R22 Regulation *Subject code:4E1AD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech I Semester Supplementary Examinations, January 2026

ENGINEERING MECHANICS

(CE)

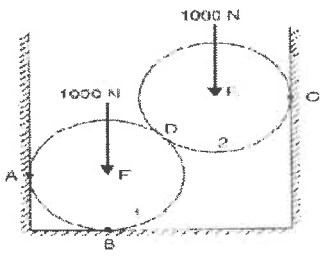
Maximum Marks: 60 Date: 09.01.2026 Duration: 3 hours

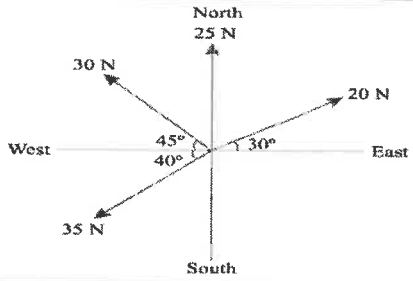
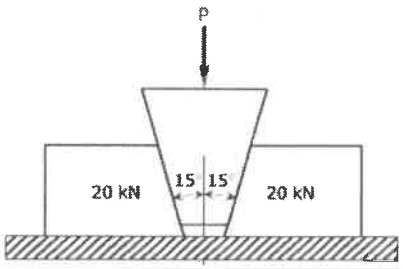
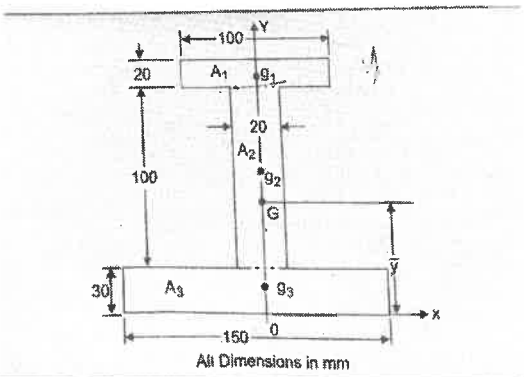
Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

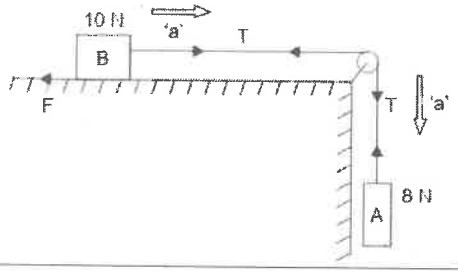
Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BTL
1.a	State Lames theorem.	1M	1	L1
b	State parallelogram law of forces.	1M	1	L1
c	What is cone of friction?	1M	2	L1
d	Define center of gravity.	1M	2	L1
e	State perpendicular axis theorem.	1M	3	L1
f	State first Pappu's theorem.	1M	3	L1
g	What is rectilinear motion?	1M	4	L1
h	Write about Polar mass moment of inertia.	1M	4	L1
i	State simple harmonic motion.	1M	5	L1
j	Define free vibration.	1M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	Two spheres, each of weight 1000 N and radius 25 cm rest in a horizontal channel of width 90 cm as shown in the Figure. Find the reactions on the points of contact A, B and C. 	10M	1	L2
	OR			
3	Determine the resultant of system of forces acting as shown in fig.	10M	1	L2

				
4	As shown in the following figure, two blocks each weighing 20 KN and resting on a horizontal surface, are to be pushed apart by a 30^O wedge. The angle of friction is 15^O for all contact surfaces. What value of P is required to start movement of the blocks? 	10M	2	L2
	OR			
5	Locate the centroid of the I-section as show in figure 	10M	2	L2
6	A solid body formed by joining the base of a right circular cone of height H to the equal base of a right circular cylinder of height h. Calculate the distance of the centre of mass of the solid from its plane face, when H = 120 mm and h = 30 mm.	10M	3	L2
	OR			
7	An elevator cage of mass 900 kg when empty is lifted or lowered vertically by means of a wire rope. A man of mass 72.5 kg is standing in it. Find: (a) The tension in the rope, (b) The reaction of the cage on the man, and (c) The force exerted by the man on the cage, when the cage is moving up with an acceleration of 3 m/s^2.	10M	3	L2

8	Two blocks shown in Fig. have weights A = 8 N and B = 10 N and co-efficient of friction between the block A and horizontal plane is 0.2. If the system is released, from rest and the block A falls through a vertical distance of 1.5 m, what is the velocity acquired by it? Neglect the friction in the pulley and extension of the string.  	10M	4	L2
	OR			
9	An automobile of mass 1500 kg is driven down a 5^{O} incline plane at a speed of 100 km/hr when the brakes are applied, causing a constant total braking force of 8000 N. Determine the distance travelled by the automobile as it comes to stop. Apply work energy theorem.	10M	4	L2
10	A body performing SHM has a velocity 12m/s when the displacement is 50mm and 3m/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?	10M	5	L2
	OR			
11	What is virtual work? Explain the concept of Virtual work. Mention some of its applications.	10M	5	L2