VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

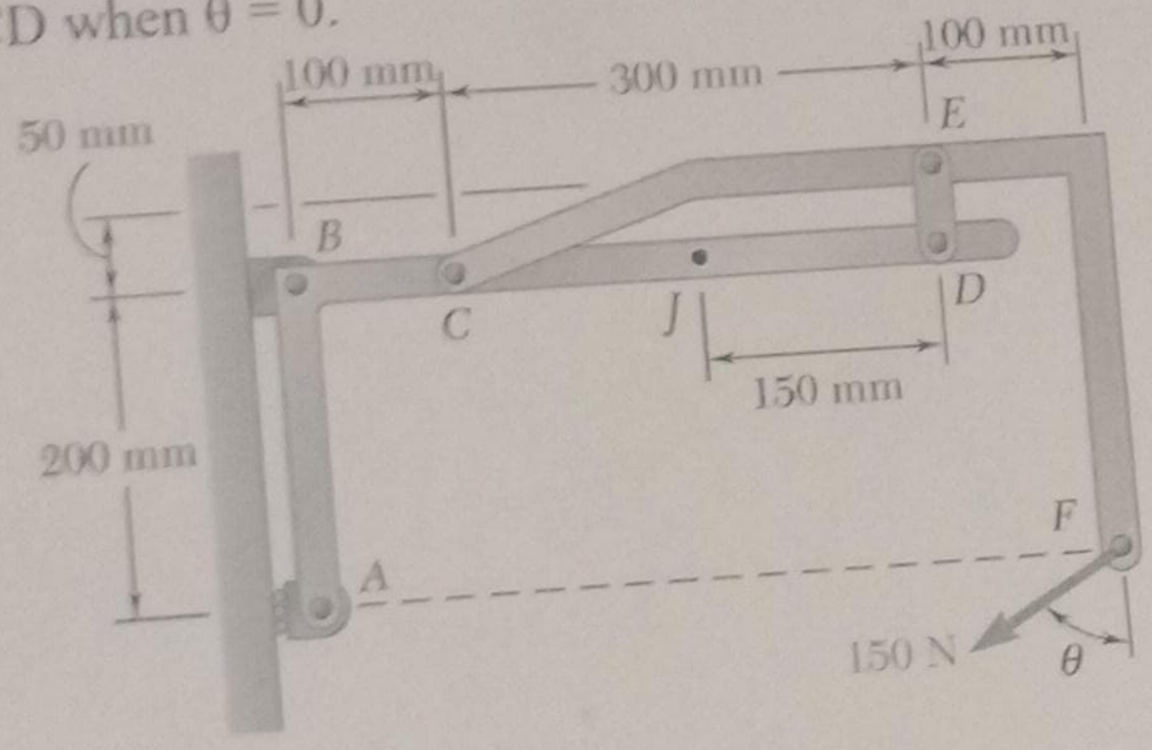
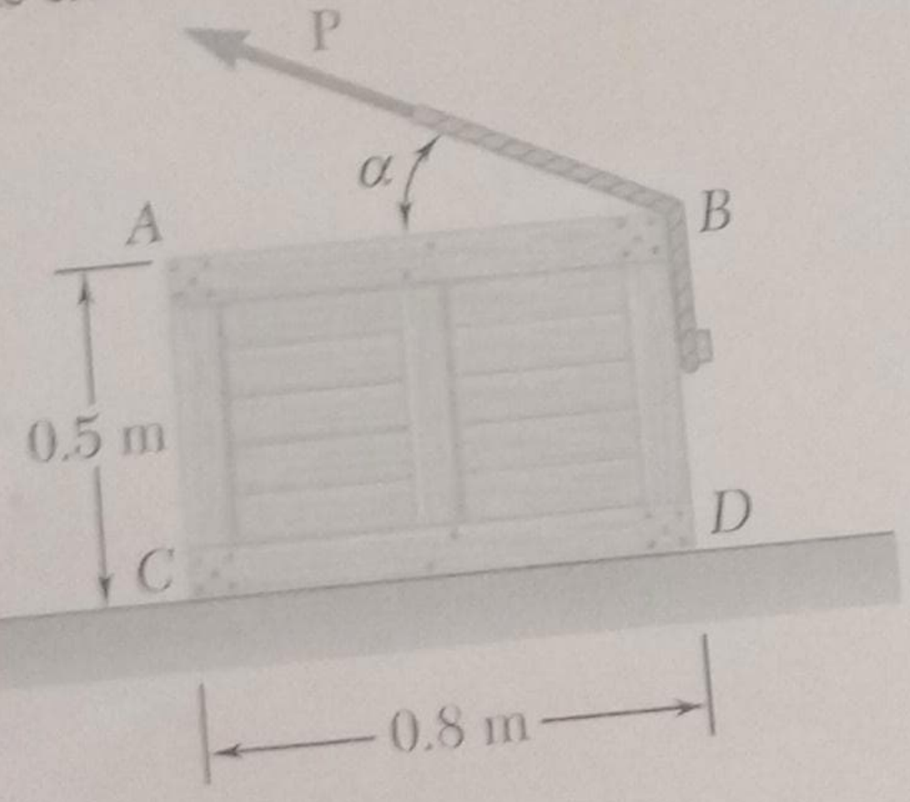
Continuous Assessment Test - II (CAT-II) Win Semester (2023-24)

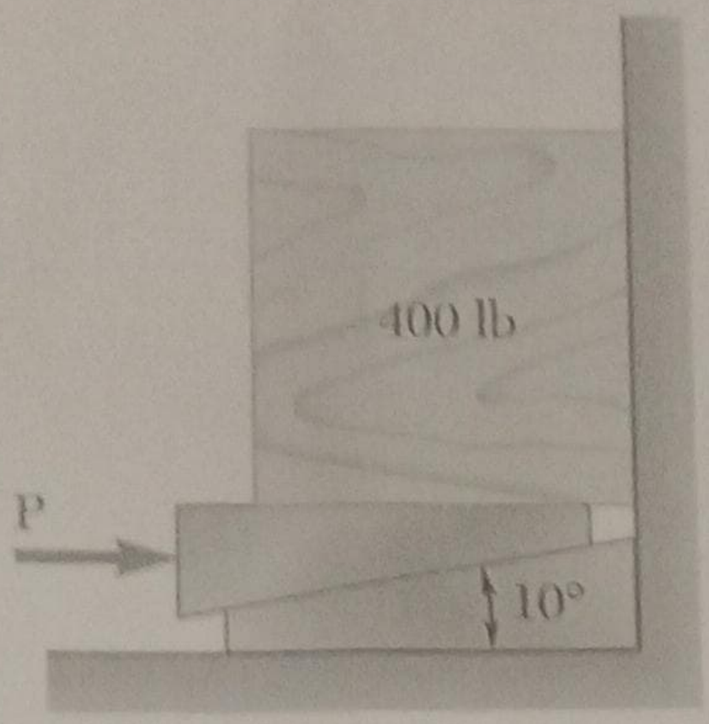
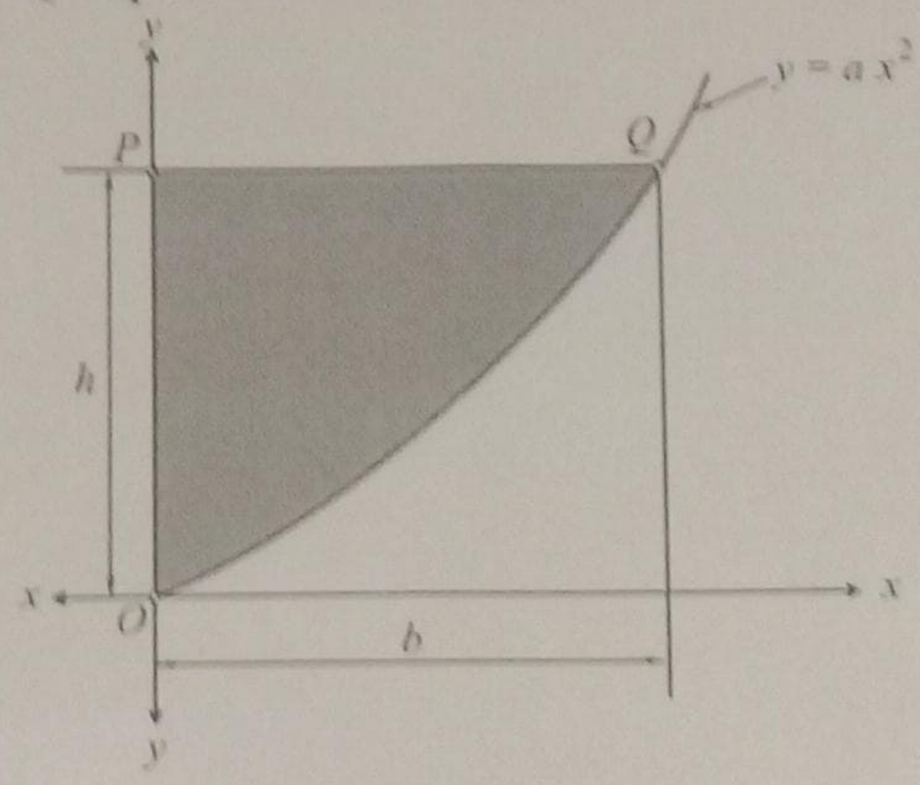
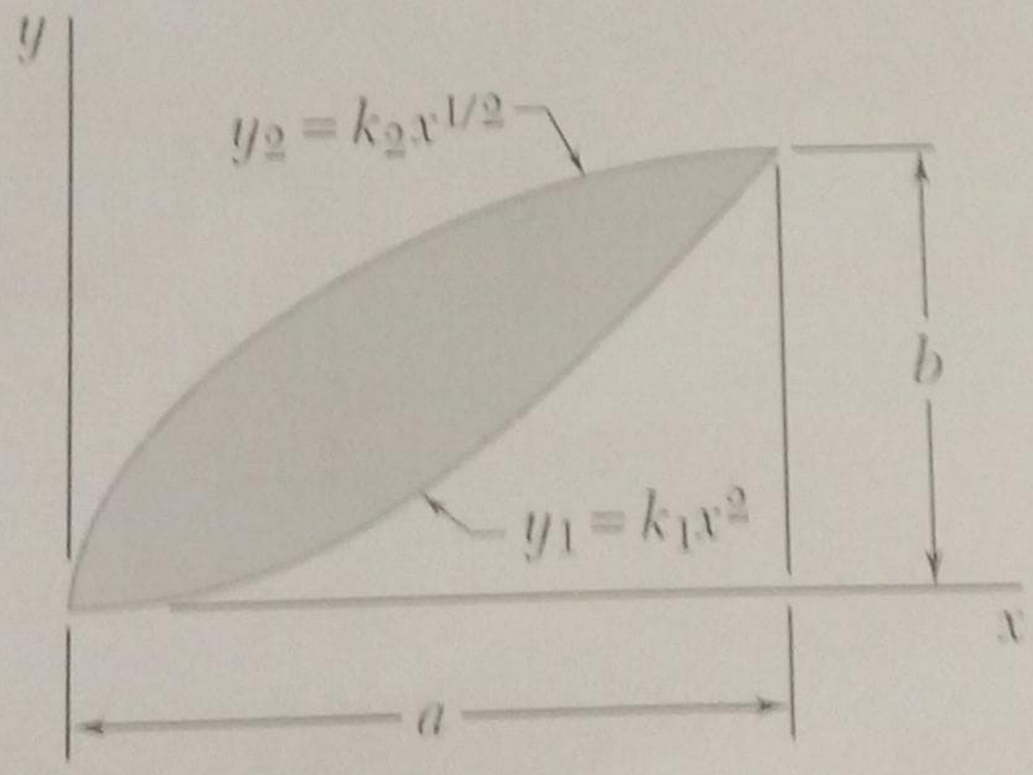
Programme Name & Branch	: B.Tech. (Chemical Engineering)
Course Code	: BMEE201L
Course Name	: Engineering Mechanics
Faculty Name(s)	: Dr. Kuldeep Roy
Class Number(s)	: VL2023240501518
Slot	: B2+TB2
Date of the Exam	: 02-April -2024
Exam Duration	: 90 minutes

Maximum Marks: 50

General instruction(s):

- Read the questions carefully before answering.
- Non-programmable calculators are allowed.

Q.No.	Question	Max Marks
1.	Illustrate the required free-body diagram(s) for the given frame and loading configuration to ascertain the components of all forces exerted on member ABCD when $\theta = 0$. 	10
2.	A 40 kg packing crate is pulled by a rope as shown in the diagram. Given: The coefficient of static friction between the crate and the floor = 0.35 and the angle $\alpha = 40°$. Determine (a) the necessary magnitude of force P to initiate the motion of the crate, (b) assess whether the crate will slide or tip under these conditions. 	10

	Two wedges, each inclined at 10° with negligible weight, are used to displace a 400-lb block. Determine the smallest force P required to be applied to one of the wedges for displacement. Given: the coefficient of static friction across all contact surfaces = 0.25. 	10
4.	Determine the centroid of the shaded region OPQ depicted in the figure, where the curve OQ is parabolic. 	10
5.	Calculate the moment of inertia and the radius of gyration relative to the x-axis for the shaded area depicted in the figure. 	10