Sardar Kaurey Khan Public Higher Secondary School Muzaffargarh

MATHEMATICS | **1st Quarter Test (Chapter 1, 2)** | **INTER PART-II**

Time Allowed: 15 minutes | **(Objective Type)** | **Max. Marks: 10**

Q.1

(i) If $f(x) = 2$, then $f(x^2) =$

(A) 2 (B) 4

(C) 8 (D) 0

(ii) If $f(x) = ax + b$, then Range f =

(A) $[0, +\infty)$ (B) $(-\infty, +\infty)$

(C) $(0, +\infty)$ (D) (a, b)

(iii) If $y = \sin^{-1}x \Leftrightarrow x = \sin y$, where

(A) $-\frac{\pi}{2} \le y \le \frac{\pi}{2}$ (B) $-\frac{\pi}{2} \le x \le \frac{\pi}{2}$

(C) $0 \le y \le \pi$ (D) $-1 \le y \le 1$

(iv) $\lim\limits_{x\to 0} \frac{\sin 7x}{x} =$

(A) 7 (B) 1/7

(C) 1 (D) –1

(v) If $x^2 + y^2 = 4$, then $\frac{dy}{dx} =$

(A) $\frac{y}{x}$ (B) $-\frac{x}{y}$

(C) $-\frac{y}{x}$ (D) $\frac{x}{y}$

(vi) Derivative of sec x at x = 0 is:

(A) 0 (B) 1

(C) 1/0 (D) –1

(vii) Maclaurin series expansion is valid only if the series is:

(A) Oscillatory (B) Divergent

(C) Convergent (D) All of these

(viii) $1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \ldots.$

(A) sin x (B) cos x

(C) e^x (D) ln (1 + x)

(ix) $\frac{d}{dx}[5f(x)] =$

(A) $5f'(x)$ (B) 5

(C) $f'(x)$ (D) $5 + f'(x)$

(x) $f(x) = ax + b$, $a \neq 0$ is:

(A) Trigonometric function (B) Linear function

(C) Cubic function (D) Quadratic function

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MATHEMATICS | **1st Quarter Test (Chapter 1, 2)** | **INTER PART-II**

Time Allowed: 1:15 hours | **(Subjective Type)** | **Max. Marks: 40**

SECTION-I

Q.2 Write short answers to any TEN (10) questions. **(10 × 2 = 20)**

(i) Prove the identity $\text{sech}^2 x = 1 - \tan h^2 x$.

(ii) Without finding the inverse, state the domain and Range of $f^{-1}(x)$, where $f(x) = \frac{x-1}{x-4}$, $x \neq 4$.

(iii) Evaluate $\lim_{x\to 0}\left(\frac{\sin ax}{\sin bx}\right)$

(iv) Evaluate $\lim_{x\to a}\left(\frac{x^n - a^n}{x^m - a^m}\right)$

(v) For what value of m, f(x) is continuous at x = 3. $f(x) = \begin{cases} mx & if\ x < 3 \\ x^2 & if\ x \geq 3 \end{cases}$

(vi) Discuss the continuity of f(x) at x = 2, where $f(x) = \begin{cases} 2x+5 & \text{if } x \leq 2 \\ 4x+1 & \text{if } x > 2 \end{cases}$

(vii) Find $\frac{dy}{dx}$ if $xy + y^2 = 2$.

(viii) Differentiate $(1 + x^2)^n$ w. r. t x^2.

(ix) Differentiate $\sin^{-1}\sqrt{1-x^2}$ w. r. t. 'x'.

(x) Find $\frac{dy}{dx}$ if $y = \tanh^{-1}(\sin x)$.

(xi) Apply the Maclaurin expansion to prove that $\ln(1 + x) = x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \ldots\ldots$

(xii) Determine the intervals in which $f(x) = \sin x$ is increasing or decreasing for the domain $(-\pi, \pi)$.

(xiii) Find the extreme values for the functions defined as: $f(x) = 1 - x^3$

(xiv) Divide 20 into two parts so that sum of their squares will be minimum.

(xv) Define critical point of a function.

SECTION-II

Note: Attempt any TWO (02) questions. **(10 × 2 = 20)**

Q.3 **(a)** If $x = a\cos^3\theta$, $y = b\sin^3\theta$, show that $a\frac{dy}{dx} + b\tan\theta = 0$. **(5)**

(b) Differentiate $\cos x^2$ from the first principle. **(5)**

Q.4 **(a)** Find y_4, if $y = \cos^3 x$. **(5)**

(b) For what value of m and n, f(x) is continuous at x = 3. $f(x) = \begin{cases} mx & if\ x < 3 \\ n & if\ x = 3 \\ -2x+9 & if\ x > 3 \end{cases}$ **(5)**

Q.5 **(a)** Evaluate $\lim_{\theta\to 0}\frac{1-\cos p\theta}{1-\cos q\theta}$ **(5)**

(b) If $y = e^{ax}\sin bx$, show that $\frac{d^2y}{dx^2} - 2a\frac{dy}{dx} + (a^2 + b^2)y = 0$. **(5)**