Name: Enrolment No:	UPES

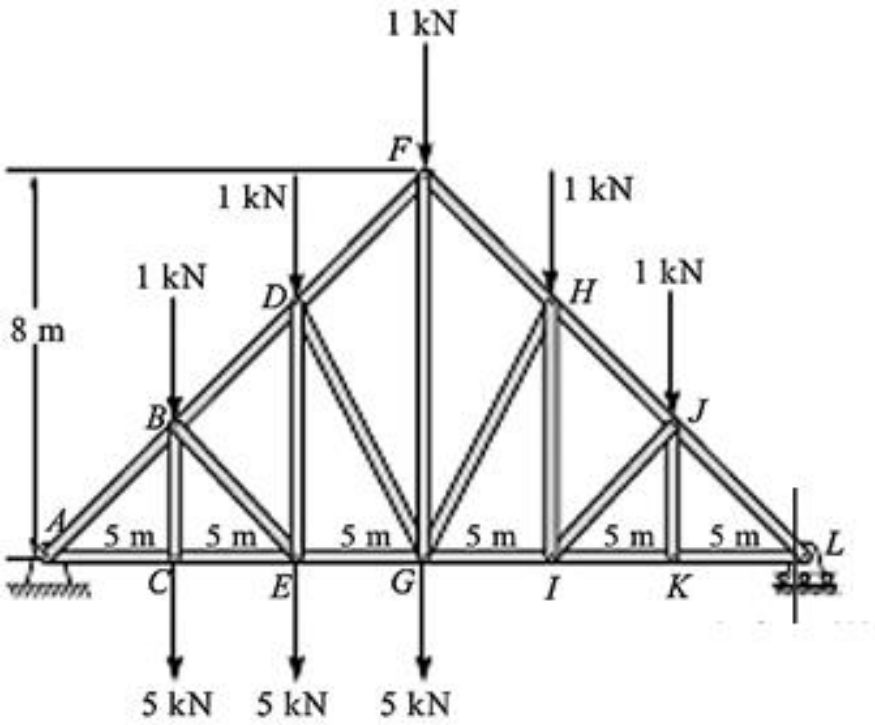
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

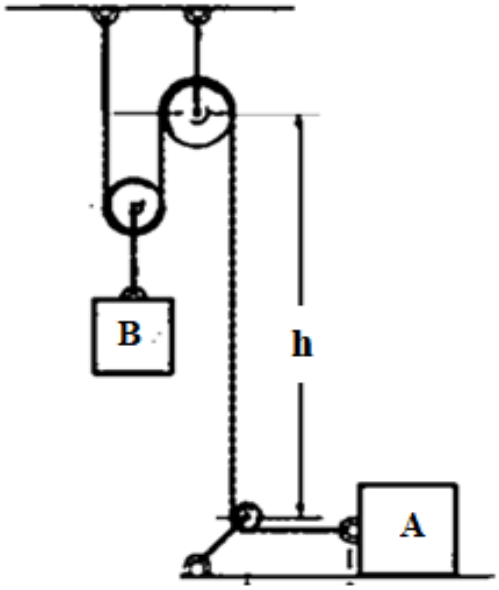
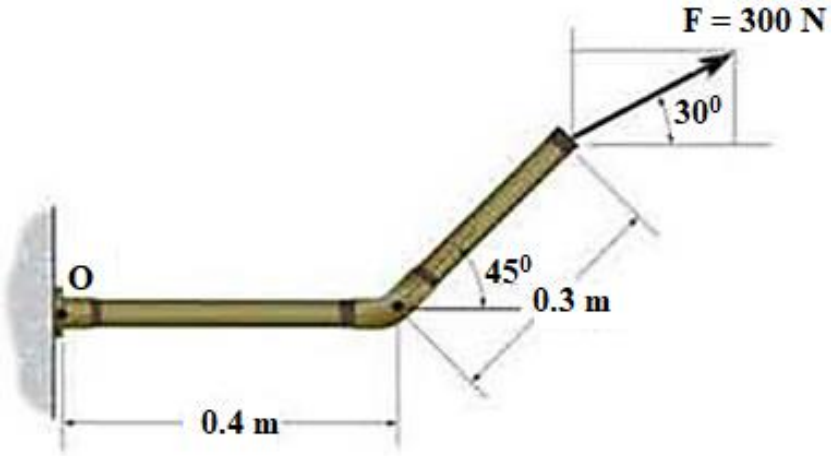
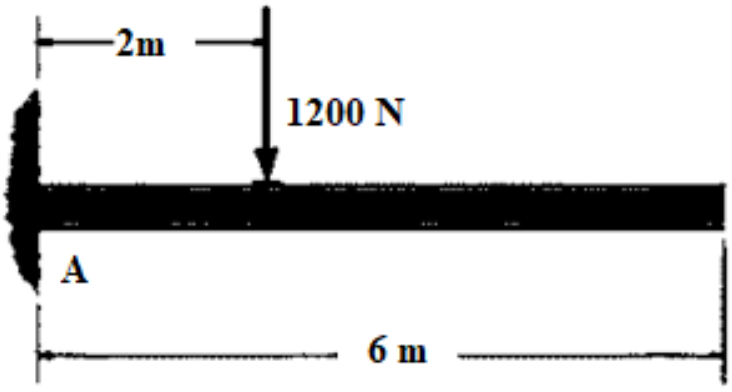
Online End Semester Examination, December 2020

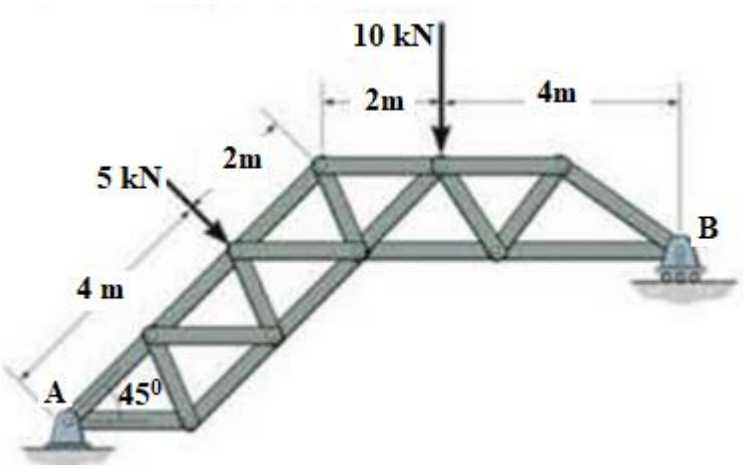
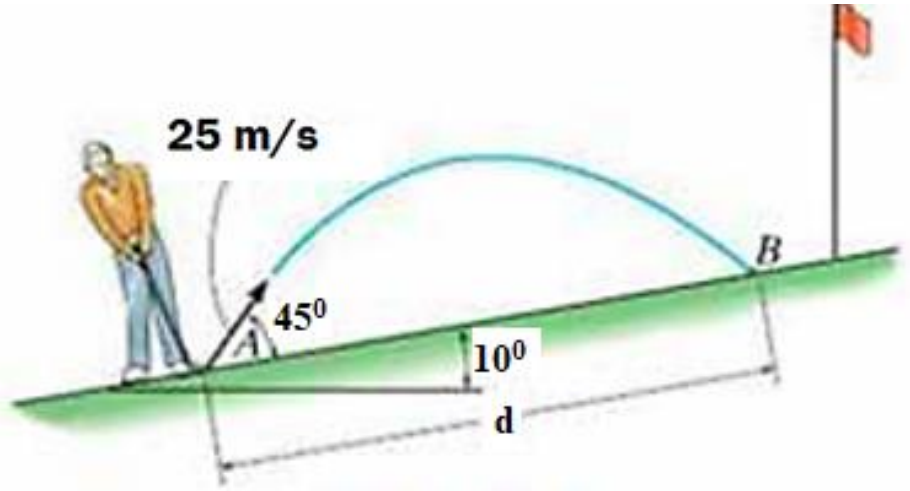
Programme Name: B.Tech- ADE, FSE, E&CE **Semester : III**
Course Name : Engineering Mechanics **Time : 03 hrs**
Course Code : MECH1002 **Max. Marks : 100**

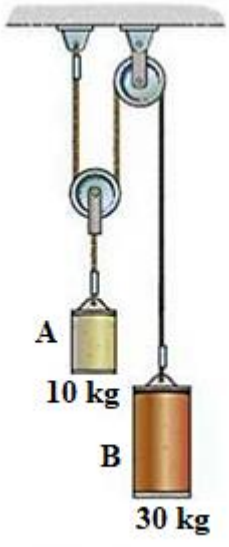
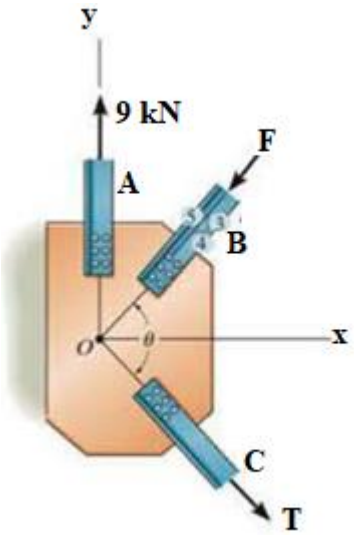
SECTION A

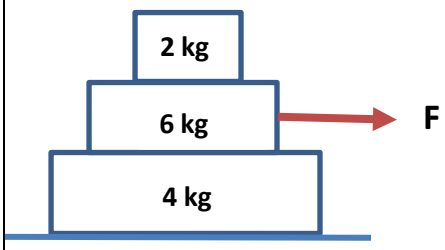
1. **Each Question will carry 5 Marks**
2. **Instruction: Complete the statement / Select the correct answer(s). Type your answers.**

S. No.	Questions	CO
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**

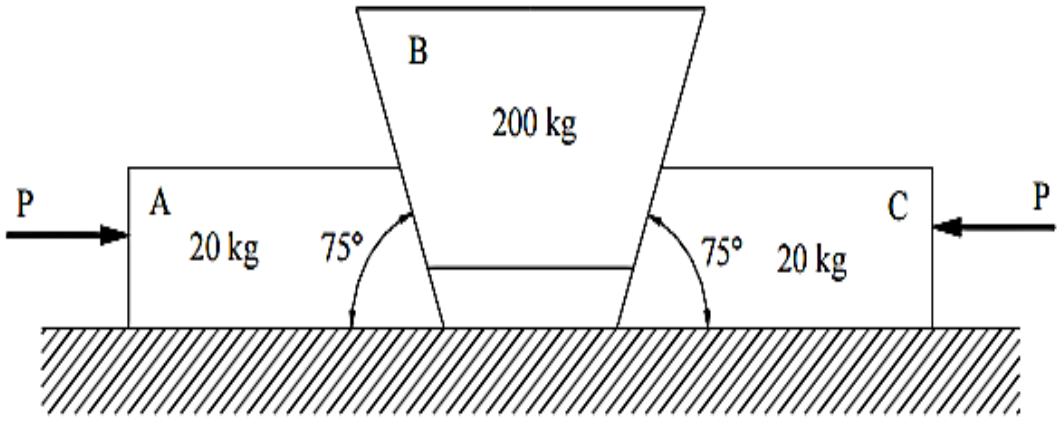
Q.5	Support reaction at point A and B are …….. and …….respectively.  	**CO1**
Q.6	A train starts from rest at station A and accelerates at 0.5 m/s^2 for 60 s. Afterwards it travel with a constant velocity for 15 min. It then decelerates at 1 m/s^2 until it is brought to rest at station B. Determine the distance between the stations.	**CO1**
SECTION B 1. **Each question will carry 10 marks** 2. **Instruction: Write short / brief notes. Scan and upload**		
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**

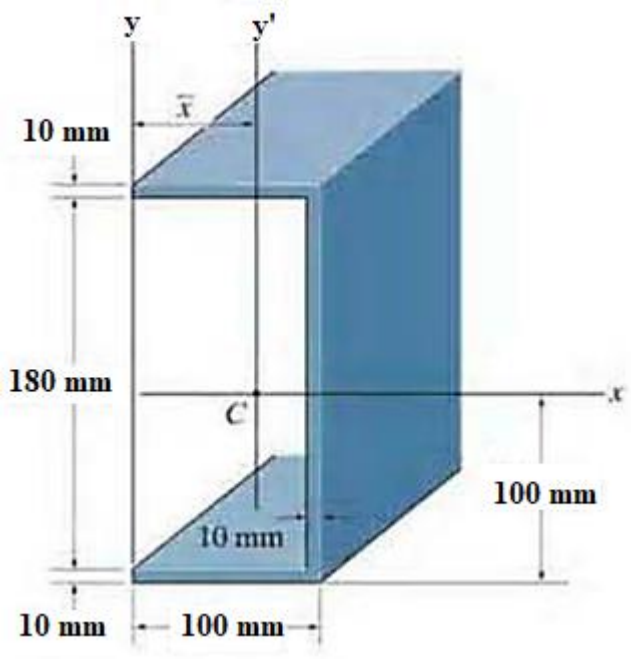
Q 8	When the blocks are released, determine their acceleration and the tension of the cable. Neglect the mass of the pulley.  	**CO3**
Q.9	The gusset plate is subjected to the forces of three members. Determine the tension force in member C and its angle Θ for equilibrium. The forces are concurrent at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

	(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. Scan and upload**

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.  ***OR***	**CO2**

	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**