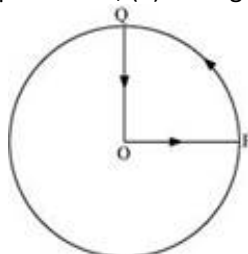


1. What is the angular velocity of the hour hand of a clock? [1]
2. What is the value of angular speed for 1 revolution? [1]
3. What is "Trajectory" of a projectile? [1]
4. Two vectors \vec{A} and \vec{B} are perpendicular to each other. What is the value of $\vec{A} \cdot \vec{B}$? [1]
5. A body is moving on a curved path with a constant speed. What is the nature of its acceleration? [1]
6. What is the angle between two forces of 2N and 3N having resultant as 4N? [2]
7. Prove that for elevations which exceed or fall short of 45° by equal amounts the ranges are equal? [2]
8. A stone is thrown vertically upwards and then it returns to the thrower. Is it a projectile? Explain? [2]
9. Find a unit vector parallel to the resultant of the vectors $\vec{A} = 2\hat{i} + 3\hat{j} + 4\hat{k}$ and $\vec{B} = 3\hat{i} + 5\hat{j} + \hat{k}$. [2]
10. What is a uniform circular motion? Explain the terms time period, frequency and angular velocity. [2]
11. Derive an equation for the path of a projectile fired parallel to horizontal. [3]
12. At what point of projectile motion [3]
(i) potential energy maximum (ii) kinetic energy maximum (iii) total mechanical energy is maximum
13. An aircraft is flying at a height of 3400 m above the ground. If the angle subtended at a ground observation point by the aircraft positions 10.0 s apart is 30° , what is the speed of the aircraft? [3]
14. The ceiling of a long hall is 25 m high. What is the maximum horizontal distance that a ball thrown with a speed of 40 ms^{-1} can go without hitting the ceiling of the hall? [3]
15. 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 Fig. If the round trip takes 10 min, what is the (a) net displacement, (b) average velocity, (c) average speed of the cyclist? [3]



16. \hat{i} and \hat{j} are unit vectors along X- and Y-axis respectively. What is the magnitude and direction of the vectors $\hat{i} + \hat{j}$, and $\hat{i} - \hat{j}$? What are the components of a vector $A = 2\hat{i} + 3\hat{j}$ along the directions of $\hat{i} + \hat{j}$ and $\hat{i} - \hat{j}$? [5]
[You may use graphical method]
17. (a) State and prove triangular law of vector addition. [5]
(b) Is the acceleration of a particle in circular motion not always towards the centre explain.