Episode No.21
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Sub: *PHYSICS*
Topic -**MOTION IN STRAIGHT LINE MOTION IN A PLANE**

1. A particle starts from rest and travels a distance 'x' with uniform acceleration then
moves uniformly a distance 2x and finally comes to rest, after moving further 5x
with uniform retardation. The ratio of maximum speed to average speed is
(a) $\frac{6}{2}$ (b) $\frac{6}{3}$ **(c)** $\frac{7}{4}$ (d) $\frac{4}{7}$

2. A particle moving in a straight line covers half the distance with a speed of $3ms^{-1}$. The other half of the distance is covered in two equal time intervals with speeds of $4.5ms^{-1}$ and $7.5\ ms^{-1}$ respectively. The average speed of the particle during this journey is
(a) 4.0 ms^{-1} (b) $5.0\ ms^{-1}$ (c) $5.5\ ms^{-1}$ (d) $4.8\ ms^{-1}$

3. A particle moves along a straight line such that its position x at any time 't' is $x = 6t^2 - t^3$ where 'x' is in metreand 't' is in second. Then
(a) at t = 0 acceleration is $12\ ms^{-2}$
(b) x-t curve shows a maximum at 4 second
(c) both (a) and (b) are wrong
(d)both (a) and (b) are correct.

4. From a tower of height 'H' a particle is thrown vertically upwards with a speed 'u'. The time taken by the particle to hit the ground is n times that taken by it to reach the highest point of its path. The relation between H, u and n is
(a) $2gH = nu^2 (n - 2)$ (b) $gH = (n - 2)\ u^2$ (c) $2gH = n^2u^2$ (d) $gH = (n - 2)^2\ u^2$

5. A student is standing at a distance of 50m from a bus. As soon as the bus begins to move with an acceleration of $1ms^{-2}$, the student starts running towards the bus with a uniform velocity 'u'. assuming the motion to be along a straight road, the minimum value of 'u', so that the student is able to catch the bus is
(a) $5ms^{-1}$ (b) $8ms^{-1}$ **(c) $10ms^{-1}$** (d) $12ms^{-1}$

6. A particle starts moving rectilinearly at time t = 0 such that its velocity 'v' changes with time 't' according to the equation $v = t^2 - t$ where t is in seconds and 'v' is in ms^{-1}. Find the time interval for which the particle retards.

(a) $\frac{1}{2} < t < 1$ (b) $\frac{1}{2} > t > \frac{1}{4}$ (c) $\frac{1}{4} < t < 1$ (d) $\frac{1}{2} < t < \frac{3}{4}$

7. A person aiming to reach the exactly opposite point on the bank of a stream is swimming with a speed of 0.5 ms^{-1}, at an angle of 120^0 with the direction of flow of water. The speed of water in the stream is

(a) 1 ms^{-1} (b) 0.5 ms^{-1} **(c) 0.25 ms^{-1}** (d) 0.433 ms^{-1}

8. In between two hills of height 100m and 90m respectively there is a valley of 20m wide. If a boy jumps from the first hill to the second. What must be his minimum horizontal velocity in order that he may not fall into the valley?

(a) 6.68 ms^1 **(b) 14.14 ms^{-1}** (c) 17 ms^{-1} (d) 2.93 ms^{-1}

9. At the height 80m, an aeroplane is moving with a speed of 150ms^{-1}. A bomb is dropped from it so as to hit a target. At what distance from the target should the bomb be dropped ($g = 10ms^2$)

(a) 605.3m (b) 600 m (c) 80m (d) 230m

10. A projectile is thrown in the upward direction making an angle of 60^0 with the horizontal direction with a velocity of 147 ms^{-1}. Then the time after which its inclination with the horizontal is 45^0 is

(a) 15s (b) 10.98 s **(c) 5.49 s** (d) 2.745 s

11. A projectile has the same range R for when the maximum height attained by it is either h_1 or h_2. Then R_1h_1 and h_2 will be related as

(a) $R = \sqrt{h_1 h_2}$ (b) $R = 2\sqrt{h_1 h_2}$ (c) $R = 3\sqrt{h_1 h_2}$ **(d)** $R = 4\sqrt{h_1 h_2}$

12. The Indian cricket coach Anil Kumble while practicing; throws a ball at ViratKohli with an initial speed of 20ms^{-1} at an angle of 45^0 with the horizontal. At the moment the ball is thrown, Kohli is 50m from Kumble. At what speed must Kohli run to catch the ball at the same height at which it is released?

(a) 3.16 ms^{-1} (b) 5.27 ms^{-1} (c) 0.44 ms^{-1} (d) 6.67 ms^{-1}