

**Comprehensive Test Series-06
(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 A stone is dropped into a quite lake and waves move in circles at the speed of 5cm/s. At the instant when the radius of the circular wave is 8cm, how fast is enclosed area increasing?
- Q.2 The radius of a circle is increasing at the rate of 0.7cm/s. What is the rate of increase of its circumference?
- Q.3 A ladder 5m long is leaning against a wall. The bottom of the ladder is pulled along the ground, away from the wall, at the rate of 2cm/s. How fast is its height on the wall decreasing when the foot of the ladder is 4m away from the wall?
- Q.4 A particle moves along the curve $6y = x^3 + 2$. Find the point on the curve at which the y-coordinate is changing 8 times as fast as the x-coordinate.
- Q.5 A balloon, which always remains spherical, has a variable diameter $\frac{3}{2}(2x+1)$. Find the rate of change of its volume with respect to x.
- Q.6 Sand is pouring from a pipe at the rate of $12\text{cm}^3/\text{s}$. The falling sand forms a cone on the ground in such a way that the height of the cone is always one-sixth of the radius of the base. How fast is the height of the sand cone increasing when the height is 4cm?
- Q.7 The total revenue in Rupees received from the sale of x units of a product is given by $R(x) = 13x^2 + 26x + 15$. Find the marginal revenue cost when $x = 7$.
- Q.8 The volume of a cube is increasing at a rate of 9 cubic centimeters per second. How fast is the surface area increasing when the length of an edge is 10 centimeters?
- Q.9 The length x of a rectangle is decreasing at the rate of 3cm/minute and the width y is increasing at the rate of 2cm/minute. When $x = 10\text{cm}$ and $y = 6\text{cm}$, find the rates of changes of (a) the perimeter and (b) the area of the rectangle.
- Q.10 The total cost C(x) in Rupees, associated with the production of x units of an item is given by $C(x) = 0.005x^3 - 0.02x^2 + 30x + 5000$

Find the marginal cost when 3 units are produced, where by marginal cost we mean the instantaneous rate of total cost at any level of output.