R20 Regulation *Subject code:3E2AD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Semester Supplementary Examinations, July 2025

ENGINEERING MECHANICS

(Common to CE & ME)

Maximum Marks: 70 Date:17.07.2025 Duration: 3 hours

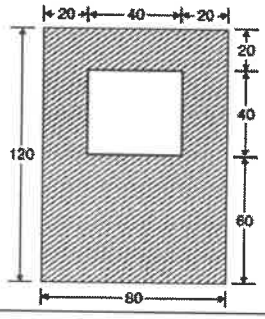
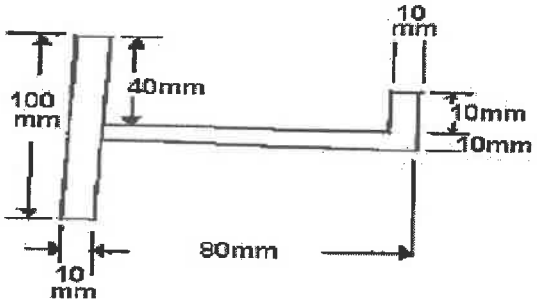
Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X2M=20 Marks)		Marks	CO	BTL
1	Define (a) coplanar force and (b) concurrent force system	2M	1	L1
2	Define couple.	2M	1	L1
3	State the Pappu's theorem – II.	2M	2	L1
4	Explain (i) coefficient of friction; (ii) cone of friction.	2M	2	L1
5	State perpendicular axis theorem.	2M	3	L1
6	Define mass moment of inertia.	2M	3	L1
7	Derive the Work energy equation for Translation motion.	2M	4	L1
8	What are the different types of motions?	2M	4	L1
9	Write classifications of vibrations.	2M	5	L1
10	Define amplitude of simple pendulum.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	Explain about various system of forces.	10M	1	L2
	OR			
12	ABCD is a square, each side being 20 cm and E is the middle point of AB. Forces of 7, 8, 12, 5, 9 and 6 KN act on the lines of directions AB, EC, BC, BD, CA and DE respectively. Find the magnitude, direction and position of the resultant force.	10M	1	L2
13	A ladder 6 m long and with 300N weight is resting against a wall at an angle of 60^0 to the ground. A man weighing 750N climbs the ladder. At what position along the ladder from the bottom does he induce slipping? The coefficient of friction for both the wall and the ground with the ladder is 0.2.	10M	2	L2
	OR			
14	A block weighing 100 N is resting on a rough plane inclined 20^0 to the horizontal. It is acted upon by a force of 50N directed upward at angle of 14^0 above the plane. Calculate the friction. If the block is about to move up the plane, Calculate the co-efficient of friction.	10M	2	L2

15	For the shaded area as shown in the following figure, determine the Moment of Inertia of an area of plane figure about their centroidal axes. All units are in centimeters.  	10M	3	L2
	OR			
16	Compute the moment of inertia of the plane area shown in figure about its horizontal centroidal axis.  	10M	3	L2
17	a) Find the work done in drawing a body weighing 1000 N through a distance 10 m along a horizontal surface by a horizontal force of 400 N. b) State the law of conservation of momentum.	5M 5M	4	L2
	OR			
18	A 20 Kg block starting from rest slides up a 300 inclined plane under the action of a 175 N force directed along the inclined plane. The coefficient of kinetic friction between the block and the plane is 0.2. Determine the (i) speed of the block after it slides 4.5 m and (ii) the distance travelled by the block when its speed becomes 4.5 m/s.	10M	4	L2
19	Differentiate Simple and Compound Pendulums.	10M	5	L2
	OR			
20	a) A body moving with simple harmonic motion has amplitude of 1 m and a period of oscillation of 2 seconds. What will be its velocity and acceleration 0.4 seconds after passing an extreme position? b) Mention the forces which are generally omitted while applying the principle of virtual work.	5M 5M	5	L2