Comprehensive Test Series-03
(Application of Derivatives)
XII

TIME: 1hr. **MM: 30**

General Instructions:

- All Questions are compulsory.
- Use of calculator is not permitted.

Q.1 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 = 10cm and y = 6cm, find the rates of changes of (a) the perimeter and (b) the area of the rectangle.

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 learning 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 $12cm^3/s$. 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 Using differentials, find the approximate value of the each of the following up to 3 places of decimals.

$(82)^{\frac{1}{4}}$, $(0.0037)^{\frac{1}{2}}$, $(3.968)^{\frac{3}{2}}$

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?