**1.** $\left(\int_0^a x\,dx\right) \le (a+4)$, then -

(a) $0 \le a \le 4$ (b) $-2 \le a \le 4$
(c) $-2 \le a \le 0$ (d) $a \le -2$ or $a \ge 4$

**2.** If $f(x) = \frac{x^9 - 3x^5 + 7x^3 - x + 1}{\cos^2 x}$ then $\int_{-\pi/4}^{\pi/4} f(x)\,dx$ equal to -

(a) 0 (b) $\pi/2$ (c) 2 (d) 1

**3.** If $\int_0^1 f(x)\,dx = 1$, $\int_0^1 xf(x)\,dx = a$ and $\int_0^1 x^2 f(x)\,dx = a^2$ then $\int_0^1 (a-x)^2 f(x)\,dx$ is equal to -

(a) $4a^2$ (b) $2a^2$ (c) $a^2$ (d) 0

**4.** Value of $\int_{1/e}^{e} \frac{dt}{t^3 + t}$ is equal to

(a) $\frac{1}{e^2+1}$ (b) $e^2 - 1$ (c) $-1$ (d) 1

**5.** $\int_{-1}^{3} \left[\tan^{-1}\frac{x}{x^2+1} + \tan^{-1}\frac{x^2+1}{x}\right]dx$ =

(a) $\pi$ (b) $2\pi$ (c) $3\pi$ (d) None of these

**6.** $\int_3^6 \frac{1}{x+1}dx$ is equal to

(a) $[\log(x+1)]_3^6$
(b) $[\log t + 1]_3^6$
(c) Both (a) and (b)
(d) None of these

**7.** $\int_0^{\pi} e^{\sin^2 x}\cos^3 x\,dx =$ **OR**

For any integer $n$, $\int_0^{\pi} e^{\sin^2 x}\cos^3(2n+1)x\,dx =$

(a) -1 (b) 0
(c) 1 (d) None of these

**8.** $\int_0^{2a} \frac{f(x)}{f(x)+f(2a-x)}dx$ is equal to

(a) $a$ (b) $a/2$ (c) $2a$ (d) 0

**9.** $\int_0^{\pi/2} \frac{\sqrt{\tan x}}{1+\sqrt{\tan x}} = \int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}}dx$ is equal to

(a) $\pi/4$ (b) $\infty$ (c) -1 (d) 1

**10.** The integral $\int_{-1/2}^{1/2}\left([x] + \ln\left(\frac{1+x}{1-x}\right)\right)dx$ equal to

(a) $\frac{-1}{2}$ (b) 0
(c) 1 (d) $2\ln\left(\frac{1}{2}\right)$

**11.** The value of the integral $\int_{-1}^{1} \log\left[x + \sqrt{x^2+1}\right]dx$ is

(a) 0 (b) log 2 (c) log 1/2 (d) None of these

**12.** The value of $\int_2^3 \frac{\sqrt{x}}{\sqrt{5-x}+\sqrt{x}}dx$ is

(a) 1 (b) 0 (c) -1 (d) 1/2

**13.** If $f(a+b-x) = f(x)$ then $\int_a^b x\,f(x)dx$ is equal to

(a) $\frac{a+b}{2}\int_a^b f(b-x)dx$ (b) $\frac{a+b}{2}\int_a^b f(x)dx$
(c) $\frac{b-a}{2}\int_a^b f(x)dx$ (d) None of these

**14.** If $\int_0^{\pi} x\,f(\sin x)dx = k\int_0^{\pi} f(\sin x)dx$, then the value of $k$ will be

(a) $\pi$ (b) $\pi/2$ (c) $\pi/4$ (d) 1

**15.** For $n > 0$, $\int_0^{2\pi} \frac{x\sin^{2n}x}{\sin^{2n}x + \cos^{2n}x}dx$ is equal to

(a) $\pi^2$ (b) $2\pi^2$
(c) $3\pi^2$ (d) $4\pi^2$

**16.** If $f(x)$ is a continuous periodic function with period $T$, then the integral $I = \int_a^{a+T} f(x)dx$ is

(a) Equal to $2a$
(b) Equal to $3a$
(c) Independent of $a$
(d) None of these

**17.** If $S_n = \frac{1}{1+\sqrt{n}} + \frac{1}{2+\sqrt{2n}} + \ldots\ldots + \frac{1}{n+\sqrt{n^2}}$ then $\lim_{n\to\infty} S_n$ is equal to

(a) log 2 (b) 2 log 2 (c) 3log2
(d) 4 log 2

**18.** $\lim_{n\to\infty}\frac{(n!)^{1/n}}{n}$ or $\lim_{n\to\infty}\left(\frac{n!}{n^n}\right)^{1/n}$ is equal to

(a) $e$ (b) $e^{-1}$ (c) 1 (d) None of these

**19.** The value of $\int_0^{\pi/2} \sin^4 x\cos^6 x\,dx$ =

(a) $3\pi/312$ (b) $5\pi/512$
(c) $3\pi/512$ (d) $5\pi/312$

**20.** If $I_n = \int_0^{\infty} e^{-x}x^{n-1}dx$, then $\int_0^{\infty} e^{-\lambda x}x^{n-1}dx$ is equal to

(a) $\lambda I_n$ (b) $\frac{1}{\lambda}I_n$
(c) $\frac{I_n}{\lambda^n}$ (d) $\lambda^n I_n$