R22 Regulation *Subject code: 4E1AD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech I Semester Supplementary Examinations, June 2024

Engineering Mechanics

(Civil Engineering)

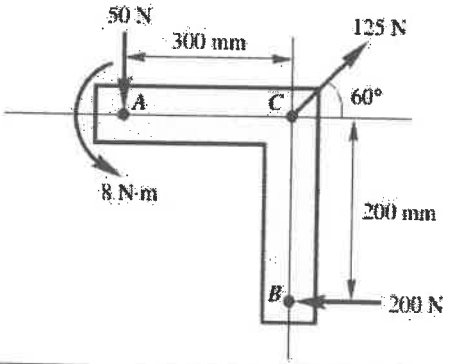
Maximum Marks: 60 Date:27.06.2024 Duration: 3 hours

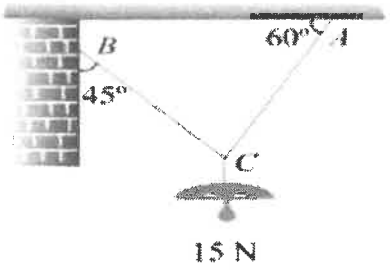
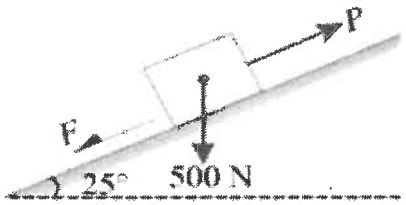
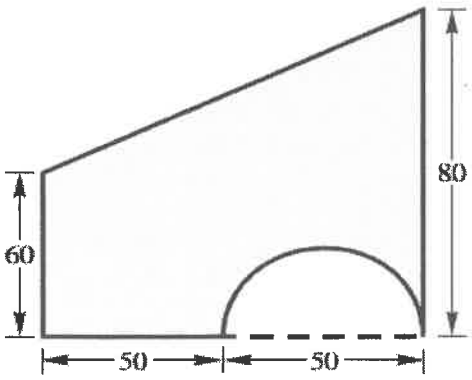
Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

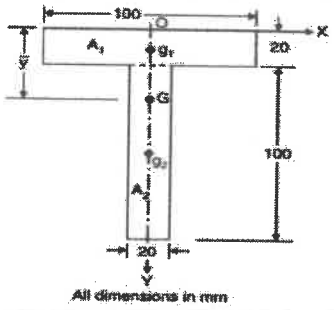
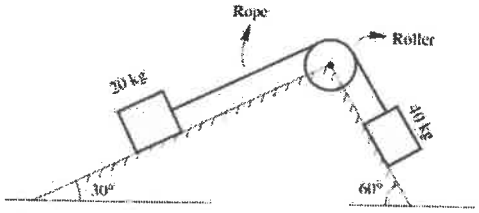
Part-A

All the following questions carry equal marks (10X1M=10 Marks)			CO No.	Bloom Tx
1.	a	List the characteristics of a force.	1	II
	b	Differentiate collinear and concurrent force systems.	1	II
	c	Write the centroid of a right angle triangle.	2	II
	d	Define the coefficient of friction.	2	I
	e	What is area moment of inertia?	3	I
	f	Write the equation for moment of inertia of a circular area about an axis perpendicular to the area and passing through its centre.	3	III
	g	Define general plane motion.	4	I
	h	State D Alembert's principle.	4	I
	i	Give the causes of vibration in a mechanical system.	5	II
	j	Mention the important characteristics of a SHM.	5	II

Part-B

Answer All the following questions. (5X10M=50Marks)				
2		Three forces and a couple are applied to an angle bracket as shown. (a) Find the resultant of this system of forces. (5) (b) Locate the points where the line of action of the resultant intersects the line AC and the line BC. (5)  	1	III

	OR		
3	An electric light fixture weighing 15 N hangs from a point C, by two strings AC and BC. The string AC is inclined at 60° to the horizontal and BC at 45°, as shown in figure. Determine the force in the strings. (10)  	1	IV
4	A body of weight 500 N is lying on a rough plane inclined at an angle of 25° with the horizontal. It is supported by an effort (P) parallel to the plane as shown in figure. Determine the minimum and maximum values of P, for which the equilibrium can exist, if the angle of friction is 20°. (10)  	2	III
	OR		
5	Locate the centroid for the area shown below. All dimensions are in mm. (10)  	2	IV

6	Determine the moment of inertia of beam cross-sectional area shown in figure about the centroidal axes. All dimensions are in mm. (10) 	3	III
	OR		
7	Derive and find the mass moment of inertia of a thin rectangular plate about a line (i) Passing through the base (ii) Passing through the centre of gravity and parallel to base. (10)	3	V
8	Two blocks of mass 20 kg and 40 kg are connected by a rope passing over a frictionless pulley as shown in figure. Assuming coefficient of friction as 0.25 for all contact surfaces, find the tension in the string and acceleration of the system. (10) 	4	III
	OR		
9	A body weighing 200 N is pulled up on a 30° plane by force of 300 N acting parallel to the plane. If the initial velocity of the body is 1.8 m/sec and coefficient of friction is 0.1, What will be the velocity after moving 4 m? Use work energy principle. (10)	4	III
10	A body performing SHM has a velocity14m/s when the displacement is 60mm and 4m/s when the displacement is 100mm, the displacement being measured from the mid-point. Calculate the frequency and amplitude of the motion. What is the acceleration when the displacement is 75cm? (10)	5	IV
	OR		
11	Present the virtual work formulation for finding the deflection and slope of Beams. (10)	5	V