Answer Elementary Exercise

1. $2^{1/3} \cdot 3^{1/2}$

2. $\dfrac{1}{2}\ell n\left(\dfrac{e}{2}\right)$

3. $2\sqrt{e}$

4. $2 - \dfrac{\pi}{2}(a - 3b)$

5. $\dfrac{1}{6}$

6. $e - \dfrac{2}{\ell n2}$

7. $\dfrac{\pi}{4}$

8. $\ell n\dfrac{4}{3}$

9. $\dfrac{1}{6}$

10. $\dfrac{\pi \ell n3}{2}$

11. $\dfrac{\pi}{6}$

12. $\dfrac{\sqrt{3}}{2} - 1 + \dfrac{\pi}{6}$

13. $\dfrac{\pi - 3}{16}$

14. $\dfrac{2}{3}\tan^{-1}\dfrac{1}{3}$

15. $\dfrac{\pi}{3}$

16. $\dfrac{\theta}{\sin\theta}$

17. $\dfrac{1}{2}\left(\dfrac{\pi}{6} + \ell n3 - \ell n2\right)$

18. $\dfrac{1}{3}$

19. $\dfrac{3\pi}{2}$

20. $\dfrac{1}{2}\ell n\left(2 + \sqrt{3}\right)$

21. $\dfrac{1}{4}\ell n\dfrac{32}{17}$

22. $\dfrac{1}{3}\dfrac{a^3 - b^3}{a^2 - b^2}$

23. (a) $2\left(\sqrt{2} + 1\right)$; **(b)** $\left(\pi - \dfrac{\pi^2}{4}\right)$

24. $\dfrac{\pi}{4}\left(\dfrac{\pi}{4} - 1\right) + \dfrac{1}{2}\ell n2$ **25.** 13

26. $\dfrac{\alpha}{2\sin\alpha}$ if $a \neq 0$; $\dfrac{1}{2}$ if $\alpha = 0$

27. 1

28. 0

29. $\dfrac{3\pi + 8}{24}$

30. 2009

31. $\dfrac{1}{20}\ell n3$

32. $-\dfrac{4}{9}$

33. $\dfrac{1}{2}$

34. $\dfrac{\pi}{2}$

35. $\dfrac{16}{9}$

36. $\dfrac{\pi}{2}$

37. $\dfrac{2}{1 + e}$

38. $\ell n2$

39. $\sqrt{2}$

40. 3

41. $|b| - |a|$

42. $\dfrac{1}{2}$

43. $\pi/3$

44. $1 - \dfrac{3}{2\sqrt{2}}$

45. (a) 48, **(b)** $2/3$

Answer Ex–I   SINGLE CORRECT (OBJECTIVE QUESTIONS)

1. A   **2.** C   **3.** C   **4.** D   **5.** A   **6.** C   **7.** A   **8.** B

9. C   **10.** A   **11.** A   **12.** D   **13.** C   **14.** C   **15.** D   **16.** B

17. D   **18.** B   **19.** C   **20.** C   **21.** D   **22.** D   **23.** A   **24.** B

25. C   **26.** B   **27.** B   **28.** B   **29.** A   **30.** C   **31.** B   **32.** D

33. D   **34.** B   **35.** D   **36.** D   **37.** C   **38.** B   **39.** C   **40.** A

41. A   **42.** A   **43.** A   **44.** B   **45.** A   **46.** C   **47.** A   **48.** A

49. C   **50.** C   **51.** A   **52.** B   **53.** B   **54.** C   **55.** C   **56.** D

57. C   **58.** D   **59.** A   **60.** A   **61.** B   **62.** B   **63.** B   **64.** A

65. A   **66.** A   **67.** A   **68.** C   **69.** B   **70.** C   **71.** C   **72.** D

73. B   **74.** A   **75.** B   **76.** B   **77.** C   **78.** C   **79.** C   **80.** B

81. A   **82.** C   **83.** A   **84.** D   **85.** C   **86.** D   **87.** B

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Answer Ex–II | MULTIPLE CORRECT (OBJECTIVE QUESTIONS)

1. A,B,C   **2.** A,B   **3.** A,C   **4.** A,B,C,D   **5.** A,D   **6.** A,D   **7.** C,D   **8.** A,B

9. B,C   **10.** A,B,C,D   **11.** A,B

Answer Ex–III | SUBJECTIVE QUESTIONS

1. (i) π **(ii)** $\dfrac{\pi}{4}$ **(iii)** $4 + \ell n\,5$ **3. (i)** $5 - \sqrt{2} - \sqrt{3}$ **(ii)** $\cos 1 + \cos 2 + \cos 3 + 3$

4. (i) $2e - 2$ **(ii)** $2 - \sqrt{2}$ **(iii)** 29 **(iv)** $\dfrac{\pi^2}{6\sqrt{3}}$

5. (i) $\dfrac{\pi}{2} - \ell n\,2$ **(ii)** $\dfrac{4-\pi}{4\sqrt{2}}$ **(iii)** $\dfrac{\pi}{6} - \dfrac{2}{9}$ **(iv)** $\pi\left(1 - \dfrac{1}{\sqrt{3}}\right) - \ell n\,4$

6. (i) $\dfrac{\pi}{2}$ **(ii)** $\dfrac{8}{21}$ **(iii)** $\dfrac{1}{20}\,\ell n\,3$ **7. (i)** π **(ii)** $\dfrac{\pi}{8}\,(b-a)^2$

8. (i) $\dfrac{\pi}{4}$ **(ii)** $\dfrac{\pi}{4}$ **(iii)** $\dfrac{a}{2}$ **(iv)** $(a+b)\,\dfrac{\pi}{4}$

9. (i) $\dfrac{3}{2}$ **(ii)** 40 **11.** $4\sqrt{2}$ **14. (i)** $\dfrac{\pi}{2}$ **(ii)** 2

15. 0 **18.** $F(x) = \begin{cases} x - \dfrac{x^2}{2} & \text{if } 0 \le x \le 1 \\[2mm] \dfrac{1}{2} & \text{if } 1 < x \le 2 \\[2mm] \dfrac{(x-2)^3}{3} + \dfrac{1}{2} & \text{if } 2 < x \le 3 \end{cases}$

19. $-\dfrac{2}{\pi^2}\cos \pi x$ for $0 < x < 1$; $\dfrac{2}{\pi^2}$ for $x \ge 1$ & $-\dfrac{2}{\pi^2}$ for $x \le 0$ **20. (i)** 0 **(ii)** $\dfrac{p^2}{1+p^2}$

22. $\dfrac{1}{\sqrt{11}}\,\ell n\,\dfrac{\sqrt{11}+1}{\sqrt{11}-1}$ **23.** $\dfrac{n}{n^2-1}$ **24.** $\dfrac{19}{72}$ **27.** $\dfrac{\pi^2}{6}$

28. $\ell n\,2$ **29.** $6 - 2e$ **30.** $\dfrac{\pi}{2} - 1$ **31.** $\dfrac{\pi}{8}\,\ell n\,2$

32. 125 **33.** $2\sqrt{6}$ **34.** $2\sqrt{2} + \sqrt{2} + \dfrac{4}{3}(3\sqrt{3} - 2\sqrt{2})$

36. $\left(\dfrac{22}{7} - \pi\right)$ **37.** $\dfrac{\pi}{8}(1 - \ell n\,4)$ **38.** $4\sqrt{2} - 4\,\ell n\,(\sqrt{2}+1)$

39. $\dfrac{\pi\sqrt{3}}{3}$ **40.** $\dfrac{\pi(a+b)}{2\sqrt{2}}$ **41.** $\dfrac{2\pi}{\sqrt{3}}$

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Answer Ex–IV | ADVANCED SUBJECTIVE QUESTIONS

1. $-\dfrac{3\sqrt{2}}{5}(e^{2\pi}+1)$ **2.** $\dfrac{1}{3}\left(\arctan\dfrac{\sqrt{2}}{3}-\arctan\dfrac{1}{3}\right)$ **3.** $\dfrac{(a\pi+2b)\pi}{3\sqrt{3}}$ **4.** $\dfrac{\pi(\pi+3)}{2}$

6. $\dfrac{\pi^2}{6\sqrt{3}}$ **7.** $\dfrac{3\pi^2}{16}$ **8.** $\dfrac{\pi}{12}$ **9.** real & distinct $\forall\ k\in R$

10. $\dfrac{\pi a^2}{4}$ **11.** 4   **12.** $-\dfrac{2\pi^2}{3}\ln 2$ **13.** $\dfrac{\pi^2}{16}-\dfrac{\pi}{4}\ln 2$ **15.** $\dfrac{5\pi}{27}$

16. $\dfrac{1}{2}\left[\ln 2+\dfrac{\pi}{2}-1\right]$ **17.** $\dfrac{16\pi}{3}-2\sqrt{3}$ **18.** 2007   **20.** $\dfrac{\pi+4}{666}$ **21.** 2525

22. $\dfrac{\pi^2}{8}-\dfrac{\pi}{4}-(1+\ln 2)+\dfrac{1}{2}$ **23.** $\left\{-\dfrac{\pi}{2},\dfrac{\pi}{2}\right\}$ **24.** cont. & diff. at x = 0

26. g(x) is cont. in (−2, 2) ; g(x) is diff.

at x = 1 & not diff. at x = 0. Not that ; $g(x)=\begin{cases}-(x+2) & \text{for } -2\le x\le 0 \\ -2+x-\dfrac{x^2}{2} & \text{for } 0<x<1 \\ \dfrac{x^2}{2}-x-1 & \text{for } 1\le x\le 2\end{cases}$

27. (c) $a=\dfrac{2\pi}{13}$ & $b=\dfrac{2\pi}{7}$ **29.** 1 + e   **30.** $f(x)=x+\dfrac{61}{119}x+\dfrac{80}{119}x^2$

31. (a) c = 1 and $\underset{x\to\infty}{\text{Limit}}$ will be $\dfrac{\sqrt{3}}{2}$ **(b)** a = 4 and b = 1   **32.** 13.5

33. $b\,\beta-a\,\alpha$ **34. (a)** $2\,e^{(1/2)\,(\pi-4)}$;   **(b)** $3-\ln 4$; **(c)** $\dfrac{1}{e}$ **(d)** 11

36. $y=\dfrac{e}{x^3}\,e^{-1/x}$ **38.** $f(x)=e^{x+1}$ **40.** 0   **42.** $f(x)=3+2e^{2x}$; $g(x)=3-2e^{2x}$

Answer Ex–V | JEE PROBLEMS

1. (a) $\dfrac{1}{8}\left[\dfrac{5\pi}{4}-\dfrac{1}{3}\right]$,   **(b)** $I=\begin{cases}\dfrac{\pi\alpha}{\sin\alpha} & \text{if }\alpha\in(0,\pi)\\ \dfrac{\pi}{\sin\alpha}(\alpha-2\pi) & \text{if }\alpha\in(\pi,2\pi)\end{cases}$ **2. (a)** A, **(b)** C, **(c)** A

4. (a) B, **(b)** A, **(c)** 2π, **(d)** $\dfrac{4\pi}{\sqrt{3}}\tan^{-1}\left(\dfrac{1}{2}\right)$ **5. (a)** C, **(b)** C, **(c)** $\dfrac{24}{5}\left(e\cos\left(\dfrac{1}{2}\right)+\dfrac{e}{2}\sin\left(\dfrac{1}{2}\right)-1\right)$

6. (a) C, **(b)** D, **(c)** A   **7.** 5051   **8. (a)** A, **(b)** (A)−S; (B)−S ; (C)−P; (D)−R

9. A,D   **10. (a)** C, **(b)** A,B,C, **(c)** 0   **11. (a)** B, **(b)** A, **(c)** B, **(d)** 4   **12.** A **13.** 0006 **14.** B

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