

## Comprehensive Test Series-02

(Application of Derivatives)

### XII

TIME: 1hr.

MM: 36

**General Instructions:**

- All Questions are compulsory.
  - Use of calculator is not permitted.
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- Q.1 Find the rate of change of the volume of a sphere with respect to its diameter.
- Q.2 A man 2 metres high, walks at a uniform speed of 6 metres per minute away from a lamp post, 5 metres high. Find the rate at which the length of his shadow increases.
- Q.3 The two equal sides of an isosceles triangle with fixed base  $b$  are decreasing at the rate of 3 cm/sec. How fast is the area decreasing when the two equal sides are equal to the base?
- Q.4 If  $y = x^4 - 10$  and if  $x$  changes from 2 to 1.99, what is the approximate change in  $y$ ?
- Q.5 Use differentials to approximate the cube root of 127.
- Q.6 Use differentials find the approximate value.
- $$\frac{1}{(2.002)^2}$$
- Q.7 Prove that the tangents to the curve  $y = x^2 - 5x + 6$  at the points (2,0) and (3,0) are at right angles.
- Q.8 Find the point on the curve  $y = 2x^2 - 6x - 4$  at which the tangent is parallel to the  $x$  - axis.
- Q.9 For the curve  $y = 4x^3 - 2x^5$  find all points at which the tangent passes through the origin.
- Q.10 Show the curves  $x = y^2$  and  $xy = k$  cut at right angles, if  $8k^2 = 1$ .
- Q.11 Show the curves  $xy = a^2$  and  $x^2 + y^2 = 2a^2$  touch each other.
- Q.12 Find the equations of tangent and normal to the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  at  $(x_0, y_0)$