Kinematics(A-3)

Total No. of Questions: 18 **Total Marks: 72**

SECTION 1: MCQ

Q1 (4 Marks)

The distance traveled by a particle is proportional to the square of time then the particle travels with

A. Uniform velocity
B. angular velocity
C. constant acceleration
D. Decreasing acceleration

Q2 A ball is thrown up and attains a maximum height of 100 m. Its initial speed was. (4 Marks)

A. $9.8ms^{-1}$
B. $44.2ms^{-1}$
C. $19.6ms^{-1}$
D. none of these

Q3 A boy can throw a stone up to a maximum height of $10m$. The maximum horizontal distance up to which the boy can throw the same stone up to will be (4 Marks)

A. $20\sqrt{2}m$
B. 10 m
C. $10\sqrt{2}$
D. 20 m

Q4 (4 Marks)

A rifle bullets loses $\left(\frac{1}{20}\right) th$ of its velocity in passing through a plank. Assuming that the plank exerts a constant retarding force, the least number of such planks required just to stop the bullet is:

A. 11
B. 20
C. 21
D. $Infinite$

SECTION 2: Multiple Select

Q1 In which of the following cases of motion,the distance moved and magnitude of displacement are equal? (4 Marks)

A. The car is moving on straight road
B. A planet is moving around the sun
C. A car is moving on circular road
D. Freely falling body under the action of gravity

Q2 A particle is moving in a circle with uniform speed. It has: (4 Marks)

A. constant kinetic energy
B. constant acceleration
C. constant velocity
D. constant displacement

Q3 A particle is projected at an angle θ from ground with speed $u(g = 10m/s^2)$, then which of the following is true? (4 Marks)

A. If $u = 10m/s$ and $\theta = 30^o$, then time of flight will be 1 sec

B. If $u = 10\sqrt{3}m/s$ and $\theta = 60^o$, then time of flight will be 3 sec

C. If $u = 10\sqrt{3}m/s$ and $\theta = 60^o$, then after 2 sec velocity becomes perpendicular to initial velocity

D. If $u = 10m/s$ and $\theta = 30^o$, then velocity never becomes perpendicular to intial velocity during its flight

Q4 Choose the INCORRECT options:- (4 Marks)

A. If relative velocity of one object with respect to other is towards the line joining them, then they must collide.

B. If relative velocity of one object with respect to other is towards the line joining them, then they may collide.

C. A particle staring from rest under the action of constant acceleration must follow a straight line trajectory .

D. Motion under constant magnitude acceleration can never result in a closed path trajectory with some area enclosed.

Q5 A block slides down a smooth inclined plane when released from the top,while another falls freely from the same point (4 Marks)

A. Sliding block will reach the ground first

B. Freely falling block will reach the ground first

C. Both the blocks will reach the ground with different speeds

D. Both the blocks will reach the ground with same speed

Q6 Two particles move in the same straight line starting at the same moment from the same point in the same direction. The first moves with constant velocity u and the second starts from rest with constant acceleration f. Then (4 Marks)

A. They will be at the greatest distance at the end of time \dfrac {u}{2f} from the start

B. They will be at the greatest distance at the end of time \dfrac {u}{f} from the start

C. Their greatest distance is $\frac{u^2}{2f}$

D. Their greatest distance is $\frac{u^2}{f}$

Q7 Two cities A and B are connected by a regular bus services with buses plying in either direction every T seconds. The speed of each bus is uniform and equal to V_b. A cyclist cycles from A to B with a uniform speed of V_c. A bus goes past the cyclist in T_1 second in the direction A to B and every T_2 second in the direction B to A. Then (4 Marks)

A. $T_1 = \frac{V_b T}{V_b + V_c}$

B. $T_2 = \frac{V_b T}{V_b - V_c}$

C. $T_1 = \frac{V_b T}{V_b - V_c}$

D. $T_2 = \frac{V_b T}{V_b + V_c}$

Q8 If the displacement of a particle varies with time as $\sqrt{x} = t + 7$, which of the following statements is(are) true? (4 Marks)

A. Velocity of the particle is inversely proportional to t.

B. Velocity of the particle is proportional to t.

C. Velocity of the particle is proportional to $\sqrt{t}$.

D. The particle moves with a constant acceleration.

Q9 At a height of $15\ m$ from ground velocity of a projectile $\vec{v} = \left(10\hat{i} + 10\hat{j}\right)$ and $(g = 10\ ms^{-2})$ (4 Marks)

A. particle was projected at an angle of 45° with horizontal

B. time of flight of projectile is $4\ s$

C. horizontal range of projectile is $100\ m$

D. maximum height of projectile form ground is $20\ m$

Q10 If acceleration is constant and initial velocity of the body is 0, then choose the correct statement. Symbols have their usual meaning. (4 Marks)

A. $v \propto \sqrt{t}$

B. $v \propto \sqrt{x}$

C. $v \propto t$

D. $v \propto x^2$

SECTION 3: Subjective

Q1 The speed of a bus is 72 km/h, whereas the speed of a car is 125 m/s. Which vehicle moves faster? (4 Marks)

Q2 A snowball is thrown from ground level (by someone in a hole) with initial speed v_o at an angle of 45 relative to the (level) ground, on which the snowball later lands. If the launch angle is increased, do (a) the range and (b) the flight time increase, decrease,or stay the same? (4 Marks)

Q3 A stone is thrown vertically upward with a speed of 28 m/s. (4 Marks)
a) Find the maximum height reached by the stone.
b) Find its velocity one second before it reaches the maximum height.
c) Does the answer of part
d) change if the initial speed is more than 28 m/s such as 40 m/s or 80 m/s?

Q4 A car starting from rest on a straight road first acceleration with 6 m/s then suddenly decelerates with $3m/s$ till it stops if total time of journey is 10 seconds, Then the maximum speed and distance acquired by the car is: (4 Marks)