



Q.1 Solve any two of the following (8M)

- Explain Angle of friction and Angle of repose with diagrams (4M)
- Determine the centroid of the shaded lamina shown in fig.1 (4M)
- A body is moving with uniform acceleration and covers 20 m in 4<sup>th</sup> sec and 30 m in 8<sup>th</sup> sec. Determine initial velocity and uniform acceleration of the body. (4M)
- The velocity of a particle is  $V_x = 100 - t^{3/2}$  and  $V_y = 1000 + 10t + 2t^2$  where V is in m/sec and t is in sec. Determine the radius of curvature of the path when  $t = 2$  sec (4M)

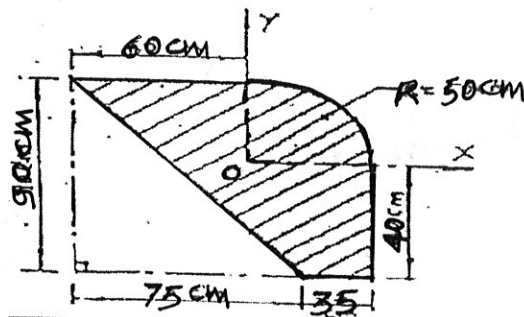


Fig.1

Q.2 Solve any two of the following. (12M)

- The acceleration of the particle is defined by the relation  $a = 25 - 3x^2$  mm/s<sup>2</sup>. The particle starts with no initial velocity at the position  $x = 0$ . (a) Determine the velocity when  $x = 2$  mm. (b) The position when velocity is again zero. (c) Position where the velocity is maximum and corresponding maximum velocity (6M)
- For a particle performing a rectilinear motion v-t diagram as shown in fig.2 Draw a-t & x-t diagram for motion if at  $t = 2$  sec,  $S = 20$  m, what is the displacement during 6 to 10 sec? Also find the total distance travelled (6M)
- If  $x = (1-t)$  and  $y = t^2$ , where x and y are in meters and t is in seconds, determine x and y components of velocity and acceleration. Also write the equation of path. (6M)
- A 50 N block is on an inclined plane of 30°. The coefficient of static friction between the block and the plane is 0.3. Determine the value of load W for upward impendment of 50 N block. Ref.Fig.3 (6M)

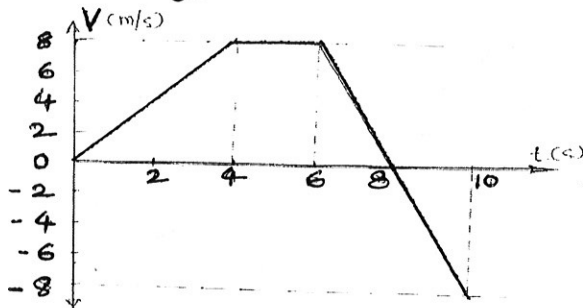


Fig.2

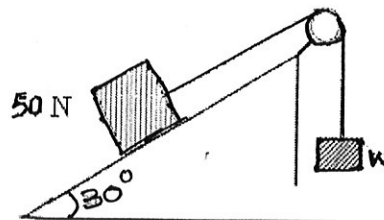


Fig.3