C – 9 PHYSICS WK-4

SECOND EQUATION OF MOTION(POSITION-TIME RELATION)

$S = ut + \frac{1}{2} at^2$

Where, u=initial velocity, a= acceleration, t=time, s=distance

Q1) A racing car has a uniform acceleration of 4 m/s^2.What distance will it cover in 10 s after start?

THIRD EQUATION OF MOTION (POSITION-VELOCITY RELATION)

$V^2 = u^2 + 2as$

Where, v = final velocity

Q2) A train is travelling at a speed of 90 km/hr.Brakes are applied so to produce a uniform acceleration of -0.5 in m/s^2.Find how far the train will go before it is brought to rest.

U=90km/hr = 90x1000 m/60x60 s = 25 m/s; v=0 m/s

GRAPHICAL REPRESENTATION

Pictorial representation or geometrical representation between two quantities on two axes.

1) Time is taken on x axis and distance travelled is taken on y axis.
2) Speed of a body = slope of graph
3) For uniform speed,slope is inclined straight line.
4) For non-uniform speed,slope is a curved line

5) For stationary body,slope is a straight line parallel to time axis.

MORE POINTS TO REMEMBER

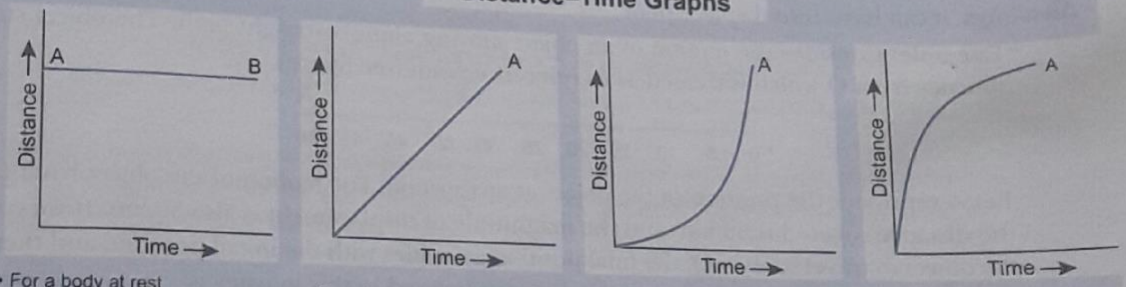
- **First equation of motion:** $v = u + at$

  Second equation of motion: $s = ut + \frac{1}{2}at^2$

  Third equation of motion: $v^2 - u^2 = 2as$

  where, v = final velocity, u = initial velocity, s = distance, a = acceleration, t = time
- Distance covered = Speed × Time
- For non-uniform motion, average speed = $\frac{2s}{t_1 + t_2}$
- Velocity of a body changing at uniform rate, average velocity = $\frac{v + u}{2}$
- Average velocity, $v_{av} = \frac{2v_1v_2}{v_1 + v_2}$. If a journey is divided into two equal parts: one half of the distance with velocity v_1 and other half with velocity v_2.
- In uniform circular motion, acceleration $a = \frac{v^2}{r}$; where v = uniform speed and r = radius of circular path
- If a body moves in a circular path, velocity $v = \frac{2\pi r}{t}$
- Angular velocity, $\omega = \frac{\theta}{t}$

Distance–Time Graphs



- For a body at rest
- As the slope is zero, so speed of the body is zero.

- For a body moving with uniform speed.

- For accelerated motion.
- The slope of graph is increasing with time

- For decelerated (speeding down) motion
- Slope of graph is decreasing with time