



Regulation R20

Subject code: 3E2AD

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Semester Supplementary Examinations, January 2024

Engineering Mechanics

(Common to CE and ME)

Maximum Marks: 70

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)

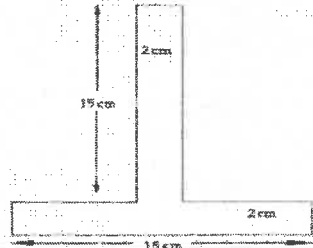
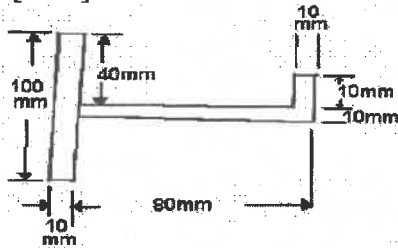
		CO	Bloom Tx
1.	Define (a) coplanar force and (b) concurrent force system	1	L1
2.	Define couple	1	L2
3.	State the Pappu's theorem – II.	2	L2
4.	Define the cone of friction.	2	L2
5.	State Perpendicular axis theorem.	3	L2
6.	Find the centroidal coordinates (\bar{x} , \bar{y}) of rectangular area of breadth b and depth d.	3	L1
7.	Define motion. Write different types of motion.	4	L1
8.	Write the work energy equation for linear motion and rotating	4	L2
9.	Define virtual work and virtual displacement.	5	L1
10.	Write the applications of virtual work	5	L1

Part-B

Answer All the following questions.

(10M X 5 = 50 Marks)

11.(a)	A beam AB is located supported and loaded as shown in the following figure. Find the reactions at the supports. [5M]	1	L4
(b)	Calculate the magnitude, direction and position of the resultant of the system of forces as shown in figure. [5M]	1	L3

	OR		
12.	Five strings are tied at a point and are pulled in all directions, equally spaced, from one another. If the magnitude of the pulls on three consecutive strings is 70N, 40N and 55N respectively, find graphically the magnitude of the pulls on two other strings, if the system is in equilibrium. [10M]	1	L4
13.	A ladder 6 m long and with 300N weight is resting against a wall at an angle of 60° 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	L4
	OR		
14.	A block weighing 100 N is resting on a rough plane inclined 20° to the horizontal. It is acted upon by a force of 50N directed upward at angle of 14° above the plane. Calculate the friction. If the block is about to move up the plane, Calculate the coefficient of friction. [10M]	2	L4
15.(a)	Find the mass moment of inertia of a hollow sphere with respect to a diameter if the mass per unit volume of the material is ρ and the outer and inner radii are R_o and R_i , respectively. [5M]	3	L2
(b)	Find the moment inertia of the T section shown in Figure below: [5M]	3	L4
			
	OR		
16.	Compute the moment of inertia of the plane area shown in figure about its horizontal centroidal axis. [10M]	3	L4
			
17.(a)	Derive work energy equation for translation. [5M]	4	L2
(b)	State the law of conservation of momentum. [5M]	4	L1
	OR		

18.	A 20 Kg block starting from rest slides up a 30° 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	L4
19.	The amplitude of a particle in simple harmonic motion is 0.75m and the period is 1.2sec. Determine: [10M] (a) maximum velocity (b) maximum acceleration. (c) displacement (d) frequency	5	L4
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? [5M]	5	L4
(b)	Mention the forces which are generally omitted while applying the principle of virtual work. [5M]	5	L3