Name:

Enrolment No:



Semester: III

Max. Marks: 100

Time: 3 hrs.

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

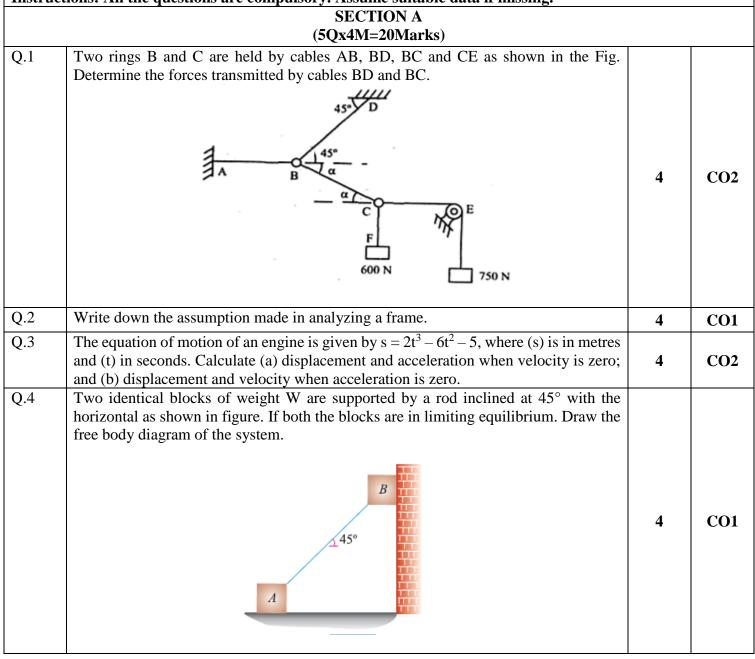
End Semester Examination, December 2022

Course: Engineering Mechanics

Programme: B.Tech ADE, Mechanical and AMNT

Course code: MECH 2031

Instructions: All the questions are compulsory. Assume suitable data if missing.



Q.5	Discuss the importance of study of vibration. Also, discuss the causes of vibration.	4	CO1
	SECTION B	•	1
	(4Qx10M=40 Marks)		
Q.6	The beam AB and CF are arranged as shown. Determine the reactions at A, C and D due to the loads acting on the beam as shown. 20 kN 40 kN A 50 B T 0.5 m C 60 KN A T M 1 M 1 M 1 M 1 M 1 M 1 M 1 M 1 M 1 M	10	CO3
Q.7	Determine the force P required to start the wedge as shown. The angle of friction for all surfaces of contact is 15°. 75° 100 kN 2.5 kN	10	CO3
Q.8	Find the forces in all the members of truss in magnitude and direction	10	СОЗ

	1.5 kN $ \begin{array}{c} B \\ C \\ 4 \\ M \end{array} $ $ \begin{array}{c} A \\ M $ $ \begin{array}{c} A \\ M \end{array} $ $ \begin{array}{c} A \\ M \end{array} $ $ \begin{array}{c} A \\ M $		
Q.9	Two stations P and Q are 5.2 km apart. An automobile starts from rest from the station P and accelerates uniformly to attain a speed of 48 kmph in 30 seconds. This speed is maintained until the brakes are applied. The automobile comes to rest at the station Q with a uniform retardation of 1 m/s². Determine the total time required to cover the distance between these two stations. OR A projectile is aimed at a mark on the horizontal plane through the point of projection. It falls 20 metres short when the angle of projection is 25°; while it overshoots the mark by 30 metres when the same angle is 55°. Find the angle of projection to hit the mark. Assume no air resistance.	10	CO2
	SECTION-C (2Qx20M=40 Marks)		
Q.10	A block of wood A of mass 10 kg is held on a rough horizontal table. An elastic string connected to the block passes over a smooth pulley at the end of the table and then under a second smooth pulley carrying a body B of mass 5 kg as shown in figure. 10 kg T T T T	20	CO3

			1
	The other end of the string is fixed to a point above the second pulley. When the 10		
	kg block is released, it moves with an acceleration of g/9. Determine the value of		
0.11	coefficient of friction between the block and the table.		
Q.11	Find the moment of inertia of the given lamina about its centroidal axes parallel to the horizontal and vertical axes.		
	nonzontal and vertical axes.		
	25 mm 50 mm 50 mm 50 mm		
	125 mm		
	OR		
		• 0	004
	Find the moment of inertia of the shaded portion:	20	CO2
	(a) about the given axis X-X and;		
	(b) about the centroidal axis parallel to the given X-X axis		
	30 mm 30 mm 30 mm		