APPLICATIONS OF DERIVATIVES

INTRODUCTION, RATE OF CHANGE OF QUANTITIES

EXERCISE

- **Q.1** The circle's radius is growing at a rate of 3 cm/sec. Determine the rate at which the circle's area is increasing when the radius reaches 10 cm.
- Q.2 A 5 m ladder is positioned against a wall, with its base being pulled along the ground away from the wall at a rate of 2 cm/sec. Determine the speed at which the top of the ladder is sliding down the wall when the ladder's base is 4 m away from the wall.
- **Q.3** Water is flowing out of a conical funnel with a semi-vertical angle of 45° at a rate of 2 cm³/s. Determine the rate at which the slant height of the water is decreasing when the water's height is $\sqrt{2}$ cm.
- **Q.4** In question 4, a hot air balloon ascends vertically from a level field and is monitored by a range finder positioned 500 ft from the lift-off point. When the elevation angle of the range finder is $\pi/4$, the angle is increasing at a rate of 0.14 rad/min. Determine the rate at which the balloon is rising at that particular moment.
- Q.5 A 20 ft. ladder is positioned with one end on the ground and the other end touching a vertical wall. The lower end of the ladder slides along the ground. Demonstrate that when the lower end of the ladder is 16 ft. away from the wall, the upper end is moving 4/3 times as fast as the lower end.
- **Q.6** The motor car covers a distance represented by s feet in t seconds after the brakes are applied, where $s = 22t 12t^2$ Determine the total distance covered by the motor car before it comes to a stop.

CLASS 12

ANSWER KEY

- **1.** $60\pi \text{ cm}^2/\text{sec}$
- 2. $\frac{8}{3}$ cm/sec

3.
$$\frac{\sqrt{2}}{\pi}$$
 cm/sec.

- **4.** 140 ft/min.
- **6.** 10.08 ft.