

## Motion in one a plane Assignment 1

### (A) Paragraph Type question

A particle moves such a way that

$$\mathbf{R} = (A \cos \omega t) \mathbf{i} + (A \sin \omega t) \mathbf{j}$$

Where  $\mathbf{i}$  and  $\mathbf{j}$  are unit vectors along x and y direction. A and  $\omega$  are constant

#### Question 1

Find the trajectory of the particle

- Circle
- Parabola
- Ecillpse
- None of the above

#### Question 2

Find the average velocity of the particle from  $t=0$  to  $t=\frac{\pi}{2\omega}$

- $2A \frac{\omega}{\pi} (\mathbf{j}-\mathbf{i})$
- $2A \frac{\omega}{\pi} (\mathbf{i}+\mathbf{j})$
- $\frac{(A \sin \omega) \mathbf{i} + (A \cos \omega) \mathbf{j}}{\pi}$
- None of the above

#### Question 3

Find the scalar Product of Acceleration and velocity at any point t

- 1
- 1
- 0
- None of the above

#### Question 4

Find the tangential acceleration at any point of time t

- $-A \omega^2$
- 0
- 1
- None of the above

#### Question 5

Find the radial acceleration at any point of time t

- 0
- $A \omega^2$
- 1
- None of the above

**Question 6**

Find the displacement vector and distance when  $t = \frac{\pi}{\omega}$

- a.  $-2A\mathbf{i}, \pi A$
- b.  $0, 2A$
- c.  $2A\mathbf{i}, \pi A$
- d.  $2A\mathbf{j}, 2A$

**Multiple choice Question**

**Question 7**

A wind is blowing in the North direction at the speed of 5 km/hr. An airplane moves to a point in the East which is 2000 km away in 40 hr. Find the velocity of the airplane with respect to the wind.

- a.  $51, \tan^{-1} \frac{1}{10}$
- b.  $50, \tan^{-1} \frac{1}{5}$
- c.  $\sqrt{2525}, \tan^{-1} \frac{1}{10}$
- d. None of these

**Question 8**

Consider the figure given below

- a. Acceleration is positive during A to C And negative during C to B
- b. Acceleration is maximum at C
- c. Velocity is maximum at C
- d. Average acceleration is zero during the journey

**Question 9**

Two projectile A and B are having trajectory equation

$$y = a_1x - b_1x^2 \text{ and } y = a_2x - b_2x^2$$

If the range is same for both the projectile A and B then which of the following option is true

- a.  $\frac{a_1}{b_1} = \frac{a_2}{b_2}$
- b.  $\frac{a_1}{b_2} = \frac{a_2}{b_1}$
- c.  $a_1a_2 = b_1b_2$
- d. None of these

**Answers to the questions**

1. (a)
2. (a)
3. (c)
4. (b)
5. (b)
6. (a)
7. (c)
8. (a), (b), (c), (d)
9. (a)