CBSE POINT, BALASORE

CLASSROOM EXAMINATION (2025-26)
SUBJECT-MATHEMATICS

TIME: 1 HR   **CLASS-XI**   **FM-24**

Section – A $[1 \times 3]$

1. $\lim\limits_{\theta \to 0} \dfrac{1 - \cos 4\theta}{1 - \cos 6\theta}$ is equal to

(a) $\dfrac{4}{9}$ (b) $\dfrac{1}{2}$ (c) $\dfrac{-1}{2}$ (d) -1

2. $\lim\limits_{x \to 1} \dfrac{(\sqrt{x} - 1)(2x - 3)}{2x^2 + x - 3}$ is equal to

(a) $\dfrac{1}{10}$ (b) $-\dfrac{1}{10}$ (c) 1 (d) None of these

3. If $y = \sqrt{\dfrac{1-x}{1+x}}$, then $\dfrac{dy}{dx}$ equals

(a) $\dfrac{y}{1-x^2}$ (b) $\dfrac{y}{x^2-1}$ (c) $\dfrac{y}{1+x^2}$ (d) $\dfrac{y}{y^2-1}$

Section – B $[3 \times 7]$

4. Evaluate $\lim\limits_{x \to 0} f(x)$, where $f(x) = \begin{cases} \dfrac{|x|}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$.

5. Find $\lim\limits_{x \to 0} f(x)$ and $\lim\limits_{x \to 1} f(x)$ where $f(x) = \begin{cases} 2x + 3 & x \leq 0 \\ 3(x + 1) & x > 0 \end{cases}$.

6. Suppose $f(x) = \begin{cases} a + bx, & x < 1 \\ 4, & x = 1 \\ b - ax, & x > 1 \end{cases}$ and if $\lim\limits_{x \to 1} f(x) = f(1)$, what are possible values of a and b?

7. If $f(x) = \begin{cases} mx^2 + n, & x < 0 \\ nx + m, & 0 \leq x \leq 1 \\ nx^3 + m, & x > 1 \end{cases}$ for what integers m and n does both $\lim\limits_{x \to 0} f(x)$ and $\lim\limits_{x \to 1} f(x)$ exist?

8. Find mean and variance of first 10 multiples of 3.

9. The mean and standard deviation of 20 observation are found to be 10 and 2, respectively. On rechecking it was found that an observation 8 was incorrect. Calculate the correct mean and standard deviation in each of the following cases.
(i) If wrong item is omitted
(ii) If it is replaced by 12.

10. Given that $\bar{x}$ is the mean and σ^2 is the variance of n observations $x_1, x_2, \ldots, x_n$. Prove that the mean and variance of the observations $ax_1, ax_2, ax_3, \ldots, ax_n$ are $a\bar{x}$ and $a^2\sigma^2$ respectively $(a \neq 0)$.

[Limits and Derivatives, Statistics]