

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2021

Course: Engineering Mechanics (MECH 2032)

Semester: III

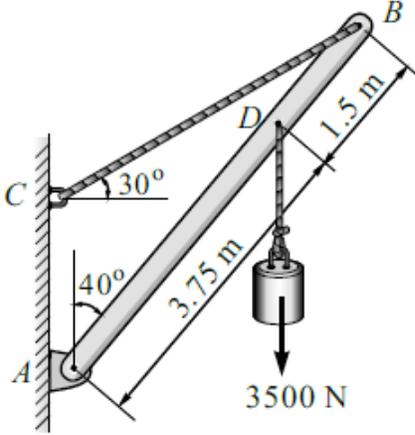
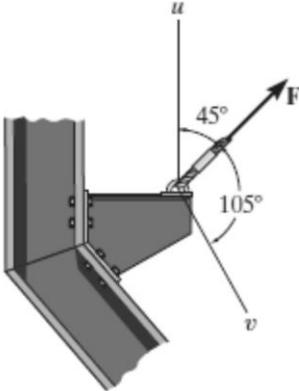
Programme: B.Tech EE, ASE, AVE, CERP, APE (Gas), Civil, FSE

Time: 3 Hours

Max. Marks: 100

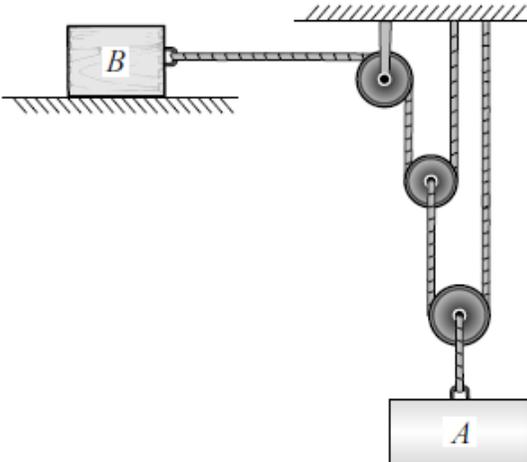
Note: All the questions are compulsory.

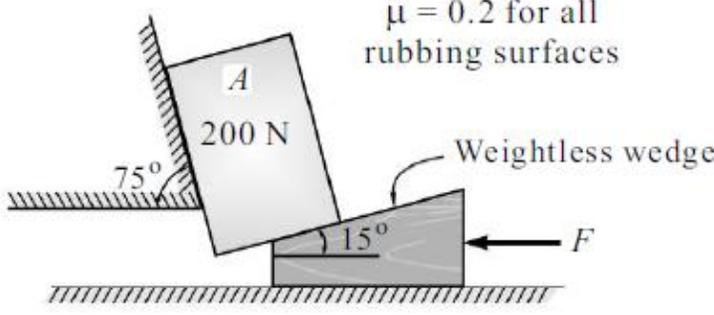
SECTION A

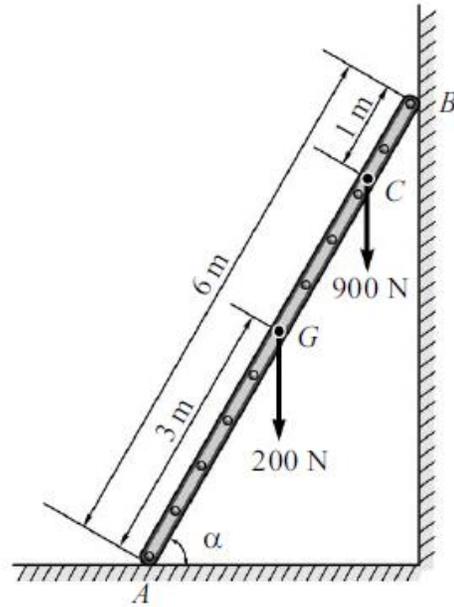
S. No.	Statement of the problem.	Marks	CO
Q-1	Draw the free body diagram for the bar AB. 	4	CO1
Q-2	A sphere is fired downward into a medium with an initial speed of 27 m/s. If it experiences a deceleration $a = 6t$ m/s where t is in seconds, determine the distance travelled before it comes to rest.	4	CO1
Q-3	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

Q-4	State & derive the expression for parallel axis theorem.	4	CO1
Q-5	Differentiate between method joint and method of section, which one is practically suitable and why?	4	CO1

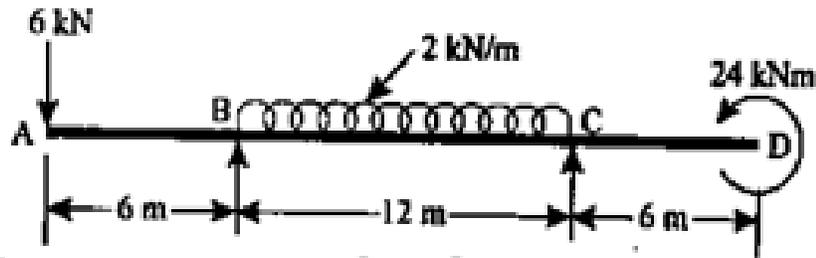
SECTION B

Q-6	Discuss free, damped and forced vibrations with suitable examples and figures.	10	CO1
Q-7	<p>Determine the acceleration of the 5 kg cylinder A as shown in figure below. Neglect the mass of the pulleys and cords. The block at B has a mass of 10 kg. The coefficient of kinetic friction between block B and the surface is 0.1.</p> 	10	CO2

Q-8	<p>Refer the fig. shown below and draw the FBD for different bodies and find the minimum value of force F to move the block A up the plane.</p> <p style="text-align: center;">$\mu = 0.2$ for all rubbing surfaces</p>  <p style="text-align: center;">OR</p> <p>The ladder shown in fig. below is 6 m long and is supported by a horizontal floor and vertical wall. The coefficient of friction between the floor and the ladder is 0.4 and between wall and ladder is 0.25. The weight of ladder is 200 N and may be considered a concentrated at G. The ladder also supports a vertical load of 900 N at C, which is at a distance of 1 m from B. Determine the least value of α at which the ladder may be placed without slipping.</p>	10	CO2
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Q-9 A beam ABCD is loaded as shown in figure below. Determine the reactions at the supports at points B and C.



10

CO2

SECTION C

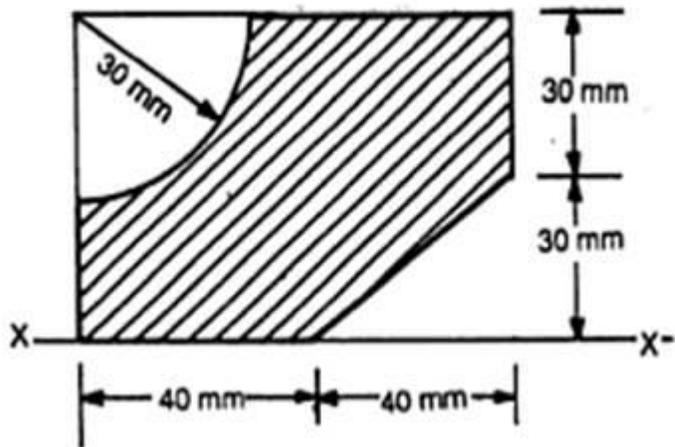
Q 10 Find the moment of inertia of the shaded portion:

(a) about the given axis X-X and;

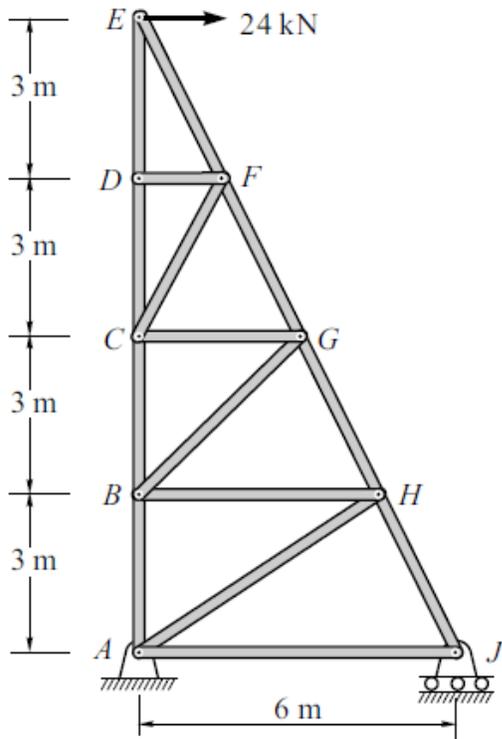
(b) about the centroidal axis parallel to the given X-X axis

20

CO3



11 Find out the force in all the members of the truss shown in figure below, by using method of joint.



OR

Find out the force in the members of the truss shown in figure below by using method of section.

20 CO3

