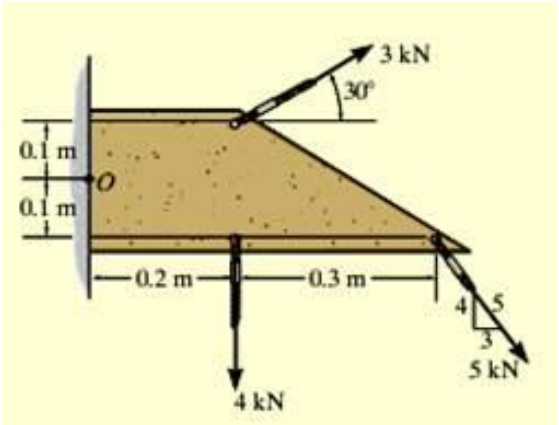
Name: **Enrolment No:**	UPES UNIVERSITY OF TOMORROW

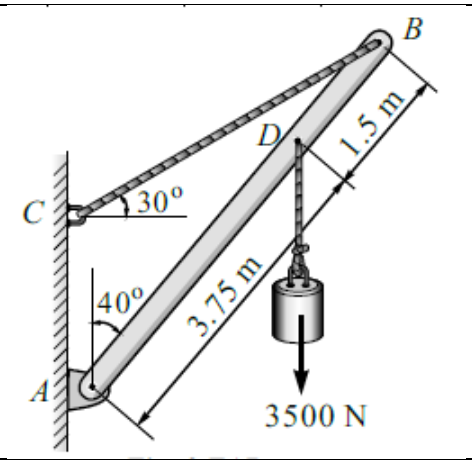
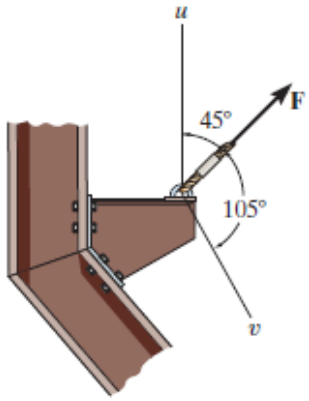
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

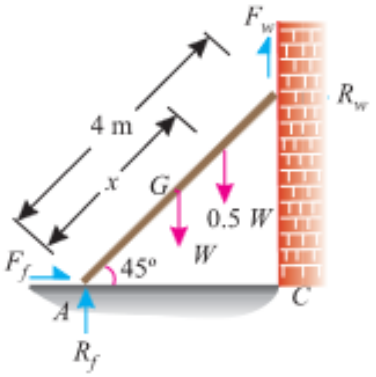
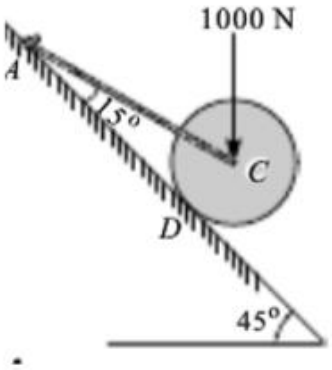
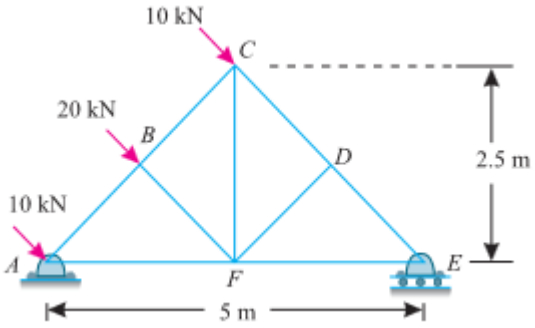
Course: Engg. Mechanics **Semester: III**
Program: B.Tech EE, CERP, FSE, Civil **Time : 03 hrs.**
Course Code: MECH2032 **Max. Marks: 100**

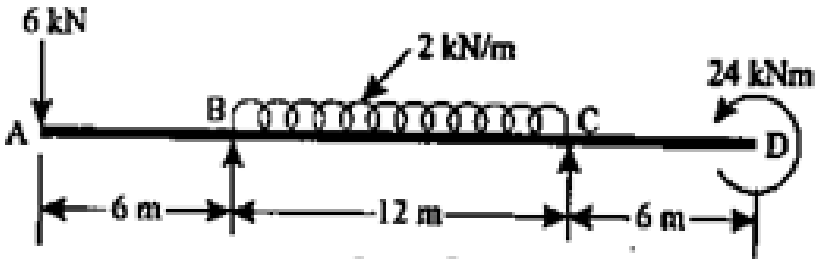
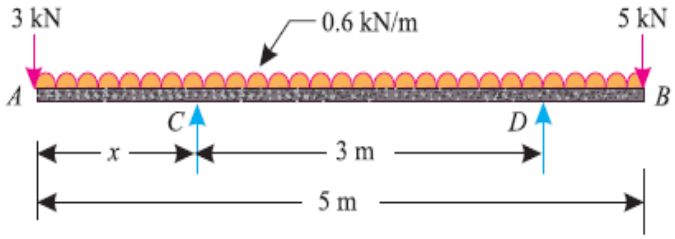
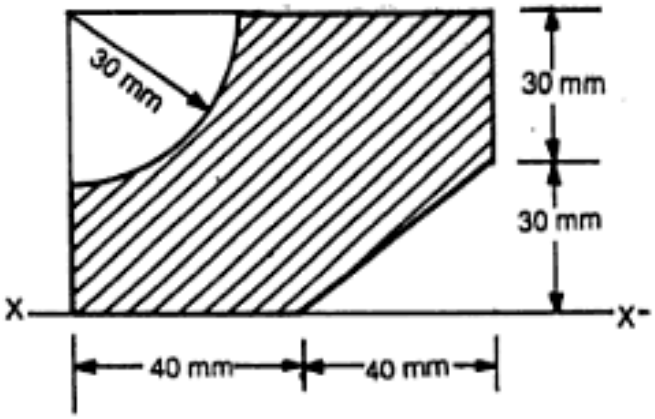
Instructions: All the questions are compulsory.

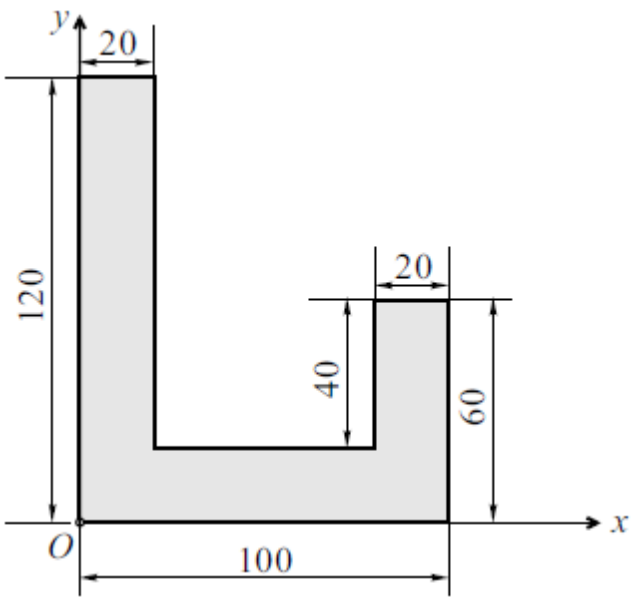
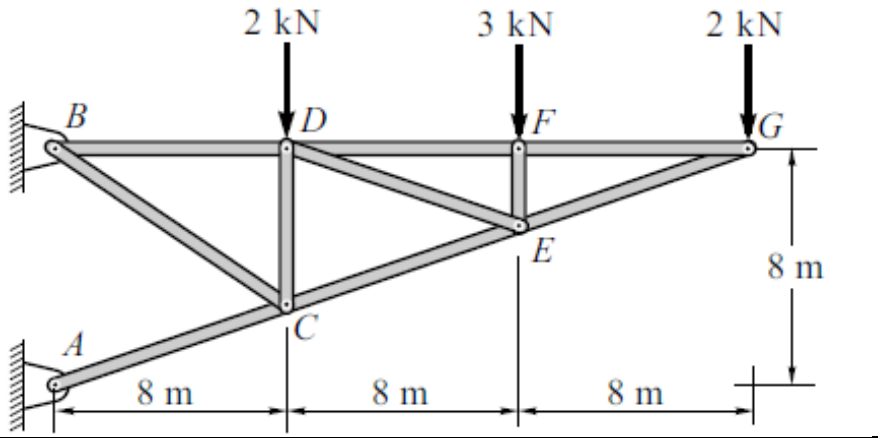
SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
1	Replace the loading on the frame given in figure by its resultant in magnitude and position. 	**4**	**CO1**
2	Define a perfect frame. Also discuss at least four differences between method of section and method of joint for the analysis of truss.	**4**	**CO1**
3	Draw the free body diagram of the bar AB.	**4**	**CO1**

			
4	If force F is to have a component along the u axis of 6 kN, determine the magnitude of F and the magnitude of its component along v axis. 	**4**	**CO1**
5	The equation of motion of an engine is given by $s = 2t^3 – 6t^2 – 5$, where (s) is in metres and (t) in seconds. Calculate (a) displacement and acceleration when velocity is zero ; and (b) displacement and velocity when acceleration is zero.	**4**	**CO1**
SECTION B (4Qx10M= 40 Marks)			
6	A uniform ladder of 4 m length rests against a vertical wall with which it makes an angle of 45°. The coefficient of friction between the ladder and the wall is 0.4 and that between ladder and the floor is 0.5. If a man, whose `weight is one-half of that of the ladder ascends it, compute the distance ascended by the man when the ladder slips.	**10**	**CO2**

			
7	For the system shown in figure, find the tension in the cable and reaction at the support. 	**10**	**CO2**
8	Find the forces in the members AB, BC, BF and FD of truss in magnitude and direction. 	**10**	**CO2**

9	A beam ABCD is loaded as shown in figure below. Determine the reactions at the supports at points B and C.  OR A beam AB 5 m long, supported on two intermediate supports 3 m apart, carries a uniformly distributed load of 0.6 kN/m. The beam also carries two concentrated loads of 3 kN at left hand end A, and 5 kN at the right hand end B as shown in figure. Determine the location of the two supports, so that both the reactions are equal.  	**10**	**CO2**
	SECTION-C **(2Qx20M=40 Marks)**		
10	Find the moment of inertia of the shaded portion: (a) about the given axis X-X and; (b) about the centroidal axis parallel to the given X-X **axis**  **OR**	**20**	**CO3**

	For the given shaded area shown in find, (i) MI about the reference axes (i.e., Ox and Oy axis). (ii) MI about the centroidal axis.  		
11	Find out the force in the members of the truss shown in figure below by using method of section.  	**20**	**CO3**