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 2026

ENGINEERING MECHANICS

(CE)

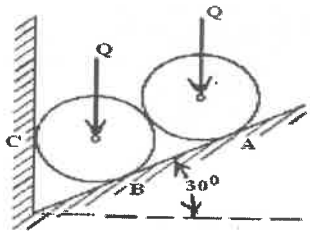
Maximum Marks: 60 Date:20.06.2026 Duration: 3 hours

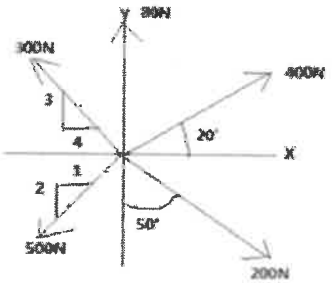
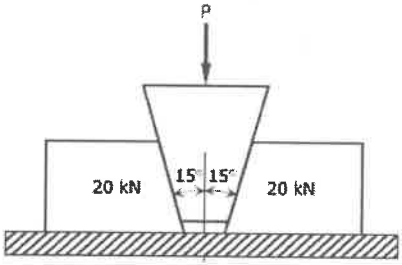
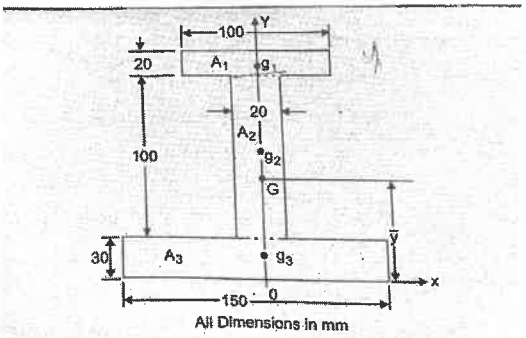
Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

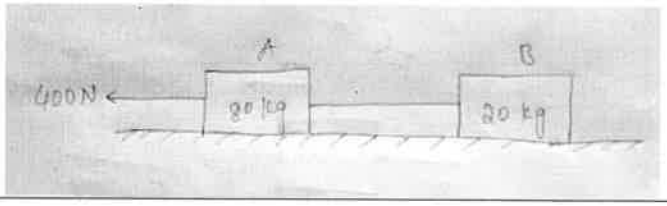
Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	BTL
1.a	State Varignon's theorem.	1M	1	L1
b	State parallelogram law of forces.	1M	1	L1
c	Write the types of friction?	1M	2	L1
d	Define center of gravity.	1M	2	L1
e	What is Radius of gyration?	1M	3	L1
f	State the Parallel axis theorem.	1M	3	L1
g	What is rotary motion?	1M	4	L1
h	Write about Polar mass moment of inertia	1M	4	L1
i	Define forced vibration.	1M	5	L1
j	Define Time period.	1M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
2	Two identical rollers, each of weight 100 N, are supported by an inclined plane and a vertical wall as shown in the following figure. Assuming smooth surfaces, find the reactions induced at the points of support 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	A brass cone with base diameter of 400 mm and height of 225 mm is placed on a vertical aluminum cylinder of height 300 mm and diameter 400 mm. density of brass 85 kN/m^3 and density of aluminum is 25.6 kN/m^3. Determine the mass moment of the composite body about the vertical geometrical axis.	10M	3	L2

8	Two bodies A and B of mass 80Kg and 20Kg are connected by a thread and move along a rough horizontal plane under the action of a force 400N applied to the first body of mass 80Kg as shown in fig. The coefficient of friction between the sliding surfaces of the bodies and the plane is 0.3. Determine the acceleration of bodies and the tension in the thread using D'Alembert's Principle. 	10M	4	L2
	OR			
9	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	4	L2
10	The piston of an engine moves with SHM. The crank rotates at 100rpm and its stroke is 180cm. Find the velocity and acceleration of the piston when it is at a distance 60cm from the Centre.	10M	5	L2
	OR			
11	What is Virtual Work? Explain the principle of virtual work and mention applications of virtual work?	10M	5	L2