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BTECH
(SEM III) THEORY EXAMINATION 2023-24
ENGINEERING MECHANICS

TIME: 3HRS

M.MARKS: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief.

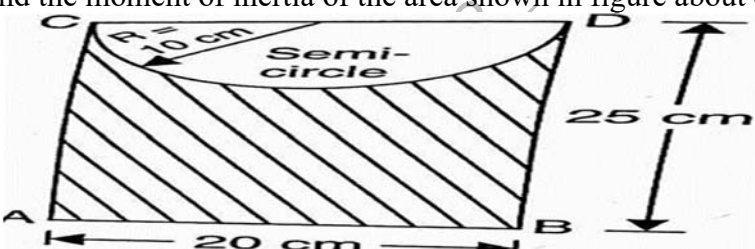
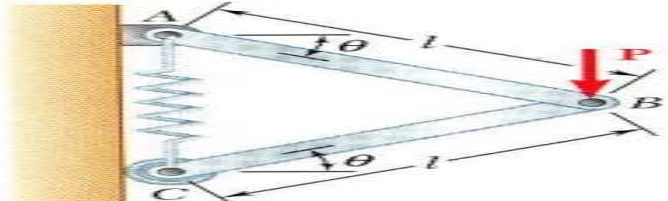
2 x 7 = 14

Q no.	Question	Marks
a.	Give the classifications of engineering mechanics.	2
b.	Write the types of force system.	2
c.	How will you find co-ordinate of centroid of an axes?	2
d.	Determine the mass moment of inertia of uniform density sphere of radius 5 cm its centroidal axes.	2
e.	Write down the equations for the equilibrium of a body in three dimensions.	2
f.	State the law of conservation of energy.	2
g.	Define virtual displacement.	2

SECTION B

2. Attempt any *three* of the following:

7 x 3 = 21

a.	Describe the applications of systems of forces. What is a system of forces?	7
b.	Find the moment of inertia of the area shown in figure about edge AB. 	7
c.	Describe the assumptions and analysis of plane truss.	7
d.	Derive the equation of motion of motion for a body moving in a straight line by method of integration.	7
e.	Determine the expressions for θ and the tension in the spring which correspond to the equilibrium position of the spring. The unstretched length of the spring is h and the constant of the spring is k . Neglect the weight of the mechanism, By virtual work method. 	7

SECTION C

3. Attempt any *one* part of the following:

7 x 1 = 7

a.	Four forces of magnitude 10 kN, 15 kN, 20 kN and 40 kN are acting at a point as shown in fig. The angles made by all these forces shown in fig. Find the resultant and direction of the resultant.	7
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b.	Define wedge. And discuss about the equilibrium of body placed on wedge.	7

4. Attempt any *one* part of the following: 7 x 1 = 7

a.	Find out the centroid of area of a circular section and also find the centroid of circles.	7
b.	Derive an expression for mass moment of inertia of solid cylinder about its longitudinal axis and its centroidal axes.	7

5. Attempt any *one* part of the following: 7 x 1 = 7

a.	Find the forces in all the members of the truss shown in figure. <div style="text-align: center;"> </div>	7
b.	Determine the reactions at A and B of the over-hanging beam shown in fig. <div style="text-align: center;"> </div>	7

6. Attempt any *one* part of the following: 7 x 1 = 7

a.	Acceleration of ship moving along a straight curve varies directly as the square of its speed. If the speed drops from 3 m/sec. to 1.5 m/sec. in one minute. Find the distance moved in this period.	7
b.	A wheel is rotating at 300 rpm attains a speed of 180 rpm after 20 seconds. Determine the acceleration of the flywheel assuming it to be inform. Also determine the time taken to come to rest from a speed of 300 rpm if the acceleration remains the same and number of revolutions made during this time.	7

7. Attempt any *one* part of the following: 7 x 1 = 7

a.	Discuss various terminologies related to kinetics of rigid body.	7
b.	The speed of a flywheel rotating at 200 rpm is uniformly increased to 300 rpm in 5 seconds. Determine the work done by the driving torque and the increase in kinetic energy during this time. Take mass of the flywheel as 25 kg and its radius of gyration as 20 rpm.	7