AVIRAL CLASSES
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PHYSICS
CRASH COURSE

LECTURE - 06

TOPICS : Kinematics Miscellaneous

1. Which of the following statements is correct about the average velocity of a particle ?

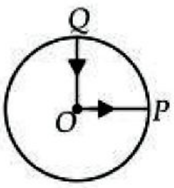
(a) $\vec{v}_{\text{average}} = \dfrac{\vec{v}(t_2) - \vec{v}(t_1)}{2}$

(b) $\vec{v}_{\text{average}} = \vec{a}_{\text{average}}(t_2 - t_1)$

(c) $\vec{v}_{\text{average}} = \dfrac{\vec{v}(t_2) + \vec{v}(t_1)}{2}$

(d) $\vec{v}_{\text{average}} = \dfrac{\vec{r}(t_2) - \vec{r}(t_1)}{t_2 - t_1}$

2. A cyclist starts from the centre O of a circular park of radius 1 km, reaches the edge P of the park, then cycles along the circumference and returns to the centre along QO as shown in the figure. If the round trip takes ten minutes, the net displacement and average speed of the cyclist (in metre and kilometre per hour) is



(a) 0, 1 (b) $\dfrac{\pi+4}{2}, 0$

(c) $21.4, \dfrac{\pi+4}{2}$ (d) 0, 21.4

3. Suppose that two objects A and B are moving with velocities $\vec{v}_A$ and $\vec{v}_B$ (each with respect to some common frame of reference). Let $\vec{v}_{AB}$ represent the velocity of A with respect to B. Then.

(a) $\vec{v}_{AB} + \vec{v}_{BA} = 0$

(b) $\vec{v}_{AB} - \vec{v}_{BA} = 0$

(c) $\vec{v}_{AB} = \vec{v}_A + \vec{v}_B$ (d) $|\vec{v}_{AB}| \neq |\vec{v}_{BA}|$

4. The component of a vector $\vec{r}$ along x-axis will have maximum value if

(a) $\vec{r}$ is along positive y-axis

(b) $\vec{r}$ is along positive x-axis

(c) $\vec{r}$ makes an angle of 45° with the x-axis

(d) $\vec{r}$ is along negative y-axis

5. For a particle performing uniform circular motion, choose the incorrect statement from the following.

(a) Magnitude of particle velocity (speed) remains constant

(b) Particle velocity remains directed perpendicular to radius vector

(c) Direction of acceleration keeps changing as particle moves

(d) Magnitude of acceleration does not remain constant

6. A cyclist is riding with a speed of 27 km h^{-1}. As he approaches a circular turn on the road of radius 80 m, he applies brakes and reduces his speed at the constant rate of 0.50 m s^{-1} every second. What is the magnitude of the net acceleration of the cyclist on the circular turn ?

(a) 0.68 ms^{-2} (b) 0.86 ms^{-2}

(c) 0.56 ms^{-2} (d) 0.76 ms^{-2}

7. For two vectors $\vec{A}$ and $\vec{B}$, $|\vec{A}+\vec{B}|=|\vec{A}-\vec{B}|$ is always true when

(a) $|\vec{A}|=|\vec{B}|\neq 0$

(b) $\vec{A}\perp\vec{B}$

(c) $|\vec{A}|=|\vec{B}|\neq 0$ and $\vec{A}$ and $\vec{B}$ are parallel

(d) $|\vec{A}|=|\vec{B}|\neq 0$ and $\vec{A}$ and $\vec{B}$ are antiparallel

8. Two particles are projected in air with speed u at angles θ_1 and θ_2 (both acute) to the horizontal, respectively. If the height reached by the first particle is greater than that of the second, then which one of the following is correct ?

(a) $\theta_1 > \theta_2$ (b) $\theta_1 = \theta_2$

(c) $T_1 < T_2$ (d) $T_1 = T_2$

9. A projectile is thrown with a velocity of $10\sqrt{2}$ ms^{-1} at an angle of 45° with horizontal. The interval between the moments when speed is $\sqrt{125}$ ms^{-1} is

(Take $g = 10\ ms^{-2}$)

(a) 1.0 s (b) 1.5 s

(c) 2.0 s (d) 0.5 s

10. A body is projected vertically upwards at time $t = 0$ and it is seen at a height H at time t_1 and t_2 seconds during its flight. The maximum height attained is (g is accleration due to gravity)

(a) $\frac{g(t_2-t_1)^2}{8}$ (b) $\frac{g(t_1+t_2)^2}{4}$

(c) $\frac{g(t_1+t_2)^2}{8}$ (d) $\frac{g(t_2-t_1)^2}{4}$