

Q1. 21 January Shift 1

Let $f : \mathbf{R} \rightarrow (0, \infty)$ be a twice differentiable function such that $f(3) = 18$, $f'(3) = 0$ and $f''(3) = 4$. Then

$\lim_{x \rightarrow 1} \left(\log_e \left(\frac{f(2+x)}{f(3)} \right)^{\frac{18}{(x-1)^2}} \right)$ is equal to :

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

Q2. 21 January Shift 2

Let $[\cdot]$ denote the greatest integer function and $f(x) = \lim_{n \rightarrow \infty} \frac{1}{n^3} \sum_{k=1}^n \left[\frac{k^2}{3^x} \right]$. Then $12 \sum_{j=1}^{\infty} f(j)$ is equal to _____.

Q3. 22 January Shift 2

If $\lim_{x \rightarrow 0} \frac{e^{(a-1)x} + 2 \cos bx + (c-2)e^{-x}}{x \cos x - \log_e(1+x)} = 2$, then $a^2 + b^2 + c^2$ is equal to :

- (1) 5 (2) 9 (3) 3 (4) 7

Q4. 28 January Shift 1

The value of $\lim_{x \rightarrow 0} \frac{\log_e(\sec(ex) \cdot \sec(e^2x) \cdots \sec(e^{10}x))}{e^2 - e^{2 \cos x}}$ is equal to

- (1) $\frac{(e^{20}-1)}{2(e^2-1)}$ (2) $\frac{(e^{10}-1)}{2(e^2-1)}$ (3) $\frac{(e^{10}-1)}{2e^2(e^2-1)}$ (4) $\frac{(e^{20}-1)}{2e^2(e^2-1)}$

ANSWER KEYS

1. (3)

2. 2

3. (4)

4. (1)