Class 12: Application of Derivative
Test 1 – 2026-27
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Duration: 60mins **Maximum Marks: 30**

(2 marks question)

1. The side of an equilateral triangle is increasing at the rate of 2cm/s. At what rate is the area increasing when the side of the triangle is 20cm.
2. Find the point on the curve $y^2 = 4x + 8$, for which the abscissa and ordinate changes at the same rate.
3. The average cost function associated with producing and marketing x units of an item is given as $AC = 2x - 11 + \frac{50}{x}$. Find the range of values of the output x, for which AC is increasing.

(3 marks question)

4. Sand is pouring from a pipe at the rate of 12 cm^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 3 cm?
5. Find the absolute maximum and minimum value of the function $f(x) = (x-2)\sqrt{x-1}$ in the interval $[1, 9]$.

(4 marks questions)

6. Write the interval in which the function $\frac{3}{10}x^4 - \frac{4}{5}x^3 - 3x^2 + \frac{36}{5}x + 11$, is
   a. Strictly Increasing
   b. Strictly Decreasing
7. Prove that $y = \frac{4\sin\theta}{2+\cos\theta} - \theta$, is an increasing function in $\left[0, \frac{\pi}{2}\right]$

(5 marks questions)

8. Show that the altitude of the right circular cone of maximum volume that can be described in a sphere of radius r is $\frac{4r}{3}$. Also show that the maximum volume of the cone is $\frac{8}{27}$ of the volume of the sphere.
9. Find the area of the greatest rectangle that can be inscribed in the ellipse
$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

Solution of Test

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