

Comprehensive Test Series-04
(Application of Derivatives)

XII

TIME: 1hr.

MM: 30

General Instructions:

- All Questions are compulsory.
 - Use of calculator is not permitted.
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- Q.1 The two equal sides of an isosceles triangle with fixed base b are decreasing at the rate of 3cm/sec . How fast is the area decreasing when two equal sides are equal to the base?
- Q.2 The volume of a cube is increasing at the rate of $8\text{cm}^3/\text{sec}$. How fast is the surface area increasing when the length of an edge is 12cm ?
- Q.3 A man of height 2 meters walks at a uniform speed of 5 kilometers/hour away from a lamp post which is 6 meters high. Find the rate at which the length of his shadow increases.
- Q.4 A water tank has the shape of an inverted right circular cone with its axis vertical and vertex lowermost. Its semi-vertical angle is $\tan^{-1}(0.5)$. Water is poured into it at a constant rate of 5 cubic per minute. Find the rate at which the level of the water is rising at the instant when the depth of water in the tank is 10m.
- Q.5 Water is leaking from a conical funnel at rate of $5\text{cm}^3/\text{sec}$. If the radius of the base of the funnel is 10cm and its height is 20cm, find the rate at which the water level is dropping when it is 5cm from the top.
- Q.6 A man is walking at the rate of 4.5km/hr towards the foot of the tower 120m high. At what rate is he approaching the top of the tower when he is 50 m away from the tower?
- Q.7 The radius of a circular soap bubble is increasing at the rate of 0.2cm/sec . Find the rate of increase of its volume when the radius is 5cm.
- Q.8 The surface of a spherical balloon is increasing at the rate of $2\text{cm}^2/\text{sec}$. Find the rate of change of its volume when its volume when its radius is 6cm.
- Q.9 Find the point on the curve $y^2 = 8x$ for which the abscissa and ordinate change at the same rate.
- Q.10 At what point of the ellipse $16x^2 + 9y^2 = 400$, does the ordinate decrease at the same rate at which abscissa increases?