INTEGRATION (CALCULUS)

Class 12 - Mathematics

1. Evaluate the Integral: $\int \frac{(\sin x + \cos x)}{\sqrt{\sin 2x}} dx$

2. Evaluate the integral: $\int_0^{\pi/2} \frac{\cos^2 x}{\sin x + \cos x} dx$

3. Evaluate $\int \frac{\sqrt{1+x^2}}{1-x^2} dx$

4. Evaluate: $\int e^{-x} \cos 2x \cos 4x \, dx$

5. Evaluate the integral $\int\limits_1^2 \left(\frac{1}{x} - \frac{1}{2x^2} \right) e^{2x} dx$ using substitution.

6. Integrate the function: $\frac{1}{1-\tan x}$

7. Evaluate: $\int \frac{(x^2+x+1)}{(x+2)(x^2+1)} dx$.

8. Evaluate: $\int x \cdot \sin^{-1} x \, dx$

9. Evaluate: $\int \frac{x^4}{(x^2+1)(x^2+9)(x^2+16)} dx$.

10. By using the properties of definite integrals, evaluate the integral $\int_0^{\pi} \log(1 + \cos x) dx$

11. Evaluate the definite integral $\int_0^{\pi/4} \frac{\sin x + \cos x}{9 + 16 \sin 2x} dx$.

12. Integrate $\int \frac{dx}{1+3e^x+2e^{2x}}$

13. Evaluate: $\int \frac{2 \log x}{x \left[2(\log x)^2 - \log x - 3 \right]} dx$.

14. Evaluate the integral: $\int (2x - 5)\sqrt{2 + 3x - x^2} \, dx$

15. Integrate the function $\frac{1}{(x^2+1)(x^2+4)}$

16. Evaluate $\int_0^{\pi} x \log \sin x \, dx$

17. Evaluate: $\int \frac{dx}{(\sin x + \sin 2x)}$.

18. Integrate the function $\int \frac{dx}{\sqrt{\sin^3 x \sin(x+\alpha)}}$

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

20. Prove that: $\int\limits_{\pi/4}^{3\pi/4} \frac{x}{(1+\sin x)} dx = \pi(\sqrt{2} - 1)$.

21. Evaluate the integral: $\int x\sqrt{1 + x - x^2} \, dx$

22. Evaluate $\int \frac{\tan x + \tan^3 x}{1 + \tan^3 x} dx$.

23. Evaluate the integral $\int_0^2 \frac{dx}{x+4-x^2}$ using substitution.

24. Prove that: $\int\limits_0^1 \frac{\log x}{\sqrt{1-x^2}} dx = -\frac{\pi}{2} (\log 2)$.

25. Evaluate: $\int \frac{dx}{(x^3+1)}$.

26. Integrate the function $\frac{5x}{(x+1)(x^2+9)}$

27. Prove that: $\int\limits_0^{\pi/2} x \cot x \, dx = \frac{\pi}{4} (\log 2)$.

28. By using the properties of definite integral, evaluate the integral $\int_0^{\pi/2} (2 \log \sin x - \log \sin 2x) dx$

29. Evaluate $\int \sqrt{\tan x}\, dx$ (Hint: Put tan x = t^2)

30. Integrate the function $\frac{x^2+x+1}{(x+1)^2(x+2)}$

31. Evaluate: $\int \frac{(1-x^2)}{x(1-2x)}\, dx$.

32. Evaluate: $\int \frac{e^x}{(e^{3x}-3e^{2x}-e^x+3)}\, dx$.

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

34. Evaluate: $\int \frac{dx}{\sin x(3+2\cos x)}$.

35. Evaluate: $\int \frac{3+2\cos x+4\sin x}{2\sin x+\cos x+3}\, dx$

36. Prove that: $\int\limits_0^1 \left(\frac{\sin^{-1}x}{x}\right) dx = \frac{\pi}{2}(\log 2)$.

37. Evaluate: $\int \frac{1}{\sin^3 x \cos^5 x}\, dx$

38. Prove that $\int_0^{\pi/4}(\sqrt{\tan x}+\sqrt{\cot x})dx = \sqrt{2}.\frac{\pi}{2}$

39. Evaluate: $\int e^{\tan^{-1}x}\left(\frac{1+x+x^2}{1+x^2}\right)dx$

40. Integrate the function $\int_1^4 [|x-1|+|x-2|+|x-3|]dx$

41. Evaluate the integral: $\int \frac{|\cot x+\cot^3 x|}{1+\cot^3 x}\, dx$

42. Evaluate $\int_0^{\frac{\pi}{2}} \frac{dx}{\left(a^2\cos^2 x+b^2\sin^2 x\right)^2}$ (Hint: Divide Numerator and Denominator by cos^4 x)

43. Evaluate: $\int \frac{x+\sqrt{x+1}}{x+2}\, dx$

44. Integrate the (rational) function $\frac{3x-1}{(x+2)^2}$

45. Evaluate: $\int \frac{1}{\sin^4 x \cos^2 x}\, dx$

46. Evaluate $\int_0^\pi \frac{e^{\cos x}}{e^{\cos x}+e^{-\cos x}}\, dx$

47. Evaluate: $\int \frac{1}{\cos^4 x+\sin^4 x}\, dx$.

48. Evaluate: $\int \frac{x}{(x-1)(x^2+4)}\, dx$

49. Evaluate: $\int \frac{x^3-3x}{x^4+2x^2-4}\, dx$

50. Evaluate $\int_0^\pi \frac{x\tan x}{\sec x\cdot\text{cosec}x}\, dx$

51. Evaluate $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \log(\sin x+\cos x)dx$

52. Evaluate: $\int \frac{(1-3x)}{(3x^2+4x+2)}\, dx$

53. If f'(x) = a sin x + b cos x and f'(0) = 4, f(0) = 3, f$\left(\frac{\pi}{2}\right)$ = 5, find f(x).

54. Evaluate: $\int \frac{1}{5+7\cos x+\sin x}\, dx$

55. Evaluate: $\int \frac{dx}{x(x^6+1)}$.

56. Evaluate the definite integral $\int_0^{\pi/2} 2\sin x\cos x\tan^{-1}(\sin x)dx$

57. $\int \tan^{-1}\sqrt{\frac{1-x}{1+x}}\, dx$

58. Evaluate: $\int \frac{(5x+8)}{x^2(3x+8)}\, dx$.

59. Evaluate $\int \frac{x^2\, dx}{x^4-x^2-12}$

60. Evaluate: $\int_{-\pi/2}^{\pi/2} \frac{-\pi/2}{\sqrt{\cos x\sin^2 x}}\, dx$