Course Code: 2030301 Roll No: MLRS- R20

MARRI LAXMAN REDDY
INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION)
(Approved by AICTE, New Delhi & Affiliated to JNTUH, Hyderabad)
Accredited by NBA and NAAC with 'A' Grade & Recognized Under Section2(f) & 12(B)of the UGC act,1956

II B.Tech I Sem Supply End Examination, July-2022

Engineering Mechanics

(Mechanical Engineering)

Max. Marks: 70

Note: 1. Question paper consists: Part-A and Part-B.
2. In Part – A, answer all questions which carries 20 marks.
3. In Part – B, answer any one question from each unit.
Each question carries 10 marks and may have a, b as sub questions.

PART- A

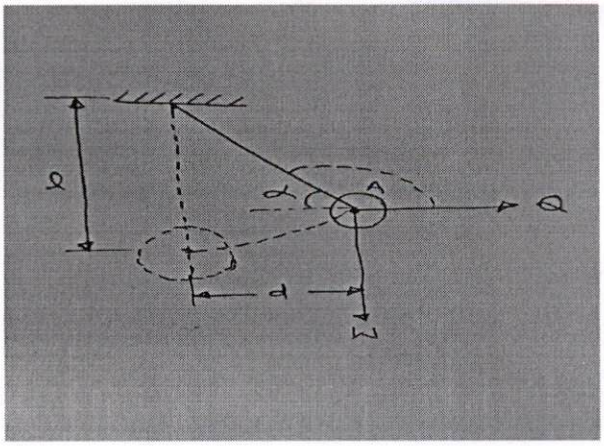
(10*2 Marks = 20 Marks)

1.	a)	What are the equations of equilibrium of a body in two dimensions and in three dimensions?	2M	CO1	BL2
	b)	State of varignon's theorem.	2M	CO1	BL1
	c)	Define the following. i) Angle of friction ii) Limiting friction	2M	CO2	BL1
	d)	State the factors influencing friction.	2M	CO2	BL2
	e)	What is the Difference between center of Gravity and center of mass?	2M	CO3	BL2
	f)	Determine the centroid of the rectangle lamina 55 mm × 25 mm	2M	CO3	BL5
	g)	Name the situations where area moment of inertia is used?	2M	CO4	BL2
	h)	What is polar moment of inertia of an area?	2M	CO4	BL1
	i)	What is general plane motion? Give one example.	2M	CO5	BL1
	j)	Under what circumstances the work energy method is used?	2M	CO5	BL2

PART- B

(10*5 Marks = 50 Marks)

2	a)	Derive for the minimum force acting horizontally the inclined plane required which will keep the body in equilibrium if the body is sliding downward.	5M	CO1	BL2
	b)	A ball of weight W is suspended from a string of length l and is pulled by a horizontal force Q. The weight is displaced by a distance d from the vertical position as shown in Figure. Determine the angle α, forces Q and tension in the string S in the displaced position.	5M	CO1	BL3



OR

3	a)	State the characteristics of a force?	10M	CO1	BL6
		b) A triangle ABC has its side AB=40mm along positive x axis and side BC=30mm in positive y axis. Three forces 40N, 50N & 30N acts along the sides AB, BC & CA respectively. determine magnitude of the resultant of such system of forces.			
4	a)	A ladder 5 m long rests on a horizontal ground and leans against a smooth vertical wall at an angle of 70^0 with the horizontal. The weight of the ladder is 300 N. The ladder is on the verge of sliding when a man weighing 750 N stands on a rung 1.5 m high. Calculate the coefficient of friction between the ladder and the floor.	5M	CO2	BL5
	b)	Obtain the relation for moment due to effort and load to be raised is a screw jack.	5M	CO2	BL3

OR

5		A block weighing 500N just starts moving down a rough inclined plane when supported by a force of 200N acting parallel to the plane in upward direction. The same block is on the verge of moving up the plane when pulled by a force of 300N acting parallel to the plane. Find the inclination of the plane and coefficient of friction between the inclined plane and the block.	10M	CO2	BL6
6	a)	State and prove Pappus theorems of area and volume.	5M	CO3	BL2
	b)	Determine the centre of gravity of a right regular solid cone of radius `R` and height `h`.	5M	CO3	BL4

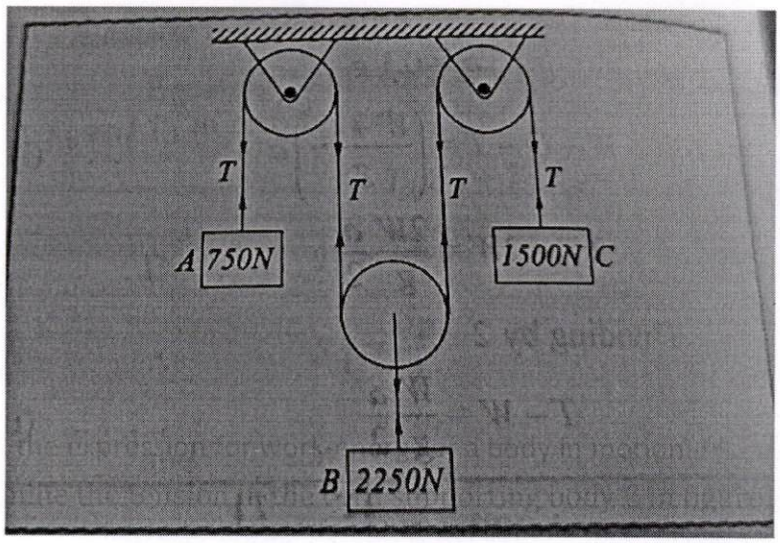
OR

7		Determine the center of gravity of a solid hemisphere of radius r from its diametral axis.	10M	CO3	BL3
8	a)	Define principal axes and principal moment of inertia.	5M	CO4	BL2
	b)	Determine the mass moment of inertia of a sphere of radius r and mass m about an axis passing through its origin. Assume the density of sphere material is constant.	5M	CO4	BL4

OR

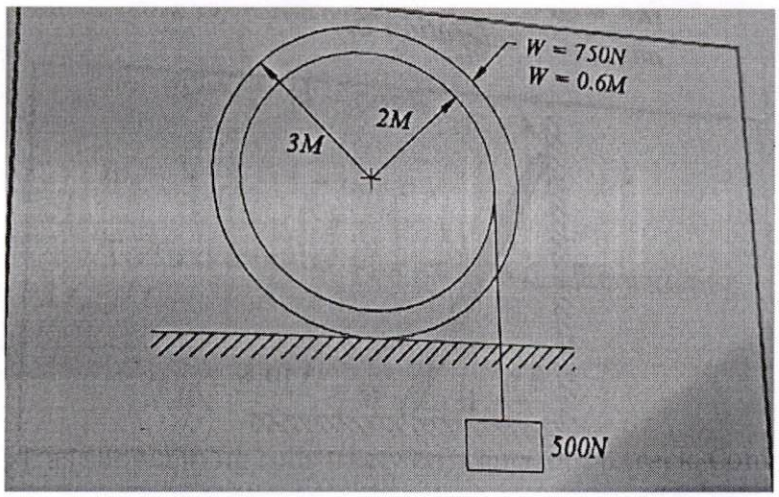
9		From the first principles, find the moment of inertia of a circular plate of radius 'R' about its diametral axis.	10M	CO4	BL3

10	a)	Derive the expression for work-energy of a body in motion.	5M	CO5	BL2
	b)	Determine the tension in the cord supporting body C in figure. The pulleys are frictionless and of negligible weight.	5M	CO5	BL4



OR

11		The disk as shown in fig rolls freely on a horizontal track. Compute the angular velocity of the disk after its Centre has moved 3 m from rest. Use work-energy method.	10M	CO5	BL5



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