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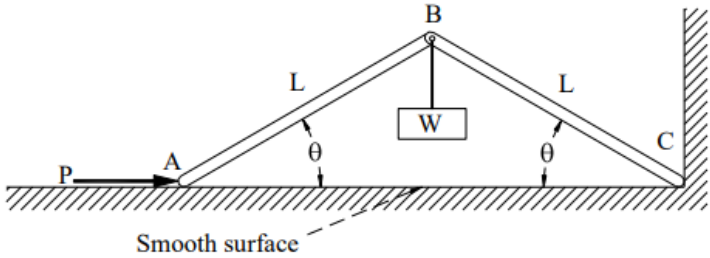
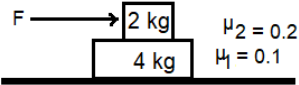
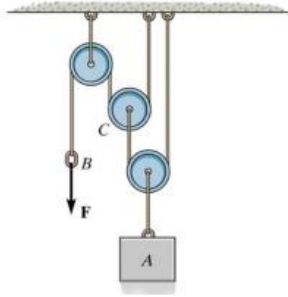
Supplementary Examination, December 2023

Course: Engineering Mechanics
Program: B. Tech ADE and Mechanical
Course Code: MECH2031
No. of pages: 3

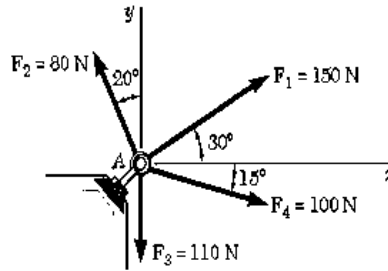
Semester: III
Time : 03 hrs.
Max. Marks: 100

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	<p>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.</p> 	4	CO1
Q 2	<p>Find the acceleration of two blocks and value of friction at the two surfaces if $F = 6 \text{ N}$.</p> 	4	CO1
Q 3	<p>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 3 m/s^2?</p> 	4	CO1

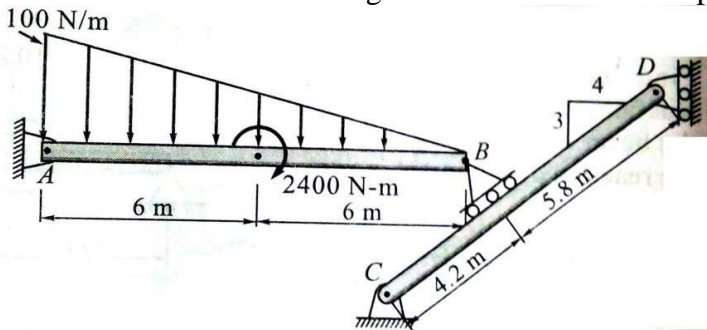
Q 4	Find the resultant of the following force system?		
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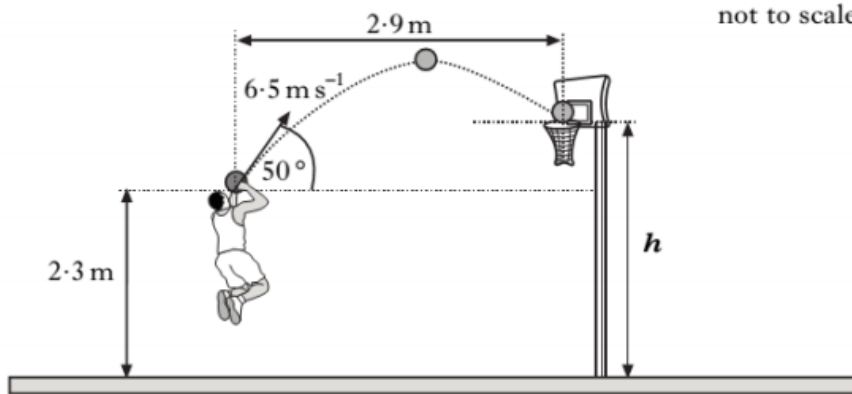
Q 5	A particle moves along a straight line with an acceleration described by the equation $a = 6t^2 - 5$, where a is in m/s^2 and t is in seconds. At $t = 1$ sec, the particle is at a distance of 7 m and at $t = 2$ sec it is at a distance of 20 m. determine the position of the particle when $t = 4$ sec.	4	CO1
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SECTION B
(4Qx10M= 40 Marks)

Q 6	Two Beams AB & CD are arranged as shown. Find the support reactions.	10	CO2
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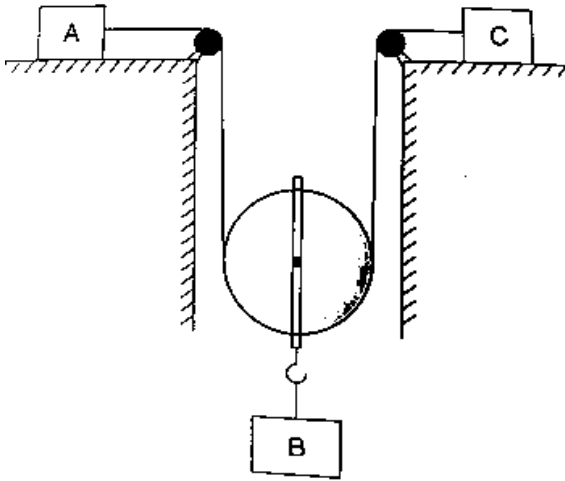


Q 7	A basketball player throws a ball with initial velocity 6.5 m/s at an angle 50° to the horizontal. The ball is 2.3 m above the ground when released. Calculate (i) The height of the basket (ii) Time taken by the ball to reach the basket.	10	CO2
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Q 8	The weights of the three blocks shown in the fig are $W_A = 100 \text{ N}$, $W_B = 200 \text{ N}$ and $W_C = 200 \text{ N}$. Co-efficient of friction between block A and the floor is	10	CO2
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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)

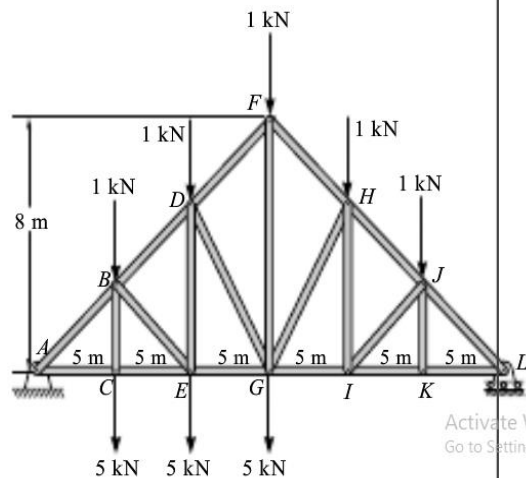
Q 10

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 reaction (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)

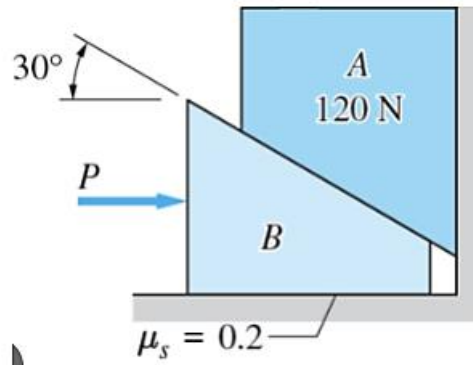


20

CO3

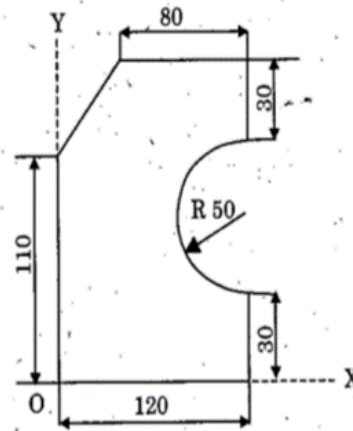
Q 11

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