Exercise

1. The acceleration a of a particle following rectilinear translation is defined as $a = -k\sqrt{v}$ where k is constant. Knowing that x=0 , v=25 m/s at t=0, and that v=12 m/s when x=6 m. Determine

   (a) The velocity of particle when x=8 m and
   (b) The time required for the particle to come to rest.

2. The acceleration of a particle at any point is expressed by the relation $a = 200x(1 + kx^2)$, where a and x are expressed in m/s^2 and m respectively. k is a constant. If the velocity of the particle at A is v_A=2.5 m/s when x=0.15 m. Find the value of k.
3. The velocity of a particle having motion in the x-y plane at time t=3.5 s is $4.12\boldsymbol{i} + 3.17\boldsymbol{j}$ m/s. The average acceleration during next 0.05 s becomes 2**i**+2.5**j** m/s^2. Determine the velocity at t=3.55s and angle a made by average acceleration and velocity vector at t=3.55 s.
4. The velocity v of a particle with respect to time t is as shown in figure-1. Draw the a-t and x-t graphs for the particle during the period 0<x<40, if x=-14.6 m at t=0. Also determine (a) the maximum value of its position,(b) the values of t for which x=32.6 m, (c) the total distance travelled by the particle during the period t=0 to t=30 and (d) the two values of t for which the particle passes through the origin.

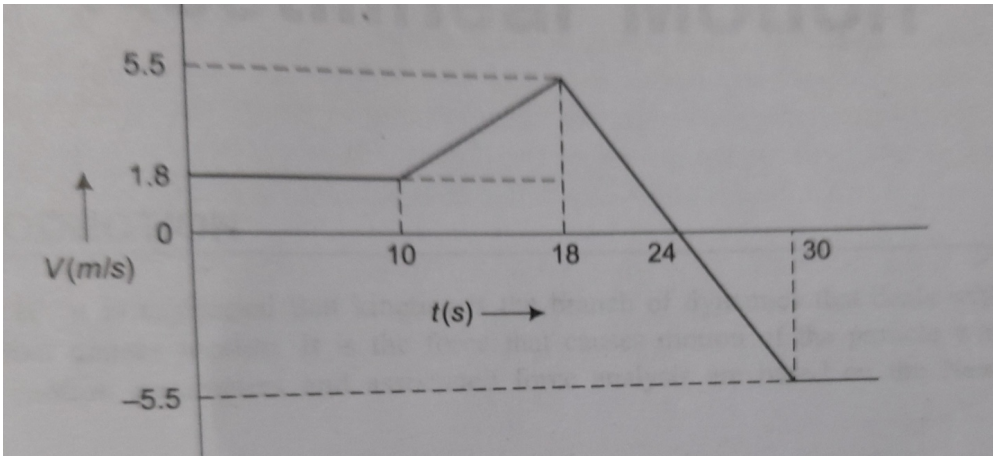

Figure-1

5. A particle moves along a straight line. Its motion is represented by the equation s=16t+4t^2-3t^3 where s in terms of m and t is in seconds . Determine the followings
   (a) Displacement , velocity and acceleration 2 seconds after start.
   (b) Displacement and acceleration when velocity is zero; and
   (c) Displacement and velocity when acceleration is zero.
6. The acceleration of a particle starting from rest is given by the equation: a=12-0.1s; where a is the acceleration in m/s2 and s is the displacement in m. Determine the velocity of the particle when a distance of 100 m is covered and the distance at which velocity will be zero again.