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**Sample Paper: Class XII**

**MM 32    Differentiation and Its Application    Time hour**

- |    |   |   |
|----|---|---|
| 1. | Find the derivative of $e^{\sin x}$ with respect to $x$ .   | 1 |
| 2. | Find the derivative of $\log(x + \sqrt{x^2 + 1})$ with respect to $x$ .   | 1 |
| 3. | A stone is dropped into quiet lake and waves move in circles at a speed of 4 cm per second. At the instant, when the radius of the circular wave is 10 cm, how fast is the enclosed area increasing?    | 1 |
| 4. | Using differentials, find the approximate value of $\sqrt{26}$ .  | 1 |
| 5. | Find the derivative of $\sqrt{\frac{1 - \tan x}{1 + \tan x}}$ w.r.t. $x$ .  | 4 |
| 6. | Find the derivative of $\cot^{-1} \frac{\sqrt{1 + \sin x} + \sqrt{1 - \sin x}}{\sqrt{1 + \sin x} - \sqrt{1 - \sin x}}$ w.r. t. $x$ .  | 4 |
| 7. | Use Langrange's Mean Value Theorem to find a point on the curve $y = \sqrt{x^2 - 4}$ defined in the interval $[2, 4]$ , where the tangent is parallel to the chord joining the end points of the curve. | 4 |

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Differentiation and Its Application

Time hour

8. Find the intervals in which the function  $f(x) = \sin x + \cos x$ ,  $0 \leq x \leq 2\pi$  is increasing or decreasing. 4
9. Water is running out of a conical funnel at the rate of  $5 \text{ cm}^3/\text{sec}$ . If the radius of the base of funnel is 10 cm and the altitude is 20 cm, find the rate at which the water level is dropping when it is 5 cm from the top. 6
10. If  $x = \sec \theta - \cos \theta$ ,  $y = \sec^n \theta - \cos^n \theta$ , show that  $(x^2 + 4) \left( \frac{dy}{dx} \right)^2 = n^2 (y^2 + 4)$ . 6

Paper by Pawan Kumar, St. Joseph's Convent School, Bathinda

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