Q1. 21 January Shift 1

The value of $\int_{-\pi/6}^{\pi/6}\left(\frac{\pi+4x^{11}}{1-\sin(|x|+\pi/6)}\right)dx$ is equal to:

(1) 8π (2) 6π (3) 2π (4) 4π

Q2. 21 January Shift 1

$6\int_0^\pi |(\sin 3x+\sin 2x+\sin x)|dx$ is equal to _____.

Q3. 21 January Shift 2

If $\int_0^1 4\cot^{-1}\left(1-2x+4x^2\right)\mathrm{d}x = \mathrm{a}\tan^{-1}(2)-\mathrm{b}\log_{\mathrm{e}}(5)$, where $\mathrm{a},\mathrm{b}\in\mathbf{N}$, then $(2\mathrm{a}+\mathrm{b})$ is equal to _____.

Q4. 22 January Shift 1

The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\left(\frac{1}{[x]+4}\right)dx$, where $[\cdot]$ denotes the greatest integer function, is

(1) $\frac{1}{60}(21\pi-1)$ (2) $\frac{7}{60}(\pi-3)$ (3) $\frac{7}{60}(3\pi-1)$ (4) $\frac{1}{60}(\pi-7)$

Q5. 22 January Shift 2

Let $f(x)=[x]^2-[x+3]-3, x\in\mathbf{R}$, where [] is the greatest integer funtion. Then

(1) $\int_0^2 f(x)\mathrm{d}x=-6$

(2) $f(x)<0$ only for $x\in[-1,3)$

(3) $f(x)>0$ only for $x\in[4,\infty)$

(4) $f(x)=0$ for finitely many values of x

Q6. 22 January Shift 2

Let $[\cdot]$ be the greatest integer function. If $\alpha=\int_0^{64}\left(x^{1/3}-\left[x^{1/3}\right]\right)\mathrm{d}x$, then $\frac{1}{\pi}\int_0^{\alpha\pi}\left(\frac{\sin^2\theta}{\sin^6\theta+\cos^6\theta}\right)\mathrm{d}\theta$ is equal to _____ .

Q7. 23 January Shift 1

The value of the integral $\int_{\frac{\pi}{24}}^{\frac{5\pi}{24}}\frac{\mathrm{d}x}{1+\sqrt[3]{\tan 2x}}$ is :

(1) $\frac{\pi}{3}$ (2) $\frac{\pi}{12}$ (3) $\frac{\pi}{18}$ (4) $\frac{\pi}{6}$

Q8. 23 January Shift 2

The number of elements in the
set $\mathrm{S}=\left\{x: x\in[0,100] \text{ and } \int_0^x t^2\sin(x-t)\mathrm{d}t=x^2\right\}$ is _____.

Q9. 24 January Shift 1

Let a differentiable function f satisfy the equation $\int_0^{36} f\left(\frac{tx}{36}\right)dt = 4\alpha f(x)$. If $y = f(x)$ is a standard parabola passing through the points $(2, 1)$ and $(-4, \beta)$, then β^α is equal to ____.

Q10. 24 January Shift 2

If $f(x)$ satisfies the relation $f(x) = e^x + \int_0^1 (y + xe^x)f(y)dy$, then $e + f(0)$ is equal to ____.

Q11. 28 January Shift 1

Let f be a polynomial function such that $f\left(x^2+1\right) = x^4 + 5x^2 + 2$, for all $x \in \mathbb{R}$. Then $\int_0^3 f(x)dx$ is equal to

(1) $\frac{5}{3}$ (2) $\frac{41}{3}$ (3) $\frac{27}{2}$ (4) $\frac{33}{2}$

Q12. 28 January Shift 1

If $\int\left(\frac{1-5\cos^2 x}{\sin^5 x\cos^2 x}\right)dx = f(x) + \mathrm{C}$, where C is the constant of integration, then $f\left(\frac{\pi}{6}\right) - f\left(\frac{\pi}{4}\right)$ is equal to

(1) $\frac{1}{\sqrt{3}}(26+\sqrt{3})$ (2) $\frac{1}{\sqrt{3}}(26-\sqrt{3})$
(3) $\frac{4}{\sqrt{3}}(8-\sqrt{6})$ (4) $\frac{2}{\sqrt{3}}(4+\sqrt{6})$

Q13. 28 January Shift 1

The value of $\sum_{r=1}^{20}\left(\left|\sqrt{\pi\left(\int_0^r x|\sin\pi x|dx\right)}\right|\right)$ is ____

Q14. 28 January Shift 2

Let $[\cdot]$ denote the greatest integer function. Then $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\left(\frac{12(3+[x])}{3+[\sin x]+[\cos x]}\right)dx$ is equal to :

(1) $13\pi+1$ (2) $12\pi+5$ (3) $11\pi+2$ (4) $15\pi+4$

ANSWER KEYS

1. (4) **2.** 17 **3.** 9 **4.** (3) **5.** (2) **6.** 36 **7.** (2) **8.** 16
9. 64 **10.** 2 **11.** (4) **12.** (3) **13.** 210 **14.** (3)