PAATHSHALA
TRAVAIL BEYOND EXCELLENCE

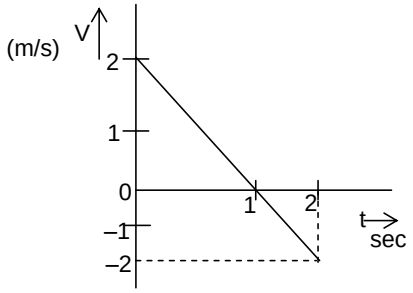
QUIZ (KINEMATICS-II)

time:60min ***max.marks:90***

Section –A

1. A particle moves along X – axis in such a way that its coordinate (x) varies with the time (t) according to the expression $x = 2 – 5t + 6t^2$ then
   (A) its initial velocity is + 5m/s
   (B) acceleration is constant +12 m/s^2
   (C) its velocity is zero at 3 sec
   (D) none of these

2. Velocity time graph of a particle in motion is shown.
   Then displacement and distance covered by the particle in 2 seconds
   (A) 2, 4 m
   (B) 0, 2 m
   (C) 2, 2 m
   (D) 0, 0 m



3. A particle is thrown horizontally with velocity 5 m/s from the top of a cliff of height 20 m. The time taken by the particle to reach the ground will be ($g = 10\ m/s^2$)
   (A) 4 sec
   (B) 2 sec
   (C) 3 sec
   (D) none of these

4. A man moves on a cycle with velocity of 4 km/hr the rain appears to fall to him vertically with a velocity of 3 km/hr.The actual velocity of rain is
   (A) 6 km/hr
   (B) 4/3 km/hr
   (C) 3/4 km/hr
   (D) 5 km/hr

5. A ball is thrown upwards within a lift moving upwards with a = 2 m/sec^2. The acceleration of ball just after release will be – taken (g = 10 m/s^2)

(A) 2 m/sec^2 (B) 12 m/sec^2

(C) 8 m/sec^2 (D) 10 m/sec^2

6. A river is flowing from west to east at a speed of 8 m per minute. A man on the south bank of the river, capable of swimming at 20 m/min with respect to water, wants to swim across the river in the shortest time. He should swim in a direction.

(A) due north (B) 30^o east of north (C) 30^o west of north (D) 60^o east of north

7. The height y and distance x along the horizontal for a body projected in the cer plane are given by $y = 8t - 5t^2$ and $x = 6t$. The initial speed of projection is

(A) 8 m/s (B) 9 m/s (C)10 m/s (D) (10/3) m/s

8. A ball is projected with velocity v_0 at an angle θ with the ground.

(i) The time after which the velocity of the ball is perpendicular to its initial direction of motion is

(A) $\frac{v_0}{g\cos\theta}$ (B) $\frac{v_0}{g\sin\theta}$

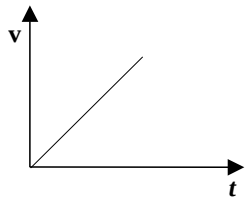
(C) $\frac{v_0}{g}\tan\theta$ (D) $\frac{v_0}{g}\cot\theta$

9. A point moves in a straight line so that its displacement x (in meter) at time t (in seconds) is given by $x^2 = t^2+1$. Its acceleration in ms^{-2}, at time t is

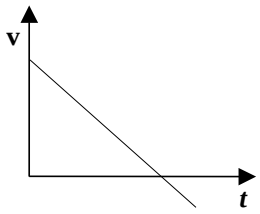
(a) $\frac{1}{x^3}$ (b) $\frac{1}{x}-\frac{1}{x^2}$ (c) $-\frac{t}{x^2}$ (d) $-\frac{t^2}{x^3}$

10. Which of the following graph correctly represents velocity-time relationship for a particle released from rest to fall freely under gravity ?

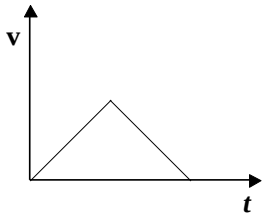
(A)



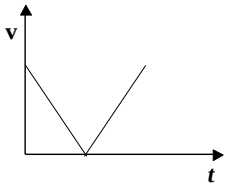
(B)



(C)

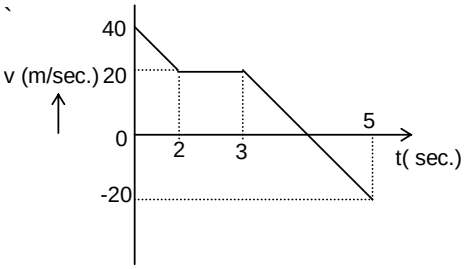


(D)



11. For the v-t graph, distance travelled by body in 5 sec. is

(A) 20 m (B) 40 m
(C) 80 m (D) 100 m



12. A particle is projected with v_0 at angle of 30^0 with vertical. Its average velocity for its time of flight is

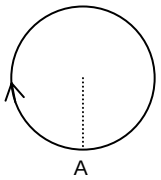
(A) v_0 sin 30 (B) v_0 cos 30
(C) v_0 tan 30 (D) none of the above

13. A body is projected with velocity v_0 at an angle of projection θ. The radius of curvature of trajectory at the point of projection is

(A) $\frac{v_0^2 \sin^2\theta}{g}$ (B) $\frac{v_0^2 \cos^2\theta}{g}$

(C) $\frac{v_0^2}{g\sin\theta}$ (D) $\frac{v_0^2}{g\cos\theta}$

14. A particle moves on a circular track of radius 5m with a uniform speed 5 m/s. What is the magnitude of average acceleration of the particle over the time interval in which it completes one revolution?



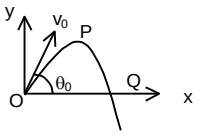
(A) $\frac{10}{2\pi} m/s^2$ (B) $\frac{5}{2\pi} m/s^2$ (C) $\frac{1}{2m} m/s^2$ (D) zero

Section - B

Comprehension – I

(Q.no 15 to 17 carries 4 M each)

. In the shown projectile,



15. Average velocity for displacement $\vec{OQ}$ equals

(A) $v_0 \cos\theta_0 \hat{i}$ (B) $\frac{v_0\cos\theta_0}{2}$ (C) $\frac{v_0\sin\theta_0}{2}$ (D) zero

16. The tangential component of acceleration at Q equals

(A) $g \sin\theta_0$ (B) $g \cos\theta_0$ (C) $- g \sin\theta_0$ (D) $- g \cos\theta_0$

17. Normal acceleration at P equals

(A) $g \sin\theta_0$ (B) g (C) -g (D) $g \cos\theta_0$

Comprehension – II

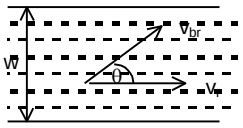
(Q.no 18 to 21 carries 4 M each)

In the given figure,

$\vec{v}_{br}$ = velocity of boat w.r.t. river flow,

W = width of river

$\vec{v}_r$ = velocity of river flow



18. If $V_r = 2V_{br}$, for minimum drift θ equals

(A) zero (B) π (C) 120^0 (D) 30^0

19. If $V_{br} = 2V_r$, minimum drift would be

(A) zero (B) 2W (C) W/2 (D) none of these

20. If time taken by the boat to cross the rivers is to be the minimum, θ equals

(A) 90^0 (B) 60^0 (C) 45^0 (D) 30^0

21. If time taken by the boat to cross the river is to be double of the minimum, θ equals

(A) 30^0 (B) 120^0 (C) 90^0 (D) none of these

Section-C

Questions 22 to 23 are MCQ. Reason(R) Assertion (A) type
Each question carries (+4,-1)

22. (A) Path of body moving under gravity is a parabola or a straight line depending on the velocity of projection.
(R) Gravitational force on the body is always towards the earth.
a) A and R are correct, while R is not the reason of A.
b) A and R are correct, while R is the reason of A.
c) A and R are incorrect.
d) A is incorrect, while R is correct.

23. (A) The displacements of a freely falling body in successive seconds after starting from rest are in the ratio 1:3:5.
(R) Because it is moving with uniform velocity.

a) A and R are correct, while R is not the reason of A.
b) A and R are correct, while R is the reason of A.
c) A is correct and R is incorrect.
d) A is incorrect, while R is correct.

Section-D

Questions 24 and 25 are matching type questions
Each question carries (6 M)

24. Angle between velocity and acceleration vectors in the following cases

List-1	List-2
A) For a Vertically projected body	*e) 90^0*
B) For a freely falling body	*f) 60^0*
C) For a projectile	*g) zero*
D) In uniform circular motion	*h) 180^0*

25. Match list1 to list2 for a projectile

List-1	List-2
a) For two angles θ and (90-θ) with same Magnitude of velocity of projection	*e) Pi.Pi/g*
b) Equation of parabola of a projectile $y = Px-Qx^2$	*f) Max. Height=25% of P^2/Q*
c) Radius of curvature of a body projected Velocity (P i+ Q j) m/s at highest point	*g) Range = Max. height*
d) Angle of projection $\theta = \tan^{-1}(4)$	*h) Range is same.*