

ASSIGNMENT CLASS XII DEFINITE INTEGRALS

Evaluate the following:

$$1. \int_0^{\pi/2} \cos^3 x \, dx$$

$$2. \int_0^{\pi/4} \sqrt{1 - \sin 2x} \, dx$$

$$3. \int_0^4 \frac{1}{\sqrt{x^2 + 2x + 3}} \, dx$$

$$4. \int_0^1 \frac{2x}{5x^2 + 1} \, dx$$

$$5. \int_1^2 \frac{\log x}{x^2} \, dx$$

$$6. \int_1^2 \frac{1}{x(1+x^2)} \, dx$$

$$7. \int_{\pi/4}^{\pi/2} \cos 2x \log \sin x \, dx$$

$$8. \int_1^2 \left(\frac{x-1}{x^2} \right) e^x \, dx$$

$$9. \int_0^{\pi/2} \frac{\cos \theta}{(1 + \sin \theta)(2 + \sin \theta)} \, dx$$

$$10. \int_0^{1/\sqrt{2}} \frac{\sin^{-1} x}{(1-x^2)^{3/2}} \, dx$$

$$11. \int_0^{\pi/2} \cos^4 x \, dx$$

$$12. \int_0^{\pi/2} (\sqrt{\tan x} + \sqrt{\cot x}) \, dx$$

$$13. \int_0^{\pi} \frac{1}{5 + 4 \cos x} \, dx$$

$$14. \int_0^{\pi/2} \frac{1}{2 \cos x + 4 \sin x} \, dx$$

$$15. \int_0^{\pi/2} \frac{\cos x}{3 \cos x + \sin x} \, dx$$

$$16. \int_0^{\pi/2} \frac{\sin 2x}{\sin^4 x + \cos^4 x} \, dx$$

$$17. \int_0^1 \frac{e^x}{1 + e^{2x}} \, dx$$

$$18. \int_0^1 \frac{\sqrt{\tan^{-1} x}}{1+x^2} \, dx$$

$$19. \int_0^{\pi/4} \sec^4 x \, dx$$

$$20. \int_0^1 \sqrt{\frac{1-x}{1+x}} \, dx$$

$$21. \int_1^2 \frac{1}{x(1 + \log x)^2} \, dx$$

$$22. \int_0^{\pi} |\cos x| \, dx$$

$$23. \int_{-1}^1 e^{|x|} \, dx$$

$$24. \int_{-1}^1 f(x) \, dx, \text{ where } f(x) = \begin{cases} 1-2x & x \leq 0 \\ 1+2x & x \geq 0 \end{cases}$$

$$25. \int_0^3 [x] \, dx$$

$$26. \int_0^2 [x^2] \, dx$$

$$27. \int_{-1}^1 |2x+1| \, dx$$

$$28. \int_{-\pi/2}^{\pi/2} (\sin |x| + \cos |x|) \, dx$$

$$29. \int_{-\pi/4}^{\pi/4} |\sin x| \, dx$$

$$30. \int_1^2 \frac{\sqrt{x}}{\sqrt{3-x} + \sqrt{x}} \, dx$$

$$31. \int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} \, dx$$

$$32. \int_0^{\pi/2} \frac{\sin^2 x}{\sin x + \cos x} \, dx$$

$$33. \int_0^{\pi/2} \frac{\sin^n x}{\sin^n x + \cos^n x} \, dx$$

$$34. \int_0^{\pi/2} \sin 2x \log(\tan x) \, dx$$

$$35. \int_{-\pi/4}^{\pi/4} x^3 \sin^4 x \, dx$$

$$36. \int_{-a}^a \sqrt{\frac{a-x}{a+x}} \, dx$$

$$37. \int_0^{\pi} \frac{x \tan x}{\sec x \operatorname{cosec} x} \, dx$$

$$38. \int_0^1 \cot^{-1}(1-x+x^2) \, dx$$

$$39. \int_{-1}^1 \log \left(\frac{2-x}{2+x} \right) \, dx$$

$$40. \int_0^1 \sin^{-1} \left(\frac{2x}{1+x^2} \right) \, dx$$

$$41. \int_0^1 \frac{\log(1+x)}{1+x^2} \, dx$$

$$42. \int_0^1 \cos^{-1} \left(\frac{1-x^2}{1+x^2} \right) \, dx$$

$$43. \int_0^{\pi/2} \frac{1}{1 + \sqrt{\cot x}} \, dx$$

$$44. \int_0^{\infty} \frac{x(\tan^{-1} x)^2}{(1+x^2)^{3/2}} \, dx$$

$$45. \int_0^{\pi/2} x^2 \cos 2x \, dx$$

$$46. \int_{-\infty}^{\infty} \frac{1}{9+x^2} \, dx$$

$$47. \int_0^1 x \sqrt{\frac{1-x^2}{1+x^2}} \, dx$$

$$48. \int_0^{\pi/2} \frac{1}{1 + \tan^3 x} \, dx$$

$$49. \int_0^1 x(1-x)^5 dx \quad 50. \int_0^a \frac{1}{x+\sqrt{a^2-x^2}} dx \quad 51. \int_0^\infty \frac{1}{(x^2+a^2)(x^2+b^2)} dx \quad 52. \int_0^{2\pi} e^x \cos\left(\frac{\pi}{4} + \frac{x}{2}\right) dx$$

$$53. \int_{-5}^0 (|x|+|x+2|+|x+5|) dx \quad 54. \text{ If } \int_0^a \sqrt{x} dx = 2a \int_0^{\pi/2} \sin^3 x dx, \text{ find the value of } \int_a^{a+1} x dx.$$

Evaluate the following integrals as limit of sums:

$$55. \int_0^2 (2x+1) dx \quad 56. \int_2^4 (2x-1) dx \quad 57. \int_0^2 (x^2+3) dx \quad 58. \int_1^3 (2x^2+5) dx \quad 59. \int_1^3 (x^2+x) dx$$

$$60. \int_2^3 (2x^2+1) dx \quad 61. \int_0^3 (2x^2+3x+5) dx \quad 62. \int_a^b e^x dx$$

योग: कर्मसु कौशलम्

ANSWERS

$$1. \frac{2}{3} \quad 2. \sqrt{2}-1 \quad 3. \log\left(\frac{5+3\sqrt{3}}{1+\sqrt{3}}\right) \quad 4. \frac{1}{5} \log 6 \quad 5. \frac{1}{2} \log\left(\frac{e}{2}\right) \quad 6. \frac{3}{2} \log 2 - \frac{1}{2} \log 5$$

$$7. \frac{1}{4} \log 2 - \frac{\pi}{8} + \frac{1}{4} \quad 8. \frac{e^2}{2} - e \quad 9. \log\left(\frac{4}{3}\right) \quad 10. \frac{\pi}{4} - \frac{1}{2} \log 2 \quad 11. \frac{3\pi}{16} \quad 12. \sqrt{2} \pi$$

$$13. \frac{\pi}{3} \quad 14. \frac{1}{\sqrt{5}} \log\left(\frac{3+\sqrt{5}}{2}\right) \quad 15. \frac{3\pi}{20} - \frac{1}{10} \log 3 \quad 16. \frac{\pi}{2} \quad 17. \tan^{-1} e - \frac{\pi}{4}$$

$$18. \frac{1}{12} \pi^{3/2} \quad 19. \frac{4}{3} \quad 20. \frac{\pi}{2} - 1 \quad 21. \frac{\log 2}{1+\log 2} \quad 22. 2 \quad 23. 2e-2 \quad 24. 4$$

$$25. 3 \quad 26. 5 - \sqrt{2} - \sqrt{3} \quad 27. \frac{5}{2} \quad 28. 4 \quad 29. 2 - \sqrt{2} \quad 30. \frac{1}{2} \quad 31. \frac{\pi}{4}$$

$$32. -\frac{1}{\sqrt{2}} \log(\sqrt{2}-1) \quad 33. \frac{\pi}{4} \quad 34. 0 \quad 35. 0 \quad 36. a\pi \quad 37. \frac{\pi^2}{4}$$

$$38. \frac{\pi}{2} - \log 2 \quad 39. 0 \quad 40. \frac{\pi}{2} - \log 2 \quad 41. \frac{\pi}{8} \log 2 \quad 42. \frac{\pi}{2} - \log 2$$

$$43. \frac{\pi}{4} \quad 44. \pi - 2 \quad 45. -\frac{\pi}{4} \quad 46. \frac{\pi}{3} \quad 47. \frac{\pi}{4} - \frac{1}{2} \quad 48. \frac{\pi}{4} \quad 49. \frac{1}{42}$$

$$50. \frac{\pi}{4} \quad 51. \frac{\pi}{2ab(a+b)} \quad 52. \frac{-3\sqrt{2}}{5} (e^{2\pi} + 1) \quad 53. \frac{63}{2} \quad 54. \frac{1}{2} \text{ or } \frac{9}{2} \quad 55. 6$$

$$56. 10 \quad 57. \frac{26}{3} \quad 58. \frac{82}{3} \quad 59. \frac{38}{3} \quad 60. \frac{41}{3} \quad 61. \frac{93}{2} \quad 62. e^b - e^a$$