Integration Formulae

1. $\int 1\,dx = x + c$

2. $\int x^n\,dx = \frac{x^{n+1}}{n+1} + c \quad n \neq -1$

3. $\int \frac{1}{x}\,dx = \log x + c$

4. $\int e^{ax}\,dx = \frac{e^{ax}}{a} + c$

5. $\int a^x\,dx = \frac{a^x}{\log a} + c$

6. $\int \sin x\,dx = -\cos x + c$

7. $\int \cos x\,dx = \sin x + c$

8. $\int \tan x\,dx = \log \sec x + c$

9. $\int \cot x\,dx = \log \sin x + c$

10. $\int \sec^2 x\,dx = \tan x + c$

11. $\int \cos ec^2 x\,dx = -\cot x + c$

12. $\int \sec x \tan x\,dx = \sec x + c$

13. $\int \cos ecx \cot x\,dx = -\cos ec\, x + c$

14. $\int \frac{1}{x^2 + a^2}\,dx = \frac{1}{a}\tan^{-1}\frac{x}{a} + c$

15. $\int \frac{1}{a^2 - x^2}dx = \frac{1}{2a}\log\frac{a+x}{a-x} + c = \frac{1}{a}\tanh^{-1}\frac{x}{a} + c$

16. $\int \frac{1}{x^2 - a^2}dx = \frac{1}{2a}\log\frac{x-a}{x+a} + c$

17. $\frac{1}{\sqrt{a^2 - x^2}}\,dx = \sin^{-1}(x/a) \ + \mathrm{C}$

18. $\int \frac{1}{\sqrt{x^2 - a^2}}dx = \log\left(x + \sqrt{x^2 - a^2}\right) + c$

19. $\int \frac{1}{\sqrt{x^2 + a^2}}dx = \log\left(x + \sqrt{x^2 + a^2}\right) + c$

20. $\int \sqrt{a^2 - x^2}\,dx = \frac{x}{2}\sqrt{a^2 - x^2} + \frac{a^2}{2}\sin^{-1}\frac{x}{a} + c$

21. $\int \sqrt{x^2 - a^2}\,dx = \frac{x}{2}\sqrt{x^2 - a^2} - \frac{a^2}{2}\log\left[\, x + \sqrt{x^2 - a^2}\,\right] + c$

22. $\int \sqrt{x^2 + a^2}\,dx = \frac{x}{2}\sqrt{x^2 + a^2} + \frac{a^2}{2}\log\left[\, x + \sqrt{x^2 + a^2}\,\right] + c$

Prepared By G.G.Bhoite

Additional Formulae

1. $\int \left[af(x) + g(x) \right] dx = a\int f(x)\,dx + b\int g(x)\,dx$

2. $\int \frac{f'(x)}{f(x)} dx = \log f(x) + c$

3. $\int e^x \left[f(x) + f'(x) \right] dx = e^x f(x) + c$

4. $\int \left[f(x) \right]^n f'(x)\,dx = \frac{\left[f(x) \right]^{n+1}}{n+1} + c,\ n \neq -1$

5. $\int u.v\,dx = u\int v dx - \int \left(u' \int v dx \right) dx + c$ (ILATE Rule)

6. $\int e^{ax} \cos bx\,dx = \frac{e^{ax}}{a^2 + b^2} \left(a\cos bx + b\sin bx \right) + c$

7. $\int e^{ax} \sin bx\,dx = \frac{e^{ax}}{a^2 + b^2} \left(a\sin bx - b\cos bx \right) + c$

8. $\int e^{ax} \cos(bx + c)\,dx = \frac{e^{ax}}{\sqrt{a^2 + b^2}} \cos\left(bx + c - \tan^{-1}\frac{b}{a} \right) + c$

9. $\int e^{ax} \sin(bx + c)\,dx = \frac{e^{ax}}{\sqrt{a^2 + b^2}} \sin\left(bx + c - \tan^{-1}\frac{b}{a} \right) + c$

10. $\int_a^b f(x)\,dx = \int_a^c f(x)\,dx + \int_c^b f(x)\,dx\ ,\quad a \prec c \prec b$

11. $\int_{-a}^{a} f(x)\,dx = \begin{cases} 2\int_0^a f(x)\,dx \ \text{if } f \text{ is even} \\ 0 \ \text{if } f \text{ is odd} \end{cases}$

12. $\int_0^a f(x)\,dx = \int_0^a f(a - x)\,dx$

.Find value of $\int e^{ax} \cos bx\,dx = \frac{e^{ax}}{a^2 + b^2} \left(a\cos bx + b\sin bx \right) + c$