1. The value of $\int_{-\pi/2}^{\pi/2} \frac{\sin^2 x\, dx}{1+e^x}$ is-

(a) $\frac{\pi}{8}$ (b) $\frac{\pi}{4}$ (c) $\frac{\pi}{6}$ (d) $\frac{\pi}{3}$

2. The value of $\int_{-2n}^{2n+\frac{1}{2}} (\sin \pi x)\left\{\frac{x}{2}\right\} dx$ is (where {x} denotes the fractional part of x)

(a) $\frac{-2n\pi+1}{\pi^2}$ (b) $\frac{n}{\pi}$

(c) $\frac{(n+1)}{\pi}$ (d) $\frac{2n\pi-1}{\pi^2}$

3. Let $\begin{bmatrix} 1 & 0 & 0 \\ 6 & 2 & 0 \\ 5 & 4 & 3 \end{bmatrix} \begin{bmatrix} x \\ x^2 \\ 1 \end{bmatrix} = \begin{bmatrix} x \\ 2\alpha x+\beta x^2 \\ 5x+\gamma x^2+3 \end{bmatrix}$ for at least 3 values of x and f(x) is a differentiable function satisfying $f(xy) = f(x) + x^2(y^2-1)+y-1$, $\forall$ x, y $\in$ R and f(1) = 3, then

$\int_{-1}^{1} (\alpha f(x)+\beta f'(x)+\gamma)\, dx$ is equal to -

(a) 10 (b) 20

(c) 25 (d) 35

4. The value of $\int_{1}^{16} \tan^{-1}\sqrt{\sqrt{x}-1}\, dx$ is

(a) $\frac{16\pi}{3} + 2\sqrt{3}$

(b) $\frac{4}{3}\pi - 2\sqrt{3}$

(c) $\frac{4}{3}\pi + 2\sqrt{3}$

(d) $\frac{16}{3}\pi - 2\sqrt{3}$

5. If $\Delta(x) = \begin{vmatrix} 1+x+2x^2 & x+3 & 1 \\ x+2x^2 & x & 3 \\ 3x+6x^2 & 3x+11 & 9 \end{vmatrix}$ then $\int_0^1 \Delta(x)\, dx$ is

(a) $\frac{176}{5}$ (b) $-\frac{176}{3}$

(c) $\frac{186}{3}$ (d) None of these

6. If $\int_0^{\pi/2} \log \sin x\, dx = k$, then $\int_0^{\pi} \log(1+\cos x)\, dx$ is given by

(a) $\pi \log 2 + 4k$ (b) $\pi \log 2 + 2k$

(c) $\pi \log 2 + k$ (d) $\pi \log 9 + k^2$

7. The value of $\int_{-2n}^{2n+\frac{1}{2}} (\sin \pi x)\left\{\frac{x}{2}\right\} dx$ is (where {x} denotes the fractional part of x)

(a) $\frac{-2n\pi+1}{\pi^2}$ (b) $\frac{n}{\pi}$

(c) $\frac{(n+1)}{\pi}$ (d) $\frac{2n\pi-1}{\pi^2}$

8. Let $I_1 = \int_{\pi/6}^{\pi/3} \frac{\sin x}{x} dx$, $I_2 = \int_{\pi/6}^{\pi/3} \frac{\sin(\sin x)}{\sin x} dx$, $I_3 = \int_{\pi/6}^{\pi/3} \frac{\sin(\tan x)}{\tan x} dx$, then

(a) $I_1 < I_2 < I_3$ (b) $I_2 < I_1 < I_3$

(c) $I_3 < I_1 < I_2$ (d) $I_3 < I_2 < I_1$

9. If $I = \int_1^{\infty} \frac{dx}{x^2\sqrt{1+x}}$, then I equals

(a) $\sqrt{2} + \log(\sqrt{2}-1)$

(b) $\sqrt{2} - \log(\sqrt{2}-1)$

(c) $\log(\sqrt{2}+1) + \sqrt{2}$

(d) $\sqrt{2} + \log(3-\sqrt{2})$

10. If $I = \int_0^{\infty} \frac{\sqrt{x}\, dx}{(1+x)(2+x)(3+x)}$, then I equals-

(a) $\frac{\pi}{2}(2\sqrt{2} - \sqrt{3} - 1)$

(b) $\frac{\pi}{2}(2\sqrt{2} + \sqrt{3} - 1)$

(c) $\frac{\pi}{2}(2\sqrt{2} - \sqrt{3} + 1)$

(d) None of these

11. If $I = \int_0^1 x\sqrt{\frac{1-x}{1+x}} dx$, the I equals-

(a) $1 + \frac{\pi}{4}$ (b) $1 - \frac{\pi}{4}$

(c) π (d) $\pi - \sqrt{2}$

12. If $I = \int_{-3}^{2} (|x+1|+|x+2|+|x-1|) dx$, then I equals:

(a) $\frac{31}{2}$ (b) $\frac{35}{2}$

(c) $\frac{37}{2}$ (d) $\frac{39}{2}$

13. If $I = \int_{-2}^{0} [x^3+3x^2+3x+(x+1)\cos(x+1)] dx$, then I equals:

(a) -4 (b) -3 (c) -2 (d) -1

14. If $I = \int_0^{\pi} e^{|\cos x|}\left\{2\sin\left(\frac{1}{2}\cos x\right)+3\cos\left(\frac{1}{2}\cos x\right)\right\}\sin dx$, then I equals

(a) $7\sqrt{e}\cos(1/2)$

(b) $7\sqrt{e}\,[\cos(1/2) - \sin(1/2)]$

(c) 0

(d) None of these

15. If $I = \int_{1/e}^{e} |\log x| \frac{dx}{x^2}$, then I equals

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

16. If for $k \in N$, $\frac{\sin 2kx}{\sin x} = 2[\cos x + \cos 3x + ...+ \cos(2k-1)x]$, then value of $I = \int_0^{\pi/2} \sin 2kx \cot x\, dx$ is

(a) $-\pi/2$ (b) 0 (c) $\pi/2$ (d) π

17. If $b > a$, and $I = \int_a^b \sqrt{\frac{x-a}{b-x}}\, dx$, then I equals

(a) $\frac{\pi}{2}(b - a)$ (b) $\pi(b - a)$

(c) $\pi/2$ (d) $2\pi(b - a)$

18. $\int_a^b \frac{|x|}{x} dx$ equals:

(a) |a| - |b| (b) |b| - |a| (c) ||a| - |b|| (d) |b - a|

19. $\int_{-\pi/2}^{\pi/2} \sqrt{\frac{1-\cos 2x}{2}}\, dx$ equals:

(a) 1 (b) 2 (c) ½ (d) 0

20. If $\pi/2 < \alpha < 3\pi/2$, then $\int_0^1 \frac{dx}{\sqrt{1-x^2\sin^2\alpha}}$ is equal to -

(a) $\left|\frac{\alpha}{\sin\alpha}\right|$ (b) $\left|\frac{\pi-\alpha}{\sin\alpha}\right|$

(c) $\left|\frac{2\pi-\alpha}{\sin\alpha}\right|$ (d) None of these

21. $\int_0^{50} [\arg|z-1|]dx$, where $|\,|$ is modulus and $[\,]$ is greatest integer function is

(a) 0 (b) 25 (c) 50 (d) 100

22. $\int_{-1}^{1} \max\{x, x^3\}\, dx$ equals-

(a) 2 (b) 1/4 (c) 3/4 (d) 3/2

23. $\int_{-2}^{2} \min\{|x|, [x]\}\, dx$ equals:

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

24. If $g(x) = \int_0^x \cos^4 t\, dt$, then $g(x + \pi)$ equals-

(a) $g(x) + g(\pi)$ (b) $g(x) - g(\pi)$ (c) $g(x) \cdot g(\pi)$ (d) 0

25. Let $\frac{d}{dx}F(x) = \frac{e^{\sin x}}{x}$, $x > 0$. If $\int_1^4 \frac{2e^{\sin x^2}}{x} dx = f(k) - f(1)$ then one of the possible value of k is:

(a) 2 (b) 4 (c) 8 (d) 16