EXERCISE – I SINGLE CORRECT (OBJECTIVE QUESTIONS)

1. If $\int_1^x \frac{dt}{|t|\sqrt{t^2-1}} = \frac{\pi}{6}$, then x can be equal to

(A) $\frac{2}{\sqrt{3}}$ (B) $\sqrt{3}$ (C) 2 (D) None of these

2. If f(x) = $\begin{cases} x & ; x < 1 \\ x-1 & ; x \geq 1 \end{cases}$, then $\int_0^2 x^2 f(x)\,dx$ is equal to

(A) 1 (B) $\frac{4}{3}$ (C) $\frac{5}{3}$ (D) $\frac{5}{2}$

3. Suppose for every integer n, $\int_n^{n+1} f(x)\,dx = n^2$. The value of $\int_{-2}^4 f(x)\,dx$ is

(A) 16 (B) 14 (C) 19 (D) 21

4. $\int_0^\pi |1+2\cos x|\,dx$ equals to :

(A) $\frac{2\pi}{3}$ (B) π (C) 2 (D) $\frac{\pi}{3} + 2\sqrt{3}$

5. The value of $\int_{-1}^3 (|x-2|+[x])\,dx$ is equal to

(where [∗] denotes greatest integer function)

(A) 7 (B) 5 (C) 4 (D) 3

6. Let f : R → R, g : R → R be continuous functions.

Then the value of integral $\int_{\ln\lambda}^{\ln 1/\lambda} \frac{f\left(\frac{x^2}{4}\right)[f(x)-f(-x)]}{g\left(\frac{x^2}{4}\right)[g(x)+g(-x)]}\,dx$ is

(A) depend on λ (B) a non-zero constant

(C) zero (D) None of these

7. If $\int_{-1}^{3/2} |x\sin\pi x|\,dx = \frac{k}{\pi^2}$, then the value of k is

(A) $3\pi + 1$ (B) $2\pi + 1$ (C) 1 (D) 4

8. $\int_0^{\pi/4} \frac{x\sin x}{\cos^3 x}\,dx$ equals to :

(A) $\frac{\pi}{4}+\frac{1}{2}$ (B) $\frac{\pi}{4}-\frac{1}{2}$ (C) $\frac{\pi}{4}$ (D) None of these

9. If f(0) = 1, f(2) = 3, f '(2) = 5 and f '(0) is finite, then $\int_0^1 x.f''(2x)\,dx$ is equal to

(A) zero (B) 1 (C) 2 (D) None of these

10. $\int_{\log\pi-\log 2}^{\log\pi} \frac{e^x}{1-\cos\left(\frac{2}{3}e^x\right)}\,dx$ is equal to

(A) $\sqrt{3}$ (B) $-\sqrt{3}$ (C) $\frac{1}{\sqrt{3}}$ (D) $-\frac{1}{\sqrt{3}}$

11. If $I_1 = \int_e^{e^2} \frac{dx}{\ln x}$ and $I_2 = \int_1^2 \frac{e^x}{x}\,dx$, then

(A) $I_1 = I_2$ (B) $2I_1 = I_2$

(C) $I_1 = 2I_2$ (D) None of these

12. $\int_{2-\log 3}^{3+\log 3} \frac{\log(4+x)}{\log(4+x)+\log(9-x)}\,dx$

(A) cannot be evaluated (B) is equal to $\frac{5}{2}$

(C) is equal to 1+2 log 3 (D) is equal to $\frac{1}{2}$ + log 3

13. Let $I_1 = \int_0^{3\pi} f(\cos^2 x)\,dx$, $I_2 = \int_0^{2\pi} f(\cos^2 x)\,dx$ and $I_3 = \int_0^{\pi} f(\cos^2 x)\,dx$, then

(A) $I_1 + 2I_3 + 3I_2$ (B) $I_1 = 2I_2 + I_3$
(C) $I_2 + I_3 = I_1$ (D) $I_1 = 2I_3$

14. If $\int_0^{11} \frac{11^x}{11^{[x]}} dx = \frac{k}{\log 11}$ then value of k is

(where [*] denotes greatest integer function)
(A) 11 (B) 101 (C) 110 (D) None of these

15. The value of function $f(x) = 1 + x + \int_1^x (\ell n^2 t + 2\,\ell n t)\, dt$

where f '(x) vanishes is
(A) e^{-1} (B) 0 (C) $2e^{-1}$ (D) $1 + 2e^{-1}$

16. If $\int_a^y \cos t^2 dt = \int_a^{x^2} \frac{\sin t}{t} dt$, then the value of $\frac{dy}{dx}$ is

(A) $\frac{2\sin^2 x}{x\cos^2 y}$ (B) $\frac{2\sin x^2}{x\cos y^2}$

(C) $\frac{2\sin x^2}{x\left(1-2\sin\frac{y^2}{2}\right)}$ (D) None of these

17. $\lim_{n\to\infty} \sum_{r=1}^{n} \left(\frac{r^3}{r^4+n^4}\right)$ equals

(A) log 2 (B) $\frac{1}{2}$ log 2 (C) $\frac{1}{3}$ log 2 (D) $\frac{1}{4}$ log 2

18. $\lim_{n\to\infty} \sum_{r=2n+1}^{3n} \frac{n}{r^2-n^2}$ is equal to

(A) log $\sqrt{\frac{2}{3}}$ (B) log $\sqrt{\frac{3}{2}}$ (C) log $\frac{2}{3}$ (D) log $\frac{3}{2}$

19. The value of $\lim_{n\to\infty}\left[\left(1+\frac{1}{n^2}\right)\left(1+\frac{2^2}{n^2}\right)......\left(1+\frac{n^2}{n^2}\right)\right]^{1/n}$ is

(A) $\frac{e^{\pi/2}}{2e^2}$ (B) $2e^2\, e^{\pi/2}$

(C) $\frac{2}{e^2} e^{\pi/2}$ (D) None of these

20. $\lim_{n\to\infty} \frac{\pi}{n}\left[\sin\frac{\pi}{n} + \sin\frac{2\pi}{n} + ... + \sin\frac{(n-1)\pi}{n}\right]$ equals

(A) 0 (B) π (C) 2 (D) None of these

21. If f(x) is a function satisfying $f\left(\frac{1}{x}\right) + x^2 f(x) = 0$

for all non-zero x, then $\int_{\sin\theta}^{\operatorname{cosec}\theta} f(x)\,dx$ equals

(A) $\sin\theta + \operatorname{cosec}\theta$ (B) $\sin^2\theta$
(C) $\operatorname{cosec}^2\theta$ (D) None of these

22. $\int_0^{(\pi/2)^{1/3}} x^5.\sin x^3\, dx$ equals to

(A) 1 (B) 1/2 (C) 2 (D) 1/3

23. $\lim_{n\to\infty}\left(\sin\frac{\pi}{2n}.\sin\frac{2\pi}{2n}.\sin\frac{3\pi}{2n}........\sin\frac{(n-1)\pi}{2n}\right)^{1/n}$ is equal to

(A) $\frac{1}{2}$ (B) $\frac{1}{3}$ (C) $\frac{1}{4}$ (D) None of these

24. If f(x) and g(x) are continuous functions satisfying f(x) = f(a – x) and g(x) + g(a – x) = 2, then $\int_0^a f(x)\,g(x)\,dx$ is equal to

(A) $\int_0^a g(x)\,dx$ (B) $\int_0^a f(x)dx$ (C) 0 (D) None of these

25. If [x] stands for the greatest integer function, the value of $\int_4^{10} \frac{[x^2]}{[x^2-28x+196]+[x^2]} dx$ is

(A) 0 (B) 1 (C) 3 (D) None of these

26. $\int_0^{\infty} [2e^{-x}]\, dx$ is equal to

(where [*] denotes the greatest integer function)
(A) 0 (B) ℓn 2 (C) e^2 (D) $2e^{-1}$

27. If $\int_0^{100} f(x)\,dx = a$, then $\sum_{r=1}^{100}\left(\int_0^1 f(r-1+x)\,dx\right) =$

(A) 100 a (B) a (C) 0 (D) 10 a

28. If f(x) = $\int_0^x \sin[2x]\,dx$ then f(π/2) is

(where [∗] denotes greatest integer function)

(A) $\frac{1}{2}$ {sin 1 + (π – 2) sin 2}

(B) $\frac{1}{2}$ {sin 1 + sin 2 + (π – 3) sin 3}

(C) 0 (D) sin 1 + $\left(\frac{\pi}{2}-2\right)$ sin 2

29. If A = $\int_0^{\pi} \frac{\cos x}{(x+2)^2}\,dx$, then $\int_0^{\pi/2} \frac{\sin 2x}{x+1}\,dx$ is equal to

(A) $\frac{1}{2} + \frac{1}{\pi+2} - A$ (B) $\frac{1}{\pi+2} - A$

(C) $1 + \frac{1}{\pi+2} - A$ (D) $A - \frac{1}{2} - \frac{1}{\pi+2}$

30. If f(x) = $\begin{cases} 0\ , \text{ where } x = \frac{n}{n+1}, n = 1,2,3..... \\ 1\ , \text{ else where} \end{cases}$, then the value of $\int_0^2 f(x)\,dx$

(A) 1 (B) 0 (C) 2 (D) ∞

31. $\int_{-\pi/2}^{\pi/2} \frac{|x|\,dx}{8\cos^2 2x+1}$ has the value

(A) $\frac{\pi^2}{6}$ (B) $\frac{\pi^2}{12}$ (C) $\frac{\pi^2}{24}$ (D) None of these

32. If $\int_0^{\infty} e^{-x^2}\,dx = \frac{\sqrt{\pi}}{2}$, then $\int_0^{\infty} e^{-ax^2}\,dx$ where a > 0 is

(A) $\frac{\sqrt{\pi}}{2}$ (B) $\frac{\sqrt{\pi}}{2a}$ (C) $2\frac{\sqrt{\pi}}{a}$ (D) $\frac{1}{2}\sqrt{\frac{\pi}{a}}$

33. The expression $\dfrac{\int_0^n [x]\,dx}{\int_0^n \{x\}\,dx}$ is equal to

(where [∗] and {∗} denotes greatest integer function and fractional part function and n $\in$ N)

(A) $\frac{1}{n-1}$ (B) $\frac{1}{n}$ (C) n (D) n – 1

34. Let A = $\int_0^1 \frac{e^t\,dt}{1+t}$ dt then $\int_{a-1}^{a} \frac{e^{-t}}{t-a-1}$ dt has the value

(A) Ae^{-a} (B) $-Ae^{-a}$ (C) $-ae^{-a}$ (D) Ae^{a}

35. $\int_0^{2n\pi}\left(|\sin x| - \left[\left|\frac{\sin x}{2}\right|\right]\right)$ dx is equal to

(where [∗] denotes the greatest integer function)

(A) 0 (B) 2n (C) 2nπ (D) 4n

36. f(x) = Minimum {tan x, cot x} $\forall$ x $\in$ $\left(0, \frac{\pi}{2}\right)$.

Then $\int_0^{\pi/3} f(x)\,dx$ is equal to

(A) $\ell n\left(\frac{\sqrt{3}}{2}\right)$ (B) $\ell n\left(\sqrt{\frac{3}{2}}\right)$ (C) $\ell n(\sqrt{2})$ (D) $\ell n(\sqrt{3})$

37. The value of $\int_1^2 ([x^2]-[x]^2)\,dx$ is equal to

(where [∗] denotes the greatest integer function)

(A) $4+\sqrt{2}-\sqrt{3}$ (B) $4-\sqrt{2}+\sqrt{3}$

(C) $4-\sqrt{3}-\sqrt{2}$ (D) None of these

38. If f(π) = 2 and $\int_0^{\pi} (f(x)+f''(x))$ sin x dx = 5 then f(0) is equal to

(It is given that f(x) is continuous in [0, π])

(A) 7 (B) 3 (C) 5 (D) 1

39. If $u_n = \int_0^{\pi/2} x^n \sin x\, dx, n \in N$ then the value of $u_{10} + 90\, u_8$ is

(A) $9\left(\frac{\pi}{2}\right)^8$ (B) $\left(\frac{\pi}{2}\right)^9$ (C) $10\left(\frac{\pi}{2}\right)^9$ (D) $9\left(\frac{\pi}{2}\right)^9$

40. If $f(x) = e^{g(x)}$ and $g(x) = \int_2^x \frac{t\, dt}{1+t^4}$ then f '(2) has the value equal to

(A) 2/17 (B) 0
(C) 1 (D) Cannot be determined

41. $\lim_{n\to\infty}\left(\frac{1}{n^2}\sec^2\frac{1}{n^2} + \frac{2}{n^2}\sec^2\frac{4}{n^2} + ... + \frac{n}{n^2}\sec^2 1\right)$ equals to

(A) $\frac{1}{2}$tan 1 (B) tan 1 (C) $\frac{1}{2}$ cosec 1 (D) $\frac{1}{2}$ sec 1

42. $\lim_{n\to\infty} \frac{1^p + 2^p + 3^p + ... + n^p}{n^{p+1}}$ is equal to

(A) $\frac{1}{p+1}$ (B) $\frac{1}{p-1}$ (C) $\frac{1}{p} - \frac{1}{p-1}$ (D) $\frac{1}{p+2}$

43. Let F(x) = f(x) + $f\left(\frac{1}{x}\right)$, where f(x) = $\int_1^x \frac{\log t}{1+t}$ dt. Then F(e) equals

(A) $\frac{1}{2}$ (B) 0 (C) 1 (D) 2

44. $\int_{-3\pi/2}^{-\pi/2} [(x+\pi)^3 + \cos^2(x+3\pi)]$ dx is equal to

(A) $\left(\frac{\pi^4}{32}\right) + \left(\frac{\pi}{2}\right)$ (B) $\left(\frac{\pi}{2}\right)$ (C) $\left(\frac{\pi}{4}\right) - 1$ (D) $\frac{\pi^4}{32}$

45. The solution for x of the equation $\int_{\sqrt{2}}^x \frac{dt}{t\sqrt{t^2-1}} = \frac{\pi}{2}$ is

(A) $-\sqrt{2}$ (B) π (C) $\frac{\sqrt{3}}{2}$ (D) $2\sqrt{2}$

46. $\int_0^{\pi} x\, f(\sin x)\, dx$ is equal to

(A) $\pi\int_0^{\pi} f(\sin x)\, dx$ (B) $\frac{\pi}{2}\int_0^{\pi/2} f(\sin x)\, dx$

(C) $\pi\int_0^{\pi/2} f(\cos x)\, dx$ (D) $\pi\int_0^{\pi} f(\cos x)\, dx$

47. The value of $\int_1^a [x]\, f'(x)\, dx$, a > 1, where [x] denotes the greatest integer not exceeding x, is

(A) [a] f(a) − {f(1) + f(2) +...........+ f([a])}
(B) [a] f([a]) − {f(1) + f(2) +...........+ f(a)}
(C) a f([a]) − {f(1) + f(2) +...........+ f(a)}
(D) af (a) − {f(1) + f(2) +...........+ f([a])}

48. Let f : R → R be a differentiable function having f(2) = 6, f '(2) = $\left(\frac{1}{48}\right)$. Then $\lim_{x\to 2}\int_6^{f(x)} \frac{4t^3}{x-2}$ dt equals

(A) 18 (B) 12 (C) 36 (D) 24

49. If $I_1 = \int_0^1 2^{x^2} dx, I_2 = \int_0^1 2^{x^3} dx, I_3 = \int_1^2 2^{x^2} dx$ and $I_4 = \int_1^2 2^{x^3} dx$, then

(A) $I_3 > I_4$ (B) $I_3 = I_4$ (C) $I_1 > I_2$ (D) $I_2 > I_1$

50. The value of $\int_0^{\pi/2} \frac{(\sin x + \cos x)^2}{\sqrt{1+\sin 2x}} dx$ is

(A) 0 (B) 1 (C) 2 (D) 3

51. If f(x) = $\frac{e^x}{1+e^x}$, $I_1 = \int_{f(-a)}^{f(a)} xg\{x(1-x)\}\, dx$ and $I_2 = \int_{f(-a)}^{f(a)} g\{x(1-x)\}\, dx$, then the value of $\frac{I_2}{I_1}$ is

(A) 2 (B) −3 (C) −1 (D) 1

52. If $f(y)=e^y$, g(y)=y; y > 0 and F(t)= $\int_0^t f(t-y)\, g(y)\, dy$, then

(A) F(t) = 1 − e^{-t}(1 + t) (B) F(t) = e^t − (1 + t)
(C) F(t) = te^t (D) F(t) = te^{-t}

53. 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) $\frac{a+b}{2}\int_a^b f(a+b+x)\, dx$

54. The value of $\lim_{x\to 0} \frac{\int_0^{x^2} \sec^2 t\, dt}{x \sin x}$ is

(A) 3 (B) 2 (C) 1 (D) −1

55. The value of the integral I = $\int_0^1 x(1-x)^n\, dx$ is

(A) $\frac{1}{n+1}$ (B) $\frac{1}{n+2}$

(C) $\frac{1}{n+1} - \frac{1}{n+2}$ (D) $\frac{1}{n+1} + \frac{1}{n+2}$

56. Let $\frac{d}{dx} F(x) = \left(\frac{e^{\sin x}}{x}\right)$, x>0, If $\int_1^4 \frac{3}{x} e^{\sin x^3} dx = F(k) - F(1)$, then one of the possible values of k, is

(A) 15 (B) 16 (C) 63 (D) 64

57. Let f(x) be a function satisfying f '(x) = f(x) with f(0) = 1 and g(x) be a function that satisfies f(x) + g(x) = x^2. Then the value of the integral $\int_0^1 f(x)\, g(x)\, dx$, is

(A) $e - \frac{e^2}{2} - \frac{5}{2}$ (B) $e + \frac{e^2}{2} - \frac{3}{2}$

(C) $e - \frac{e^2}{2} - \frac{3}{2}$ (D) $e + \frac{e^2}{2} + \frac{5}{2}$

58. $\int_0^{\pi/2} \frac{dx}{1+\tan^3 x}$ is equal to

(A) 0 (B) $\pi/2$ (C) $\pi/3$ (D) $\pi/4$

59. $\int_{\sin x}^{1} t^2 f(t)\, dt = 1 - \sin x \;\forall\; x \in (0, \pi/2)$, then $f\left(\frac{1}{\sqrt{3}}\right)$ is

(A) 3 (B) $\sqrt{3}$ (C) 1/3 (D) None of these

60. If $I_n = \int_0^{\pi/4} \tan^n x\, dx$, then $\frac{1}{I_2+I_4}, \frac{1}{I_3+I_5}, \frac{1}{I_4+I_6}$ is

(A) A.P. (B) G.P. (C) H.P. (D) None of these

61. $\lim_{x\to 0} \frac{\int_0^{x^2} \cos t^2\, dt}{x \sin x}$ is equal to

(A) −1 (B) 1 (C) 2 (D) −2

62. $\int_0^{\pi/4} \sin(x-[x])\, d(x-[x])$ is equal to

(A) $\frac{1}{2}$ (B) $1 - \frac{1}{\sqrt{2}}$ (C) 1 (D) None of these

63. If [x] denotes the greatest integer less than or equal to x, then the value of $\int_1^5 [|x-3|]\, dx$ is

(A) 1 (B) 2 (C) 4 (D) 8

64. The value of the integral $\int_{-1}^{3} \left(\tan^{-1}\frac{x}{x^2+1} + \tan^{-1}\frac{x^2+1}{x}\right) dx$ is equal to

(A) π (B) 2π (C) 4π (D) None of these

65. If $\frac{C_0}{1} + \frac{C_1}{2} + \frac{C_2}{3} = 0$, where C_0, C_1, C_2 are all real, the equation $C_2x^2 + C_1x + C_0 = 0$ has

(A) atleast one root in (0, 1)
(B) one root in (1, 2) & other in (3, 4)
(C) one root in (−1, 1) & the other in (−5, −2)
(D) both roots are imaginary

66. If f(x) satisfies the requirements of Rolle's Theorem in [1, 2] and f '(x) is continuous in [1, 2], then $\int_1^2 f'(x)\, dx$ is equal to

(A) 0 (B) 1 (C) 3 (D) −1

67. $\int_0^2 (x - \log_2 a)\, dx = 2 \log_2 \left(\frac{2}{a}\right)$, if

(A) a > 0 (B) a > 2 (C) a = 4 (D) a = 8

68. $\int_{-1}^{1} \frac{x^4}{1+e^{x^7}} dx$ is

(A) $\frac{1}{2}$ (B) 0 (C) $\frac{1}{5}$ (D) None of these

69. $\frac{1}{c}\int_{ac}^{bc} f\left(\frac{x}{c}\right)dx =$

(A) $\frac{1}{c}\int_a^b f(x)\,dx$ (B) $\int_a^b f(x)\,dx$

(C) $c\int_a^b f(x)\,dx$ (D) $\int_{ac^2}^{bc^2} f(x)\,dx$

70. If $\int_{\ell n 2}^{x} \frac{dx}{\sqrt{e^x-1}} = \frac{\pi}{6}$, then x =

(A) 4 (B) ℓn 8 (C) ℓn 4 (D) None of these

71. Let $I_1 = \int_0^1 \frac{e^x\,dx}{1+x}$ and $I_2 = \int_0^1 \frac{x^2dx}{e^{x^3}(2-x^3)}$, then $\frac{I_1}{I_2}$ is to

(A) 3/e (B) e/3 (C) 3e (D) 1/3e

72. If f(x) is a continuous function and attains only rational values in [–3, 3] and its greatest value in [–3, 3] is 5, then $\int_{-3}^{3} f(x)dx$ =

(A) 5 (B) 10 (C) 20 (D) 30

73. Let f(x) = minimum (|x|, 1 – |x|, 1/4), $\forall$ x $\in$ R, then the value of $\int_{-1}^{1} f(x)\,dx$ is equal to

(A) $\frac{1}{32}$ (B) $\frac{3}{8}$ (C) $\frac{4}{32}$ (D) None of these

74. $\int_{-\pi/4}^{\pi/4} \frac{e^x \sec^2 x}{e^{2x}-1}\,dx$ =

(A) 0 (B) $\frac{\pi}{2}$ (C) $2e^{\pi/4}$ (D) None of these

75. Let f(x) = $\int_0^x (t^2-t+1)\,dt$ $\forall$ x $\in$ (3, 4), then the difference between the greatest and the least values of the function is

(A) $\frac{49}{6}$ (B) $\frac{59}{6}$ (C) $\frac{69}{8}$ (D) $\frac{59}{3}$

76. For 0 < x < $\frac{\pi}{2}$, $\int_{1/\sqrt{2}}^{1/2} \cot x\ d(\cos x)$ equals to

(A) $\frac{\sqrt{3}-\sqrt{2}}{2}$ (B) $\frac{\sqrt{2}-\sqrt{3}}{2}$

(C) $\frac{1-\sqrt{3}}{2}$ (D) None of these

77. If f(x)= $\begin{cases} e^{\cos x}\sin x & , |x| \le 2 \\ 2 & , \text{otherwise} \end{cases}$, then $\int_{-2}^{3} f(x)\,dx$ =

(A) 0 (B) 1 (C) 2 (D) 3

78. The value of $\int_0^{\pi/3} [\sqrt{3}\tan x]\,dx$

(where [$*$] denotes the greatest integer function)

(A) $\frac{5\pi}{6}$ (B) $\frac{5\pi}{6} - \tan^{-1}\left(\frac{2}{\sqrt{3}}\right)$

(C) $\frac{\pi}{2} - \tan^{-1}\left(\frac{2}{\sqrt{3}}\right)$ (D) None of these

79. $\int_{-1}^{1} \frac{\sin x + x^2}{3-|x|}\,dx$

(A) 0 (B) $2\int_0^1 \frac{\sin x}{3-|x|}\,dx$

(C) $2\int_0^1 \frac{x^2}{3-|x|}\,dx$ (D) $2\int_0^1 \frac{\sin x + x^2}{3-|x|}\,dx$

80. Let $I_1 = \int_1^2 \frac{dx}{\sqrt{1+x^2}}$ and $I_2 = \int_1^2 \frac{dx}{x}$

(A) $I_1 > I_2$ (B) $I_2 > I_1$ (C) $I_1 = I_2$ (D) $I_1 > 2I_2$

81. $\int_{5/2}^{5} \frac{\sqrt{(25-x^2)^3}}{x^4}\,dx$ equals to

(A) $\frac{\pi}{3}$ (B) $\frac{2\pi}{3}$ (C) $\frac{\pi}{6}$ (D) None of these

82. The value of $\int_{-2}^{1}\left[x\left[1+\cos\left(\frac{\pi x}{2}\right)\right]+1\right] dx$ is

(where [$*$] denotes the greatest integer function)

(A) 1 (B) 1/2 (C) 2 (D) None of these

83. The value of $\int_{0}^{[x]}\{x\}\,dx$ is

(A) $\frac{1}{2}[x]$ (B) $2[x]$ (C) $\frac{1}{2[x]}$ (D) None of these

84. If x $\in$ (0, 2) then the value of $\int_{0}^{1} e^{2x-[2x]}\,d(x-[x])$ is

(where [$*$] denotes the greatest integer function)

(A) e + 1 (B) e (C) 2e – 2 (D) None of these

85. $\lim\limits_{n\to\infty}\sum_{r=1}^{n}\frac{\sqrt{n}}{\sqrt{r}\,(3\sqrt{r}+4\sqrt{n})^2} =$

(A) $\frac{1}{7}$ (B) $\frac{1}{10}$ (C) $\frac{1}{14}$ (D) None of these

86. The value of $\int_{\pi/4}^{\pi/3}\operatorname{cosec} x\ d(\sin x)$ for $0 < x < \pi/2$ is

(A) $\ell n\ 2$ (B) $\frac{1}{2}\ \ell n\ \frac{3}{2}$

(C) $\ell n\left(\frac{\sin 1/2}{\sin 1/\sqrt{2}}\right)$ (D) None of these

87. $\int_{0}^{2} x^3\left[1+\cos\frac{\pi x}{2}\right] dx$ is

(where [$*$] denotes the greatest integer function)

(A) $\frac{1}{2}$ (B) $\frac{1}{4}$ (C) 0 (D) None of these