R22 Regulation *Subject code:4E4BA*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

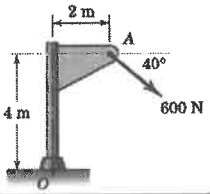
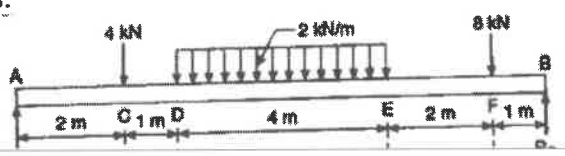
B.Tech IV Semester Supplementary Examinations, December 2024

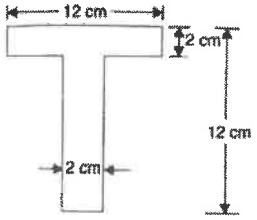
Solid Mechanics and Hydraulic Machines

(EEE)

Maximum Marks: 60 Date: 03.12.2024 Duration: 3 hours

	Part-A	CO	Bloom Tx
All the following questions carry equal marks (10 x 1M=10 Marks)			
1.a)	A force F = (10 i + 8 j – 5 k) N acts at point A (2, 5, 6) m. What is the moment of the force about the point B (3, 1, 4).	1	II
b)	Define angle of friction and angle of repose.	1	I
c)	State the parallel axis theorem as applied to moment of inertia.	2	I
d)	Define modulus of rigidity.	2	I
e)	Compare rectilinear and curvilinear motion.	3	II
f)	Write the impulse-momentum equation and mention its application.	3	I
g)	Define effective head.	4	I
h)	What is the purpose of drawing a velocity triangle?	4	I
i)	Give the significance of specific speed.	5	I
j)	How will you classify the turbines?	5	I

	Part-B		
Answer All the following questions. (5 X 10M=50Marks)			Bloom Tx level
2	(a) A body of weight 100 N rests on a rough horizontal surface ($\mu = 0.3$) and is acted upon by a force applied at an angle of 30° to the horizontal. What force is required to just cause the body to slide over the surface? [6M] (b) Calculate the magnitude of the moment about the point 'O' of the 600 N force shown in figure. [4M] 	1	IV
	OR		
3	(a) A simply supported beam is loaded as shown. Find the support reactions. [7M] 	1	IV

	(b) State and describe the parallelogram law of forces. [3M]		
4	Find the center of gravity of the T-section shown in figure. [10M] 	2	IV
	OR		
5	For a given material, Young's Modulus is 110 GN/m^2 and shear modulus is 42 GN/m^2. Find the bulk Modulus and lateral contraction of a round bar of 37.5 mm diameter and 2.4 m length, when stretched by 2.5 mm. [10M]	2	IV
6	The driver of a car moving at a constant speed of 18 kmph realizes that if he moves at this speed, he will reach the office late by 10 seconds. Hence, he accelerates at a constant rate of 2 m/s^2 so that he reaches the office right in time. Determine the time taken to reach the office and the distance covered during time. [10M]	3	IV
	OR		
7	A 10 g bullet is shot horizontally in a wood block of mass 1 kg. The bullet gets embedded in the block and the block is displaced on a rough horizontal surface of a table with μ=0.2 through 1 m. What was the velocity of bullet? [10M]	3	IV
8	A jet of water of diameter 50 mm strikes a stationary, symmetrical curved plate with a velocity of 40 m/s. Find the force extended by the jet at the center of plate along its axis if the jet is deflected through 120° at the outlet of the curved plate. [10M]	4	IV
	OR		
9	Discuss the elements of a typical hydroelectric power plant installation. Write a short note on the various applications of Hydroelectric power plant. [10M]	4	III
10	Give a detailed account of the components and working of a Pelton wheel turbine with a neat sketch. Give its applications. [10M]	5	III
	OR		
11	Discuss the components and working of a single acting reciprocating pump with a neat sketch. [10M]	5	III