R25 Regulation *Subject code:5ES2AH*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech II Semester Regular Examinations, June 2026

ENGINEERING MECHANICS

(CE)

Maximum Marks: 60 Date:22.06.2026 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 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 (5X2M=10Marks)	Marks	CO	BTL
1.a	State Varignon's theorem.	2M	1	BLI
b	What is the difference between centroid and center of gravity (C.G)	2M	2	BLI
c	What is the moment of inertia of a semicircle about its centroidal axis?	2M	3	BL3
d	Define rectilinear motion.	2M	4	BL1
e	State D'Alemberts principle	2M	5	BL1

Part-B

	Answer All the following questions. (5X10M=50Marks)	Marks	CO	BTL
2	Two spheres of weight P and Q rest inside a hollow cylinder, which is resting on a horizontal plane as shown in fig.. Draw the free body diagrams of both the spheres taken together and both spheres taken separately.	10M	1	BL3

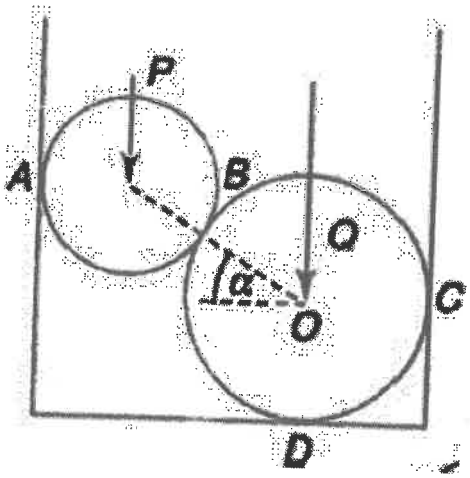
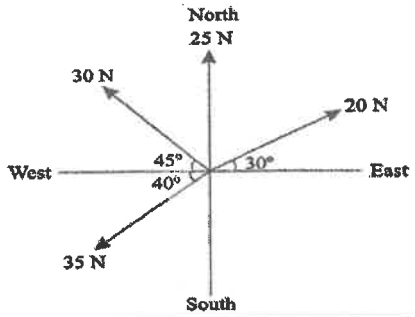
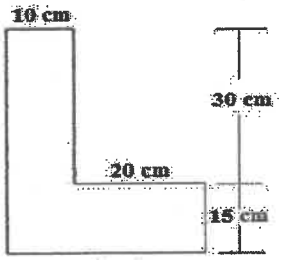
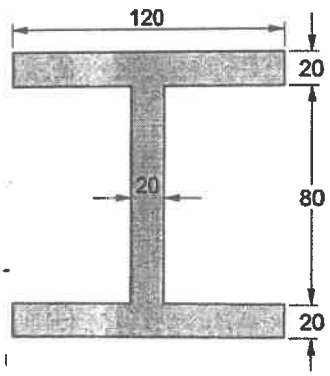
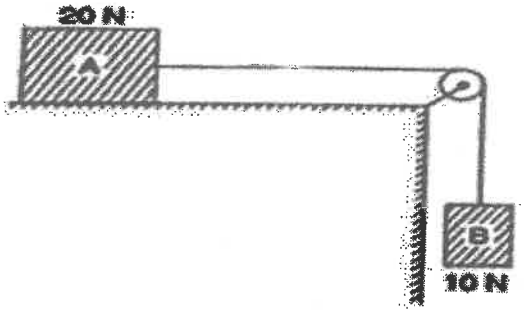


Fig.

OR

3	Find the magnitude and direction of the resultant force for the given figure.  	10M	1	BL2
4	a) What is wedge friction? Mention its applications. b) A body of weight 300 N is lying on a rough horizontal plane having a coefficient of friction as 0.3. Find the magnitude of the force, which can move the body, while acting at an angle of 25^0 with the horizontal.	4M 6M	2	BL2 BL3
	OR			
5	Find the centroid of the plane lamina as shown in the following figure.  	10M	2	BL3
6	Determine the moment of inertia and radius of gyration for the plane lamina as shown in the fig. about centroidal x-axis. All dimensions are in mm.  	10M	3	BL2
	OR			
7	Find the mass moment of inertia of a sphere of radius 'R' about its diametric axis.	10M	3	BL3

8	A motorist is travelling at 90 kmph, when he observed a traffic light 250 m ahead of him turns red. The traffic light is timed to stay red for 12 sec. If the motorist wishes to pass the light without stopping, just at it turns green, determine: a) the required uniform deceleration of the motor and b) speed of the motor as it passes the traffic light.	10M	4	BL3
	OR			
9	Derive the motion of two bodies connected by a string passing over a smooth pulley to determine acceleration and tension developed in the string with a neat sketch.	10M	4	BL3
10	A body of mass 15 kg falls on the ground from a height of 19.6 m. The body penetrates into the ground. Find the distance through which the body will penetrate into the ground, if the resistance by the ground to penetration is constant and equal to 4900 N. Take g = 9.8 m/s^2	10M	5	BL3
	OR			
11	Two blocks shown in Fig. have weights A = 20 N and B = 10 N and coefficient of friction between the block A and the horizontal plane is $\mu = 0.25$. If the system is released from the rest and block B falls through a vertical distance of 2 m, what is the velocity attained by block B. Neglect the friction in the pulley and the extension of the string.  Fig.	10M	5	BL3