

2008-COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY

I B.TECH DEGREE EXAMINATION

ENGINEERING MECHANICS
(MECHANICAL ENGINEERING)

TIME-3HOUR
MARKS-100

JUNE-2008

ANSWER ALL QUESTIONS

SECTION A [8*5=40]

1. a) Explain principle of transmissibility of force and law of superposition.
- b) State and prove Pappus theorem.
- c) Derive an expression for polar moment of inertia of a circle of diameter 'd' with respect to its centre.
- d) Explain principle of Virtual work.
- e) Prove that the trajectory of a projectile is parabolic.
- f) Explain principle of conservation of momentum in case of impact of bodies.
- g) Derive a formula for equivalent length of a compound pendulum.
- h) What is "centre of percussion"? Obtain an expression for distance b/w centre of percussion and rotating axis of a rigid body, considering x-axis through the centre of gravity of the rotating body.

SECTION B [4*15=60]

2. A semicircular disc of radius 'r' and weight 'w' rests on a horizontal surface and is pulled at right angles to its geometric axis by a horizontal force 'P'. Find the angle that the flat surface of disc will make the horizontal just before sliding begins. The weight 'w' is acting at the centre of gravity.
OR
3. A beam AB is hinged at 'A' and supported at B by a vertical cord which passes over a frictionless pulley at C and carries at its end a load P as shown. Determine the distance 'x' from 'A' at which a load Q must be placed on the beam if it is to remain in equilibrium in a horizontal position. Neglect the weight of beam. If proportion of distance x:l is 1:6 and P=10N, find load at 'Q'.
4. A particle is projected from origin 'O' with a velocity of 120m/s at an elevation of 60 degree to the horizontal. At some position P it has a velocity in a direction making an angle of 30 degree with the horizontal. Determine the velocity of the particle at P coordinates of P and the distance OP.
OR
5. A car traveling at 40km/hr sights a distant signal at 150m and comes uniformly to rest at the signal. It remains at rests for 20s. As allowed by the signal, it uniformly accelerate and attain 40km/hr in 250m. Calculate time lost due to signal
6. A steam turbine is running at 2400 revolutions/minute. On shutting off steam it slows down & comes to rest in 4 minutes. If the angular retardation is uniform, find its magnitude in radians per second square & also the no. of revolutions made by the turbine before coming to rest.
OR
7. A slender prismatic bar of weight W=36 N is free to rotate in a vertical plane about a fixed axis through 'O'. The bar is released from rest in the unstable position of equilibrium & falls into the horizontal position A'B', where it is brought to rest by 2 identical springs having constant K. If the spring A is compressed 1.27 cm before the bar comes to rest, what is the spring constant?