1. The value of $\int_0^2 x^{[x^2+1]}\,dx$, where [x] is the greatest integer less than or equal to x is -

(a) 2 (b) 8/3 (c) 4 (d) None of these

2. The value of $\int_{-1}^{3} \{|x-2|+[x]\}\,dx$, where [x] denotes the greatest integer less than or equal to x is -

(a) 5 (b) 7 (c) 4 (d) 3

3. Given $I_m = \int_1^e (\log x)^m\,dx$. If $\frac{I_m}{K} + \frac{I_{m-2}}{L} = e$ then values of K and L are -

(a) 1 - m, $\frac{1}{m}$

(b) $\frac{1}{1-m}$, m

(c) $\frac{1}{1-m}$, $\frac{m(m-2)}{m-1}$

(d) $\frac{m}{m-1}$, m - 2

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. The value of $\int_0^{\pi} [2\sin x]\,dx$, where [.] represents the greatest integer function is -

(a) π (b) 2π (c) $-\pi$ (d) $2\pi/3$

6. The integral $\int_{-1/2}^{1/2} \left([x] + \log\frac{1+x}{1-x}\right) dx$ equals -

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

7. The value of the integral $\int_{-1/2}^{1/2} \sqrt{\left(\frac{x+1}{x-1}\right)^2 + \left(\frac{x-1}{x+1}\right)^2 - 2}\,dx$ is -

(a) 2 log $\frac{4}{3}$ (b) 4 log $\frac{4}{3}$ (c) log $\frac{4}{3}$

(d) None of these

8. $\int_0^{n^2} [\sqrt{x}]\,dx$ is equal to -

(a) $\frac{n(n+1)(4n+1)}{6}$

(b) $\frac{n(n-1)(4n+1)}{6}$

(c) $\frac{n(n-1)(4n-1)}{6}$

(d) None of these

9. The value of the integral $\int_0^{2[x]} (x-[x])dx$ is -

(a) [x] (b) $\frac{1}{2}$ [x]

(c) 3[x] (d) 2[x]

10. For $x \in R$ and a continuous function f, let

$I_1 = \int_{\sin^2 t}^{1+\cos^2 t} x\, f\{(2-x)\}\,dx$ and $I_2 = \int_{\sin^2 t}^{1+\cos^2 t} f\{x(2-x)\}\,dx$.

Then I_1/I_2 is -

(a) 0 (b) 1 (c) 2 (d) 3

11. Evaluate : $\int_a^b \frac{|x|}{x}\,dx$, a < b -

(a) |a| - |b| (b) |b| + |a| (c) |b| - |a| (d) None of these

12. Given $\int_0^1 \frac{\sin t}{1+t}\,dt = \alpha$, find the value of $\int_{4\pi-2}^{4\pi} \frac{\sin(t/2)}{4\pi+2-t}$ in terms of α -

(a) α (b) - α (c) 2α (d) None of these

13. Evaluate : $\int_0^{\frac{16\pi}{3}} |\sin x|\,dx$

(a) $\frac{21}{4}$ (b) $\frac{21}{2}$

(c) $\frac{11}{2}$ (d) $\frac{11}{4}$

14. Show that $\int_0^1 \frac{\ln x}{(1+x)}\,dx = -\int_0^1 \frac{\ln(1+x)}{x}\,dx = -\frac{\pi^2}{12}$

(a) $\frac{\pi^2}{12}$ (b) $\frac{\pi^2}{6}$

(c) $-\frac{\pi^2}{6}$ (d) $-\frac{\pi^2}{12}$

15. Evaluate : $\int_0^1 \cot^{-1}(1 - x + x^2)\,dx$ -

(a) $\frac{\pi}{2}$ - ln 2 (b) $\frac{\pi}{2}$ - ln 4

(c) $\frac{\pi}{4}$ - ln 2 (d) None

16. Evaluate : $\int_{-1}^{1}[x[1+\sin\pi x]+1]\,dx$, where [.] is the greatest integer function -

(a) 2 (b) 1 (c) 3 (d) None of these

17. The value of $\lim\limits_{x\to 0}\dfrac{\int_0^x \cos t^2 dt}{x}$ is -

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

18. Evaluate : $\int_0^{102}[\tan^{-1}x]\,dx$, where [·] denotes the greatest integer function less than or equal to x -

(a) 102 - tan 2 (b) 102 - tan 1

(c) 101 - tan 2 (d) None of these

19. Given f an odd function periodic with period 2 continuous $\forall$ x and $g(x)=\int_0^x f(t)dt$, then -

(a) g(x) is odd function (b) g(2n) = 1

(c) g(2n) = 0 (d) None of these

NUMERIC RESPONCE

20. $I_2=\int_{\sin^2 t}^{1+\cos^2 t} f\{x(2-x)\}dx$. Then $\dfrac{I_1}{I_2}$ is -

(a) 0 (b) 1 (c) 2 (d) 3

21. $\int_0^{\infty}\dfrac{dx}{(x+\sqrt{1+x^2})^3}=\alpha$ then find value of 8α.

22. $\lim\limits_{n\to\infty}\dfrac{1}{n}\sum_{r=1}^{n}\sin^{2k}\left(\dfrac{r\pi}{2n}\right)=\dfrac{\lfloor 2k}{(x)^k(k!)^2}$. Find the value of x.

23. $\int_0^{\pi/4}(\cos 2\theta)^{3/2}\cos\theta\,d\theta=\dfrac{a.\pi}{b\sqrt{2}}$, where a & b are coprime

then find sum of digits of 3a + b.

24. $\int_0^{\pi/2}\dfrac{1+2\cos x}{(2+\cos x)^2}dx = k$ then find value of 6 k

25. If $\int_0^{\pi} x f(\cos^2 x+\tan^4 x)dx=\dfrac{\pi k}{1997}\int_0^{\pi/2} f(\cos^2 x+\tan^4 x)dx$ then value of k is