Q1. 22 January Shift 1

If the domain of the function $f(x) = \sin^{-1}\left(\frac{5-x}{3+2x}\right) + \frac{1}{\log_e(10-x)}$ is $(-\infty, \alpha] \cup [\beta, \gamma] - \{\delta\}$, then $6(\alpha + \beta + \gamma + \delta)$ is equal to

(1) 67   (2) 66   (3) 70   (4) 68

Q2. 22 January Shift 1

The number of distinct real solutions of the equation $x|x + 4| + 3|x + 2| + 10 = 0$ is

(1) 2   (2) 1   (3) 3   (4) 0

Q3. 22 January Shift 2

Let the domain of the function $f(x) = \log_3 \log_5 \left(7 - \log_2\left(x^2 - 10x + 85\right)\right) + \sin^{-1}\left(\left|\frac{3x-7}{17-x}\right|\right)$ be $(\alpha, \beta]$. Then $\alpha + \beta$ is equal to :

(1) 9   (2) 10   (3) 12   (4) 8

Q4. 22 January Shift 2

Let f and g be functions satisfying $f(x + y) = f(x)f(y)$, $f(1) = 7$ and $g(x + y) = g(xy)$, $g(1) = 1$, for all $x, y \in \mathbf{N}$. If $\sum_{x=1}^{n}\left(\frac{f(x)}{g(x)}\right) = 19607$, then n is equal to:

(1) 7   (2) 6   (3) 4   (4) 5

Q5. 23 January Shift 2

Consider two sets $A = \{x \in \mathbf{Z} : |(|x - 3| - 3)| \leq 1\}$ and $B = \left\{x \in \mathbf{R} - \{1, 2\} : \frac{(x-2)(x-4)}{x-1}\log_e(|x - 2|) = 0\right\}$. Then the number of onto functions $f : A \to B$ is equal to

(1) 32   (2) 79   (3) 62   (4) 81

Q6. 24 January Shift 1

If the domain of the function $f(x) = \log_{(10x^2-17x+7)}\left(18x^2 - 11x + 1\right)$ is $(-\infty, a) \cup (b, c) \cup (d, \infty) - \{e\}$, then $90(a + b + c + d + e)$ equals:

(1) 170   (2) 307   (3) 316   (4) 177

Q7. 24 January Shift 2

Let f be a function such that $3f(x) + 2f\left(\frac{m}{19x}\right) = 5x$, $x \neq 0$, where $m = \sum_{i=1}^{9}(i)^2$. Then $f(5) - f(2)$ is equal to

(1) 18   (2) 36   (3) 9   (4) -9

Q8. 28 January Shift 1

If $g(x) = 3x^2 + 2x - 3$, $f(0) = -3$ and $4g(f(x)) = 3x^2 - 32x + 72$, then $f(g(2))$ is equal to:

(1) $-\frac{7}{2}$ (2) $-\frac{25}{6}$ (3) $\frac{7}{2}$ (4) $\frac{25}{6}$

Q9. 28 January Shift 2

Given below are two statements:

Statement I: The function $f : \mathbf{R} \to \mathbf{R}$ defined by $f(x) = \frac{x}{1+|x|}$ is one-one.

Statement II: The function $f : \mathbf{R} \to \mathbf{R}$ defined by $f(x) = \frac{x^2+4x-30}{x^2-8x+18}$ is many-one.

In the light of the above statements, choose the correct answer from the options given below :

(1) Both Statement I and Statement II are true

(2) Statement I is true but Statement II is false

(3) Statement I is false but Statement II is true

(4) Both Statement I and Statement II are false

Q10. 28 January Shift 2

The sum of all the elements in the range of $f(x) = \mathrm{Sgn}(\sin x) + \mathrm{Sgn}(\cos x) + \mathrm{Sgn}(\tan x) + \mathrm{Sgn}(\cot x)$,

$x \neq \frac{n\pi}{2}, n \in \mathbf{Z}$, where $\mathrm{Sgn}(t) = \begin{cases} 1, \text{ if } t > 0 \\ -1, \text{ if } t < 0 \end{cases}$, is :

(1) 2   (2) 0   (3) 4   (4) -2

ANSWER KEYS

1. (3)   **2.** (2)   **3.** (1)   **4.** (4)   **5.** (3)   **6.** (3)   **7.** (1)   **8.** (3)

9. (1)   **10.** (1)