

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

Online End Semester Examination, December 2020

Programme Name: B.Tech- ADE, FSE

Semester : III

Course Name : Engineering Mechanics

Time : 03 hrs

Course Code : MECH1002

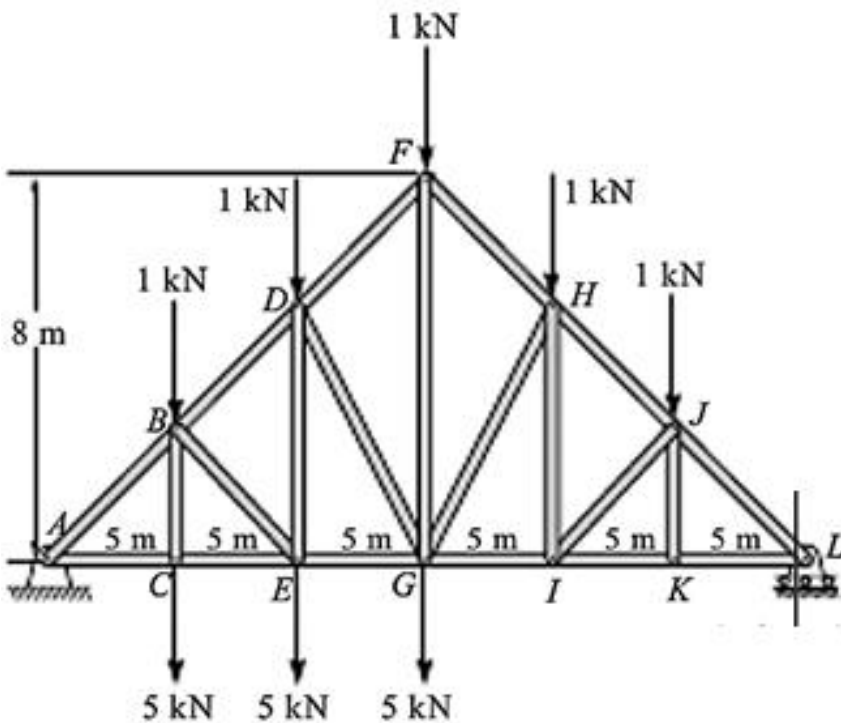
Max. Marks : 100

SECTION A

- 1. Each Question will carry 5 Marks
- 2. Instruction: Complete the statement / Select the correct answer(s)

S. No.	Questions	CO
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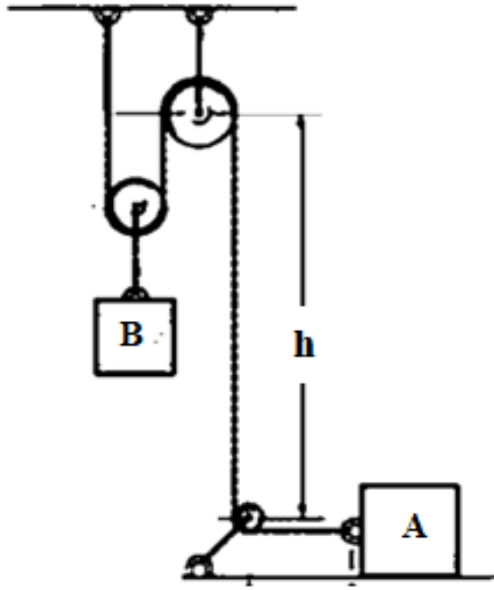
Q 1 Identify zero-member force without calculation and also give the reason for the same.



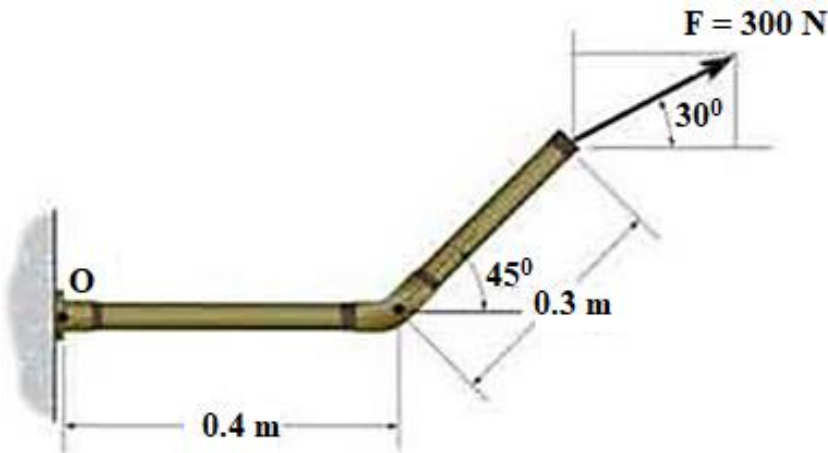
CO1

Q 2 Acceleration of block A and B are related as:

CO1

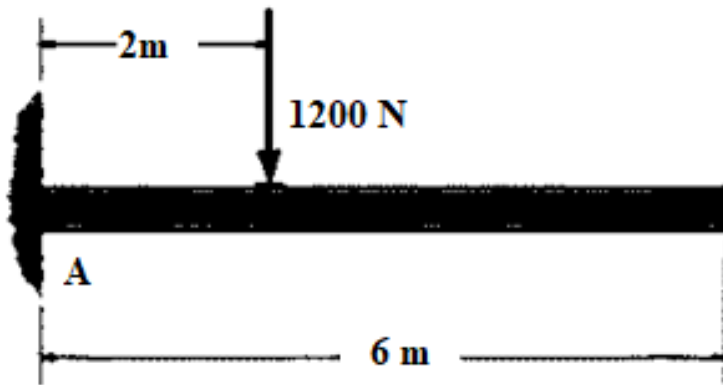


Q.3 The moment of force about point O is.....

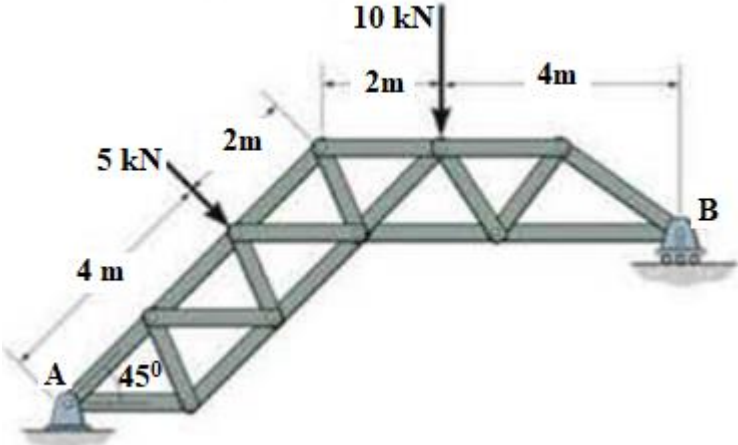


CO1

Q.4 Reactive force and moment at point A is

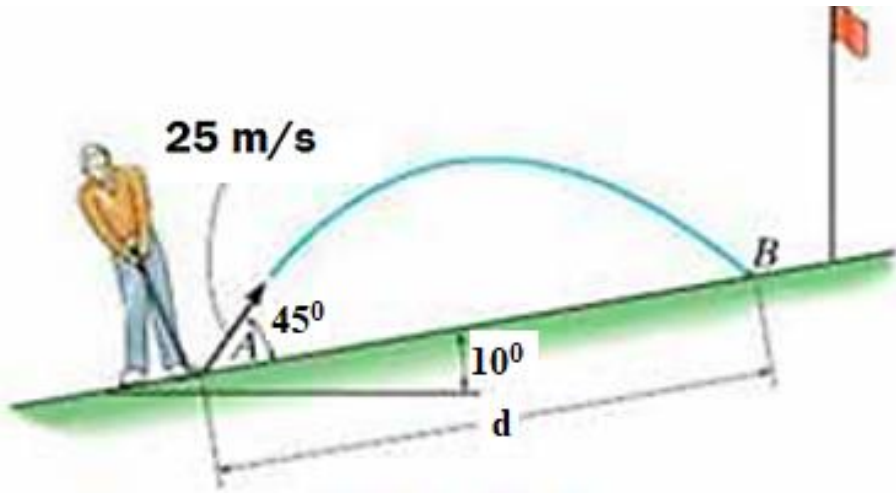


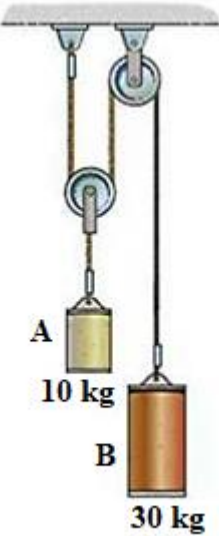
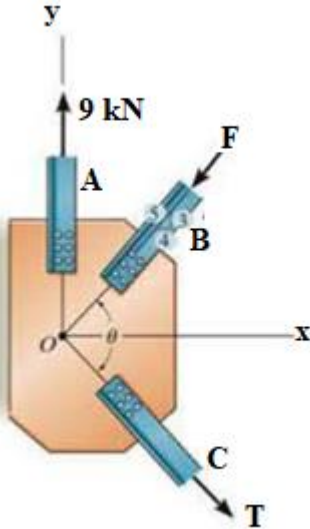
CO1

Q.5	Support reaction at point A and B are andrespectively.	CO1
		
Q.6	A train starts from rest at station A and accelerates at 0.5 m/s^2 for 60 s. Afterwards it travel with a constant velocity for 15 min. It then decelerates at 1 m/s^2 until it is brought to rest at station B. Determine the distance between the stations.	CO1

SECTION B

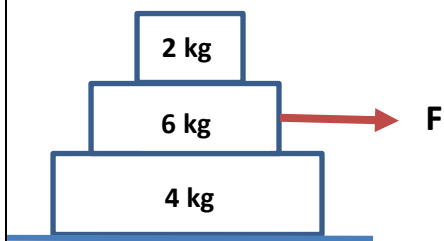
1. Each question will carry 10 marks
2. Instruction: Write short / brief notes

Q 7	A golf ball is struck with a velocity of 25 m/s as shown. Determine the distance d to where it will land.	CO2
		

<p>Q 8</p>	<p>When the blocks are released, determine their acceleration and the tension of the cable. Neglect the mass of the pulley.</p> 	<p>CO3</p>
<p>Q.9</p>	<p>The gusset plate is subjected to the forces of three members. Determine the tension force in member C and its angle θ for equilibrium. The forces are concurrent at point O. Take $F = 8$ kN.</p> 	<p>CO3</p>
<p>Q.10</p>	<p>The acceleration of a particle which moves with rectilinear translation is given by: $a = (t-2) \text{ m/s}^2$. At $t = 0$, the displacement and velocity are zero.</p> <p>(i) Find the velocity and displacement when $t = 2$ sec and when $t = 4$s.</p> <p>(ii) Show sketches of S, v and a for $0 < t < 4$.</p>	<p>CO2</p>

(iii) Find average value of velocity and acceleration.

Q.11 Find minimum force F , so that sliding starts between 4kg and 6 kg block. The coefficient of friction between 2kg and 6 kg block is 0.1 and 0.3 between 6kg and 4kg block. The coefficient of friction between 4 kg and surface (ground) is 0.1.

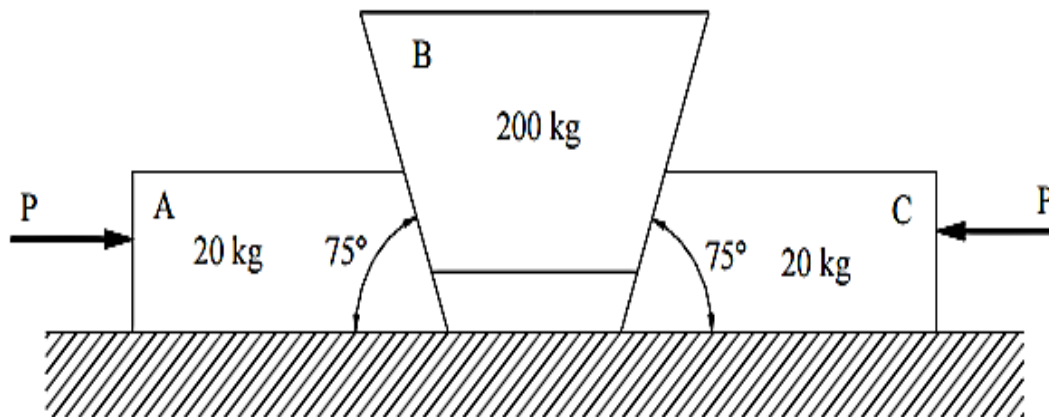


CO3

SECTION C

1. Each Question carries 20 Marks.
2. Instruction: Write long answer.

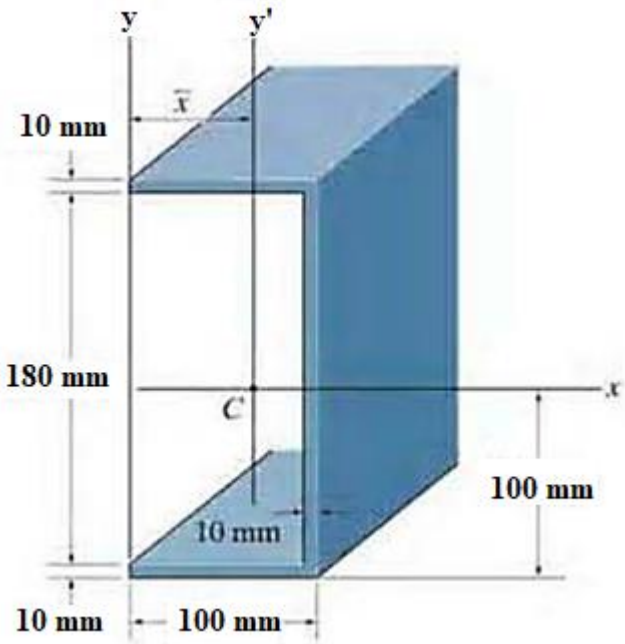
Q 12 If the coefficient of static friction for all surfaces of contact is 0.25, determine the smallest value of the forces P that will move wedge B upward.



CO2

OR

Locate the centroid \bar{x} of the beam's cross sectional area and then determine the moment of inertia of the area about the centroidal y' axis.



CO2