CE / ME 114 (R-22)

Total No. of Questions : 10] [Total No.of Pages : 03

I/IV B. Tech. DEGREE EXAMINATIONS, AUGUST - 2023

First Semester

CE / ME

ENGINEERING MECHANICS

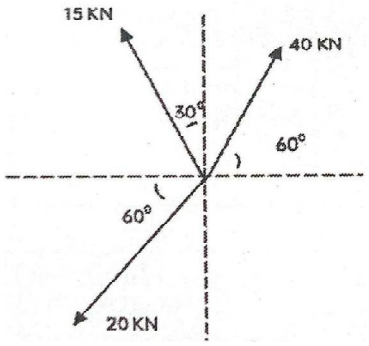
Time : **Three Hours** Maximum : **70** Marks

Answer All Questions

Answer ONE question from each Unit. 5x14=70 M

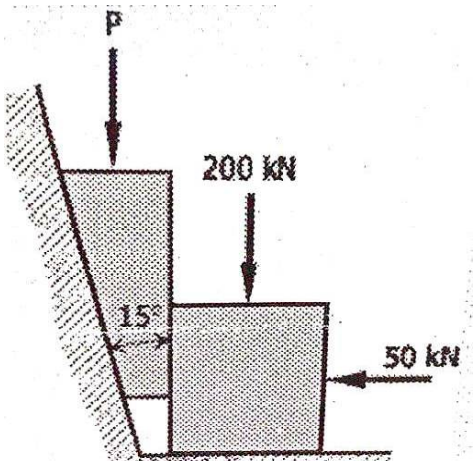
UNIT - I

1. Three forces of magnitude 40 kN, 15 kN and 20 kN are acting at a point O as shown in figure. The angles made by 40 kN, 15 kN and 20 kN forces with X - axis are 60^o, 120^o and 240^o respectively. Determine the magnitude and direction of the resultant force.



(OR)

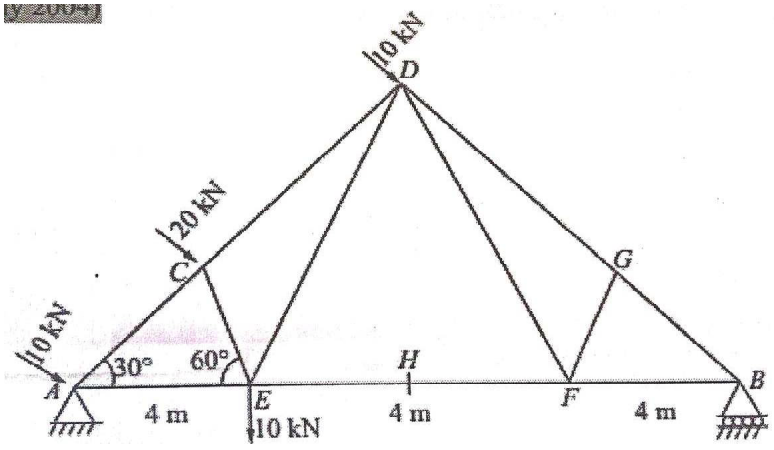
2. Determine the force P required to start the wedge shown in Fig. The angle of friction for all surfaces in contact is 15^o.



P.T.O.

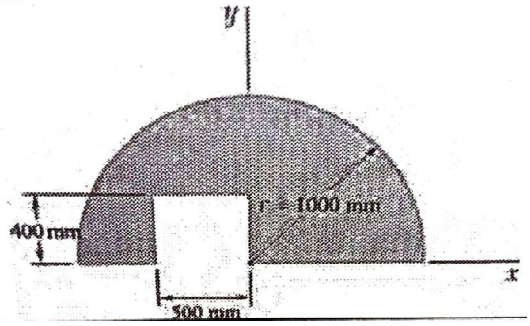
UNIT - II

3.Find the forces in the members of the truss in Fig. Tabulate your results neatly.



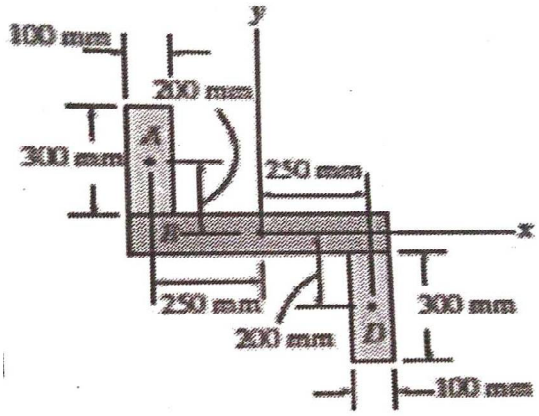
(OR)

4. Locate the centroid of the plane area shown.



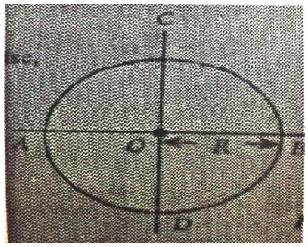
UNIT - III

5. Determine the moment of inertia for the cross sectional area of the member shown in figure about the x and y centroidal axes.



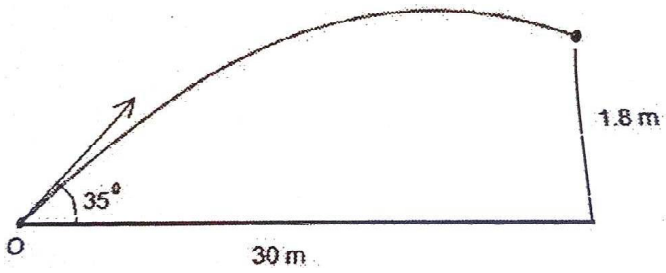
(OR)

6. Define MI of a circular disc about its diameter ?



UNIT - IV

7. A ball is kicked at an angle of 35° with the ground.
   a) What should be the initial velocity of the ball so that it hits a target that is 30 meters away at a height of 1.8 meters ?
   b) What is the time for the ball to reach the target ?

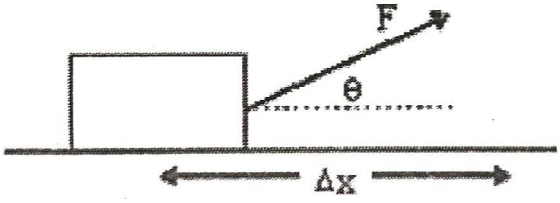


(OR)

8. The curvilinear motion of a particle is defined by V_x=50-16t and y=100-4t^2, where V_x is in meters per second, y is in meters and t is in seconds. It is also known that X = 0 when t = 0. Determine velocity and acceleration of the particle when the position y = 0 is reached.

UNIT - V

9. In the diagram below, calculate the work done if :
   a) F = 15.0 N, θ = 15°, and Δx = 2.50 m,
   b) F = 25.0 N, θ = 75°, and Δx = 12.0 m,
   c) F = 10.0 N, θ = 135°, and Δx = 5.50 m



(OR)

10. If a Saturn V rocket with an Apollo spacecraft attached has a combined mass of 2.9 x 10^5 kg and is to reach a speed of 11.2 km/s, how much kinetic energy will it then have ?