Answer Elementary Exercise

1. $\frac{2^x.e^x}{1+\ell n2}+C$

2. $\frac{1}{2}(\tan x+x)+C$

3. $\frac{1}{2}\sin 2x+C$

4. tanx – x + C

5. $\frac{x^3}{3}+C$

6. $\frac{x^{a+1}}{a+1}+\frac{a^x}{\ell na}+c$

7. – (cotx + tanx) + C

8. $-\frac{1}{x}+\tan^{-1}x+C$

9. $-\left[\frac{1}{9}\cos 9x+\frac{1}{10}\cos 10x+\frac{1}{11}\cos 11x+\frac{1}{12}\cos 12x\right]+C$

10. sin 2x + C

11. $-\frac{\cos 3x}{3}+C$

12. $\frac{180}{\pi}\sin x^\circ+C$

13. $\ell nx + 2\tan^{-1}x + C$

14. $\frac{1}{2}\left[x-\frac{\ell n(2x+1)}{2}\right]+C$

15. tanx – x + C

16. x + C

17. 2 (sinx + x cos α) + C

18. $\frac{x^5}{5}-\frac{x^3}{3}+x-2\tan^{-1}x+C$

19. secx – cosec x + C

20. $\frac{1}{2}\left[\frac{x^3}{3}+\tan^{-1}x\right]+C$

21. (sinx + cosx)sgn (cosx – sinx) + C

22. tanx – cotx – 3x + C

23. $\frac{x^2}{2}-x+C$

24. $-\sqrt{2}\cos\frac{x}{2}+C$

25. $-\frac{\cos 4x}{8}+C$

26. $\frac{67}{5}$

27. $\frac{1}{2}(x-\sin x)+C$

28. –2 cosx + C

29. $-\frac{\cos 8x}{8}+C$

30. $\frac{x}{\sqrt{2}}+C$

31. $\frac{x^3}{3}+\frac{x^2}{2}+\frac{3x}{2}+\frac{7}{4}\ell n(2x+1)$

32. tanx – $\tan^{-1}$x + C

33. $\frac{1}{4}\sin^{-1}\frac{4}{3}x+C$

34. $\frac{1}{10}\tan^{-1}\frac{2x}{5}+C$

35. $\frac{2}{3}x+\frac{5}{9}\ell n(3x+2)+C$

36. tanx – sec x + C

37. $\frac{\sin 3x}{3}-\frac{\sin 2x}{2}+C$

38. $-\frac{2}{x}+\tan^{-1}x+C$

39. (sinx – cosx) + (sink + cosk)x + C

40. $C-\frac{2}{x}+\frac{2}{3}\frac{1}{x^3}-\frac{3}{5}\frac{1}{x^5}-2\tan^{-1}x$

41. $-\frac{1}{64}\cos 8x+C$

42. $x^x + C$

Answer Ex–I SINGLE CORRECT (OBJECTIVE QUESTIONS)

1. A	**2.** B	**3.** C	**4.** A	**5.** D	**6.** D	**7.** B	**8.** C
9. C	**10.** A	**11.** D	**12.** A	**13.** C	**14.** B	**15.** B	**16.** A
17. C	**18.** A	**19.** C	**20.** C	**21.** B	**22.** C	**23.** B	**24.** B
25. C	**26.** D	**27.** C	**28.** D	**29.** A	**30.** C	**31.** A	**32.** B
33. A	**34.** B	**35.** C	**36.** A	**37.** C	**38.** B	**39.** A	**40.** A
41. B	**42.** D	**43.** A	**44.** B	**45.** C	**46.** A	**47.** A	**48.** B
49. A	**50.** B	**51.** A	**52.** A	**53.** B	**54.** C	**55.** B	**56.** B
57. A	**58.** B	**59.** C	**60.** A	**61.** D			

Answer Ex–II MULTIPLE CORRECT (OBJECTIVE QUESTIONS)

1. C,D	**2.** A,B	**3.** B,C,D	**4.** A,B,C,D	**5.** A,B	**6.** B,D	**7.** A,C,D
8. A,C	**9.** A,C					

Answer Ex–III SUBJECTIVE QUESTIONS

1. **(i)** $-\frac{\cos 2x}{2} + \ell n\,|x+1|$ **(ii)** $\frac{1}{3}\,\ell n\,|\sec(3x+1)| + \frac{1}{4}\,e^{4x+5} + c$ **(iii)** $\frac{1}{2}\ell n\,|\sec(4x+5)| + c$

(iv) $\frac{2}{3}(x+2)^{3/2} - 4(x+2)^{1/2} + c$ **(v)** $\frac{x}{2} - \frac{1}{4}\sin 2x + c$ **(vi)** $\frac{x}{2} + \frac{1}{4}\sin 2x + c$

(vii) $-\frac{1}{10}\cos 5x + \frac{1}{2}\cos x + c$ **(viii)** $\frac{1}{2}(e^{3x} + e^{-2x}) + 2x + c$ **(ix)** $\frac{1}{3}\,e^{3x} + e^{2x} + e^{x} + c$

(x) $\frac{2}{3}\,((x+3)^{3/2} + (x+2)^{3/2})$

2. **(i)** $-\frac{1}{2}\cos x^2 + c$ **(ii)** $\frac{1}{2}\ell n\,|x^2+1| + c$ **(iii)** $\frac{1}{2}\,(\tan x)^2 + c$ **(iv)** $\ell n\,|e^x + x| + c$

(v) $\ell n\,|x + \cos x| + c$ **(vi)** $\frac{1}{2}\,\ell n\,|e^{2x} - 2|$ **(vii)** $1/2\,\ell n\,|x^2 + \sin 2x + 2x|$

(viii) $\ell n\,|\,\ell n\,(\sec x + \tan x)\,| + c$ **(ix)** $\frac{2}{15}\,(a^3 + x^3)^{5/2} - \frac{2a^2}{9}\,(a^3 + x^3)^{3/2} + c$

3. **(i)** $(\sin x)\,(1 - x) + c$ **(ii)** $\frac{x^2}{2}\,\ell n\,x - \frac{x^2}{4} + c$ **(iii)** $\frac{x^2}{4} - \frac{x}{4}\sin 2x - \frac{1}{8}\cos 2x + c$

(iv) $\frac{x^2}{2}\,\tan^{-1}x - \frac{x}{2} + \frac{1}{2}\,\tan^{-1}x + c$ **(v)** $x\,(\ell n\,x - 1) + c$

(vi) $\frac{\sec x \tan x}{2} + \frac{1}{2}\ \ell n\ |\sec x + \tan x| + c$ **(vii)** $(x^2 - 1)\ e^{x^2} + c$

(viii) $x \sin^{-1}\sqrt{x} + \frac{\sqrt{1-x}\sqrt{x}}{2} - \frac{\sin^{-1}\sqrt{x}}{2} + C$ **(ix)** $x \tan^{-1} x - \frac{1}{2}\ \ell n\ (1 + x^2) - \frac{(\tan^{-1} x)^2}{2} + c$

(x) $\frac{e^x}{2}\ (\sin x - \cos x) + C$ **(xi)** $e^x \tan x$

4. **(i)** $\frac{x}{2}\sqrt{1+x^2} + \frac{1}{2}\ \ell n\ |x + \sqrt{x^2+4}| + c$ **(ii)** $\frac{1}{2}\tan^{-1}\frac{x}{2} + c$ **(iii)** $\ell n\ |x + \sqrt{x^2+4}| + c$

(iv) $\frac{1}{\sqrt{5}}\ \tan^{-1}\frac{x}{\sqrt{5}} + c$ **(v)** $\frac{x+1}{2}\sqrt{x^2+2x+5} + \frac{1}{2}\ell n\ |x + 1 + \sqrt{x^2+2x+5}| + c$

(vi) $\frac{1}{2}\ \tan^{-1}\left(\frac{(x+1)}{2}\right) + c$ **(vii)** $-\frac{(1-x-x^2)^{3/2}}{3} - \frac{3}{8}\ (2x + 1)\sqrt{1-x-x^2} - \frac{15}{16}\ \sin^{-1}\left(\frac{2x+1}{\sqrt{5}}\right) + c$

(viii) $\ell n\ |x^2 + 3x + 4| - \frac{4}{\sqrt{7}}\ \tan^{-1}\frac{2x+3}{\sqrt{7}} + c$ **(ix)** $-\frac{1}{5}\ \ell n\left|1+\frac{1}{x^5}\right| + c$

(x) $-\frac{1}{4}\left(1+\frac{1}{x^5}\right)^{4/5} + c$ **(xi)** $\frac{(x^2-8)^{3/2}}{24x^3} + c$ **(xii)** $x - \arctan x + \ell n_e\ \frac{\sqrt{1+x^2}}{x} + c$

5. **(i)** $\frac{2}{\sqrt{3}}\ \tan^{-1}\left(\frac{\tan x/2}{\sqrt{3}}\right) + c$ **(ii)** $\frac{2}{\sqrt{3}}\ \tan^{-1}\left(\sqrt{3}\tan\frac{x}{2}\right) + c$ **(iii)** $\frac{10}{13}x - \frac{2}{13}\ell n\ |3\cos x + 2\sin x| + c$

(iv) $\ell n\left|1+2\tan\frac{x}{2}\right| + c$ **(v)** $\frac{1}{\sqrt{6}}\ \tan^{-1}\left(\frac{\sqrt{3}\tan x}{\sqrt{2}}\right) + c$ **(vi)** $\ell n\ |1 + \cos x| + c$

(vii) $\tan x + \frac{1}{4}\sin 2x - \frac{3x}{2} + c$

6. **(i)** $\frac{1}{2\sqrt{3}}\ \tan^{-1}\left(\frac{x^2-1}{\sqrt{3}x}\right) - \frac{1}{4}\ \ell n\left|\frac{x+\frac{1}{x}-1}{x+\frac{1}{x}+1}\right| + c$ **(ii)** $\frac{1}{\sqrt{2}}\ \tan^{-1}\left(\frac{x^2-1}{\sqrt{2}x}\right) + c$ **(iii)** $-\frac{1}{2\sqrt{3}}\ \ell n\left|\frac{x+\frac{1}{x}-\sqrt{3}}{x+\frac{1}{x}+\sqrt{3}}\right| + c$

7. **(i)** $\ell n\left|\frac{\sqrt{x+2}-1}{\sqrt{x+2}+1}\right| + c$ **(ii)** $\frac{1}{4\sqrt{3}}\ \ell n\left|\frac{t-\sqrt{3}}{t+\sqrt{3}}\right| - \frac{1}{2}\ \tan^{-1}(t) + C$

(iii) $-\frac{1}{\sqrt{3}}\ \ell n\left|\left(t-\frac{1}{3}\right)+\sqrt{\left(t-\frac{1}{3}\right)^2+\frac{2}{9}}\right| + c$ where $t = \frac{1}{x+1}$ **(iv)** $-\tan^{-1}\sqrt{\frac{x^2+2}{x^2}} + c$

8. **(i)** $\ell n\left|\frac{x+1}{x+2}\right| + c$ **(ii)** $\frac{1}{10}\ \ell n\ |x + 3| - \frac{1}{20}\ \ell n\ |x^2 + 1| + \frac{3}{10}\ \tan^{-1} x + c$

(iii) $-\ell n\ |x + 1| - \frac{1}{(x+1)} + \ell n\ |x + 2| + c$ **(iv)** $\frac{1}{2}\ \ell n\ |x + 1| - \ell n\ |x + 2| + \frac{1}{2}\ \ell n\ |x + 3| + c$

9. $\frac{1}{128}\,[3x - \sin 4x + \frac{1}{8}\,.\,\sin 8x] + c$ **10.** $\frac{1}{\cos(a-b)}\,\ell n\left|\frac{\sin(x-a)}{\cos(x-b)}\right| + c$

11. $(x + 1) + 2\sqrt{x+1} - 2\,\ell n\,|x + 2| - 2\tan^{-1}\sqrt{x+1} + c$

12. $\frac{1}{\sqrt{3}}\tan^{-1}\left(\frac{x^2-1}{x\sqrt{3}}\right) - \frac{2}{\sqrt{3}}\tan^{-1}\left(\frac{2x^2+1}{\sqrt{3}}\right) + c$ **13.** $\text{arcsec } x - \frac{\ell nx}{\sqrt{x^2-1}} + c$

14. $2\,\ell n\,|\sin^2\phi - 4\sin\phi + 5| + 7\tan^{-1}(\sin\phi - 2) + c$ **15.** $\frac{1}{2\sqrt{2}}\tan^{-1}(\sqrt{2}\,\tan x) + \frac{1}{2}\tan x + c$

16. $\frac{(4+x^2)^{3/2}.(x^2-6)}{120x^5} + c$ **17.** $\ell n\,(x\,e^{\sin x}) - \frac{1}{2}\,\ell n\,(1 - x^2\,e^{2\sin x}) + c$

18. $\frac{1}{2}\,[\sin 2x\,.\,\ell n(1 + \tan x) - x + \ell n\,(\sin x + \cos x)] + c$ **19.** $x\cos\alpha + \sin\alpha\,\ell n\left\{\frac{\cos\frac{1}{2}(\alpha - x)}{\cos\frac{1}{2}(\alpha + x)}\right\} + c$

20. $\frac{1}{2}\,e^x\,[(x^2 - 1)\cos x + (x - 1)^2\,.\,\sin x] + c$ **21.** $\frac{\sqrt{x^2+2x-3}}{8(x+1)^2} + \frac{1}{16}\,.\,\cos^{-1}\left(\frac{2}{x+1}\right) + c$

22. $e^x\left(\frac{x+1}{x^2+1}\right) + c$ **23.** $-\frac{1}{3}\tan x\,.\,(2 + \tan^2 x)\,.\,\sqrt{4 - \cot^2 x}$ **24.** $-2\cos^4 x\,.\,e^{\tan^2 x} + c$

25. $x\tan^{-1}x\,.\,\ln(1 + x^2) + (\tan^{-1}x)^2 - 2x\tan^{-1}x + \ln(1 + x^2) - (\ln\sqrt{1+x^2})^2 + c$ **26.** $e^x\sqrt{\frac{1+x^n}{1-x^n}} + c$

27. $-\frac{\cos x}{b + a\sin x} + c$ **28.** $x;\ x^2 + 2x\cos\alpha + 1$ **29.** $\tan x\,\ell n\,(1 + \sin^2 x) - 2x + \sqrt{2}\tan^{-1}(\sqrt{2}\,.\,\tan x) + c$

Answer Ex–IV ADVANCED SUBJECTIVE QUESTIONS

1. $\ell n\left(\frac{1 + 3\cos^2 2\theta}{\cos 2\theta}\right) + C$ **2.** $-\frac{x+1}{x^5 + x + 1} + C \text{ or } C - \frac{x^5}{x^5 + x + 1}$

3. $\frac{1}{4}\,\ell n\,(\cos x + \sin x) + \frac{x}{2} + \frac{1}{8}\,(\sin 2x + \cos 2x) + c$ **4.** $4\tan^{-1}\left(x + \sqrt{x^2 + 2x - 1}\right) + c$

5. $\left(\frac{x}{e}\right)^x - \left(\frac{e}{x}\right)^x + C$ **6.** $\frac{1}{a^2 + b^2}\left(x + \tan^{-1}\left(\frac{a^2\tan x}{b^2}\right)\right) + C$ **7.** $\frac{2x^3}{3} - x - \frac{2}{3}\,(x^2 - 1)^{3/2} + c$

8. $\cos a\,.\,\text{arc}\cos\left(\frac{\cos x}{\cos a}\right) - \sin a\,.\,\ell n\,(\sin x + \sqrt{\sin^2 x - \sin^2 a}) + c$

9. $\frac{1}{2}\ln\left|\tan\frac{x}{2}\right| + \frac{1}{4}\sec^2\frac{x}{2} + \tan\frac{x}{2} + c$ **10.** $(a + x)\arctan\sqrt{\frac{x}{a}} - \sqrt{ax} + C$

11. $\frac{(x^2+1)\sqrt{x^2+1}}{9x^3}\cdot\left[2-3\ell n\left(1+\frac{1}{x^2}\right)\right]$ **12.** $\ell n\left(\frac{xe^x}{1+xe^x}\right) + \frac{1}{1+xe^x} + C$ **13.** 3

14. $-\ell n\,(1 - x^4) + c$ **15.** $6\left[\frac{t^4}{4}-\frac{t^2}{2}+t+\frac{1}{2}\ell n(1+t^2)-\tan^{-1}t\right] + C$ where $t = x^{1/6}$

16. $\frac{4}{\sqrt{\cos\frac{x}{2}}} + 2\tan^{-1}\sqrt{\cos\frac{x}{2}} - \ell n\,\frac{1+\sqrt{\cos\frac{x}{2}}}{1-\sqrt{\cos\frac{x}{2}}} + c$ **17.** $C - \ell n\,(1 + (x + 1)e^{-x}) - \frac{1}{1+(x+1)e^{-x}}$

18. $\sin^{-1}\left(\frac{1}{2}\sec^2\frac{x}{2}\right) + c$ **19.** $\frac{1}{24}\ell n\,\frac{(4+3\sin x+3\cos x)}{(4-3\sin x-3\cos x)} + c$ **20.** $\frac{1}{2}\left[\sin x-\cos x-\frac{1}{\sqrt{2}}\ell n\tan\left(\frac{x}{2}+\frac{\pi}{8}\right)\right] + c$

21. $\frac{1}{2\sqrt{3}}\ell n\,\frac{\sqrt{3}+\sin x-\cos x}{\sqrt{3}-\sin x+\cos x} + \arctan(\sin x + \cos x) + c$ **22.** $\left[-\ell n(\sec x)-\frac{1}{2}\ell n(\sec 2x)+\frac{1}{3}\ell n(\sec 3x)\right] + c$

23. $2x - 3\arctan\left(\tan\frac{x}{2}+1\right) + c$ **24.** $C - e^{\cos x}(x + \operatorname{cosec} x)$ **25.** $\sin^{-1}\left(\frac{ax^2+b}{cx}\right) + k$

26. $e^x\sqrt{\frac{1+x}{1-x}} + c$ **27.** $\operatorname{arcsec} x - \frac{\ell n\,x}{\sqrt{x^2-1}} + c$ **28.** $\sqrt{3}\ \ell n\,\frac{t-\sqrt{3}}{1+\sqrt{3}} + 2\tan^{-1}(t) + C$

29. $4\,\ell n\,x + \frac{7}{x} + 6\tan^{-1}(x) + \frac{6x}{1+x^2} + C$ **30.** $\frac{\sqrt{2-x-x^2}}{x} + \frac{\sqrt{2}}{4}\ell n\left(\frac{4-x+2\sqrt{2}\sqrt{2-x-x^2}}{x}\right) - \sin^{-1}\left(\frac{2x+1}{3}\right) + c$

31. $\frac{-2}{\alpha-\beta}\sqrt{\frac{x-\beta}{x-\alpha}} + c$ **32.** $\frac{2}{3}\tan^{-1}(\sin x + \cos x) + \frac{1}{2\sqrt{3}}\ell n\left|\frac{\sqrt{2}+\sin x+\cos x}{\sqrt{2}-\sin x-\cos x}\right| + C$

Answer Ex–V | JEE PROBLEMS

1. $(x + 1)\tan^{-1}\frac{2(x+1)}{3} - \frac{3}{4}\ell n\,(4x^2 + 8x + 13) + C$ **2.** $\frac{1}{6(m+1)}(2x^{3m}+3x^{2m}+6x^m)^{\frac{m+1}{m}} + C$

3. D **4.** **(a)** A **(b)** D **5.** C **6.** C