10 marks each and Section C comprises of 2 questions of 20 marks each.***

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Determine the force P required to keep the two rods in equilibrium when the angle = 30° and weight W is 50 Kg. The rods are each of length L and of negligible weight. They are prevented from moving out of the plane of the figure by supports not shown. 	**4**	**CO1**
Q 2	Find the acceleration of two blocks and value of friction at the two surfaces if F = 6 N. 	**4**	**CO1**
Q 3	The mass of block A is 50 kg. What is the magnitude of F in Newton such that block A moves with an acceleration of $3m/s^2$? 	**4**	**CO1**

Q 4	Find the resultant of the following force system? 	**4**	**CO1**
Q 5	A particle moves along a straight line with an acceleration described by the equation $a = 6t^2 - 5$, where a is in m/s^2 and t is in seconds. At t= 1 sec, the particle is at a distance of 7 m and at t = 2 sec it is at a distance of 20 m. determine the position of the particle when t = 4 sec.	**4**	**CO1**
SECTION B **(4Qx10M= 40 Marks)**			
Q 6	Two Beams AB & CD are arranged as shown. Find the support reactions. 	**10**	**CO2**
Q 7	A basketball player throws a ball with initial velocity 6.5 m/s at an angle 50º to the horizontal. The ball is 2.3 m above the ground when released. Calculate (i) The height of the basket (ii) Time taken by the ball to reach the basket. 	**10**	**CO2**
Q 8	The weights of the three blocks shown in the fig are W_A = 100 N, W_B = 200 N and W_c = 200 N. Co-efficient of friction between block A and the floor is	**10**	**CO2**

	0.2, that between floor and block is 0.25. Assuming pulleys are weightless and smooth, find the acceleration of each block.  		
Q 9	Two auto mobiles travelling in the same direction in adjacent lanes are stopped at a highway traffic signal. As the signal turns green, automobile A accelerates at a constant rate of 1 m/s^2. Two seconds later automobile B starts and accelerates at a constant rate of 1.3 m/s^2. Determine i) When and where will B overtake A ii) The speed of each automobile at that time.	**10**	**CO3**
	SECTION-C **(2Qx20M=40 Marks)**		
Q 10	For the truss shown in the figure- (a) Identify the zero force members without any calculations and also give the reason for the same. **(2 marks)** (b) Find the support rection **(4 marks)** (c) Find the force in the members DF, DG and GI by method of sections. **(7 marks)** (d) Calculate the forces in all the members by method of joints. **(7 marks)**  	**20**	**CO3**

Q 11	Determine the smallest force P required to start block A moving up?  **OR** Determine area moment of inertia of composite area shown in figure about the centroidal axis.  	**20**	**CO3**