

INDEFINITE INTEGRATION

Evaluate the following Integrals using formulae:

- 1) $\int \frac{\cos \sqrt{x}}{\sqrt{x}} dx =$
- (a) $\sin \sqrt{x}$ (b) $2 \cos \sqrt{x}$ (c) $2 \sin \sqrt{x}$ (d) $\frac{\sqrt{\cos x}}{x}$
- 2) $\int \frac{\tan(\log x)}{x} dx =$
- (a) $\log \cos(\log x)$ (b) $\log \sec(\log x)$ (c) $\log \sin(\log x)$ (d) $-\log \cos(\log x)$
- 3) $\int \frac{\sqrt{\tan x}}{\sin x \cos x} dx =$
- (a) $2\sqrt{\tan x}$ (b) $2\sqrt{\cot x}$ (c) $\sqrt{\cot x}$ (d) $\sqrt{\tan x}$
- 4) $\int \frac{dx}{\sin x + \sqrt{3} \cos x} =$
- (a) $\frac{1}{2} \log \tan \left[\frac{x}{2} + \frac{\pi}{6} \right]$ (b) $\frac{1}{2} \log \left\{ \operatorname{cosec} \left(x + \frac{\pi}{3} \right) - \cot \left(x + \frac{\pi}{3} \right) \right\}$
- (c) $\frac{1}{2} \log \left\{ \sec \left(x - \frac{\pi}{6} \right) + \tan \left(x - \frac{\pi}{6} \right) \right\}$ (d) $-\frac{1}{2} \log \left\{ \operatorname{cosec} \left(x + \frac{\pi}{3} \right) + \cot \left(x + \frac{\pi}{3} \right) \right\}$
- 5) $\int \frac{\sin 2x dx}{a^2 \cos^2 x + b^2 \sin^2 x} =$
- (a) $(b-a) \log(a^2 \cos^2 x + b^2 \sin^2 x)$ (b) $\frac{1}{b-a} \log(a^2 \cos^2 x + b^2 \sin^2 x)$
- (c) $\frac{1}{b^2 - a^2} \log(a^2 \cos^2 x + b^2 \sin^2 x)$ (d) $\frac{1}{a^2 + b^2} \log(a^2 \cos^2 x + b^2 \sin^2 x)$
- 6) $\int \frac{e^x dx}{e^{2x} + 1} =$
- (a) $\log(e^x + e^{-x})$ (b) $\log(e^{2x} + 1)$ (c) $\tan^{-1}(e^x)$ (d) $\tan^{-1}(2e^x)$
- 7) $\int \frac{\sqrt{x}}{\sqrt{a^3 - x^3}} dx =$
- (a) $\frac{2}{3} \left(\frac{x}{a} \right)^{3/2}$ (b) $\frac{2}{3} \sin^{-1} \left(\frac{x}{a} \right)^{3/2}$ (c) $\frac{2}{3} \cos^{-1} \left(\frac{x}{a} \right)^{3/2}$ (d) $\frac{2}{3} \sin^{-1} \left(\frac{a}{x} \right)^{3/2}$
- 8) $\int x^3 e^{x^2} dx =$
- (a) $x^2(e^{x^2} - 1)$ (b) $\frac{1}{2} x^2(e^{x^2} - 1)$ (c) $\frac{1}{2} e^{x^2}(x^2 - 1)$ (d) $\frac{1}{2}(e^{x^2} - 1)$

9) $\int \frac{x \sin^{-1} x}{\sqrt{1-x^2}} dx =$

- (a) $\sqrt{1-x^2} \sin^{-1} x$ (b) $x \sin^{-1} x$ (c) $x - \sqrt{1-x^2} \sin^{-1} x$ (d) $(\sin^{-1} x)^2$

10) $\int x \tan^{-1} x dx =$

- (a) $\left(\frac{x^2+1}{2}\right) \tan^{-1} x - \frac{x}{2}$ (b) $\left(\frac{x^2+1}{2}\right) + \tan^{-1} x - x$ (c) $(x^2+1) \tan^{-1} x - x$ (d) $(x^2+1) \tan^{-1} x + x$

11) $\int \frac{x + \sin x}{1 + \cos x} dx =$

- (a) $\tan \frac{x}{2}$ (b) $x \tan \frac{x}{2}$ (c) $\cot \frac{x}{2}$ (d) $x \cot \frac{x}{2}$

12) $\int \frac{\sin^2 x - \cos^2 x}{\sin^2 x \cdot \cos^2 x} dx =$

- (a) $\tan x + \cot x$ (b) $\tan x - \cot x$ (c) $\tan x + \sec x$ (d) $\tan x + \operatorname{cosec} x$

13) $\int \frac{dx}{x\sqrt{1-x^3}} =$

(a) $\frac{1}{3} \log \left| \frac{\sqrt{1-x^2} + 1}{\sqrt{1-x^2} - 1} \right|$ (b) $\frac{1}{3} \log \left| \frac{\sqrt{1-x^2} - 1}{\sqrt{1-x^3} + 1} \right|$

(c) $\frac{2}{3} \log \left| \frac{1}{\sqrt{1-x^3}} \right|$ (d) $\frac{1}{3} \log |1-x^3|$

14) $\int \frac{dx}{x-x^3} =$

- (a) $\frac{1}{2} \log \frac{x^2}{1-x^2}$ (b) $\frac{1}{2} \log \frac{1-x^2}{x^2}$ (c) $\log \frac{(1-x)}{x(1+x)}$ (d) $\log x(1-x^2)$

15) $\int \sqrt{1+x^2} d(x^2) =$

- (a) $\frac{2}{3x} (1+x^2)^{3/2}$ (b) $\frac{2}{3} (1+x^2)^{3/2}$ (c) $\frac{2x}{3} (1+x^2)^{3/2}$ (d) $\frac{2x}{3} (1+x^2)$

16) $\int \frac{2x dx}{1+x^4} =$

- (a) $\tan^{-1}(x^2)$ (b) $\frac{1}{2} \tan^{-1} x^2$ (c) $\log(1+x^4)$ (d) $\tan^{-1}\left(\frac{1}{x^2}\right)$

17) $\frac{3^x dx}{\sqrt{1-9^x}} =$

- (a) $\log_e 3 \sin^{-1}(3^x)$ (b) $\frac{1}{\log_e 3} \sin^{-1}(3^x)$ (c) $\log_e 3 \sin^{-1}(3^{x/2})$ (d) $\frac{1}{\log_e 3} \sin^{-1}(3^{x/2})$

18) $\frac{1}{x(x^4-1)} dx =$

- (a) $\log \left[\frac{x^4}{x^4-1} \right]$ (b) $\frac{1}{2} \log \left[\frac{x^2+1}{x^2-1} \right]$ (c) $\frac{1}{4} \log \left[\frac{x^4-1}{x^4} \right]$ (d) $\log \frac{x(x^2-1)}{x^2+1}$

19) $\int \frac{e^{\log \left(1 + \frac{1}{x^2} \right)} dx}{x^2 + \frac{1}{x^2}} =$

- (a) $\frac{1}{\sqrt{2}} \tan^{-1} \left(x + \frac{1}{x} \right)$ (b) $\frac{1}{\sqrt{2}} \tan^{-1} \left(\frac{x - \frac{1}{x}}{\sqrt{2}} \right)$ (c) $\sqrt{2} \tan^{-1} \left(x + \frac{1}{x} \right)$ (d) $\frac{1}{\sqrt{2}} \tan^{-1} \left(\frac{1}{x} - x \right)$

20) $\int \frac{dx}{(2+x)\sqrt{1+x}} =$

- (a) $2 \tan^{-1} \sqrt{1+x}$ (b) $\frac{1}{2} \tan^{-1} \sqrt{1+x}$ (c) $\tan^{-1} \sqrt{1+x}$ (d) $\log \{ (2+x)\sqrt{1+x} \}$

21) $\int \frac{dx}{x+\sqrt{x}} =$ (a) $\log(1+\sqrt{x})$ (b) $\frac{1}{2} \log(1+\sqrt{x})$ (c) $2 \log(1+\sqrt{x})$ (d) $\log(x+\sqrt{x})$

22) $\int \sin 2x \log \cos x dx =$

- (a) $\frac{1}{2} \cos^2 x - \cos^2 x \log \cos x$ (b) $\frac{1}{2} \cos^2 x + \cos^2 x \log \cos x$ (c) $\cos^2 x \cdot \log \cos x$ (d) $\cos^2 x (1 - \log \cos x)$

23) If $\int \frac{dx}{(x+1)(x-2)} = A \log(x+1) + B \log(x-2) + C$, then

- (a) $A+B = 0$ (b) $AB = -$ (c) $AB = \frac{1}{9}$ (d) $AB = -9$

24) If $\int \tan^4 x dx = a \tan^3 x + b \tan x + cx$, then

- (a) $a = \frac{1}{3}$ (b) $b = -1$ (c) $a = 1$ (d) $c = 1$

25) If $\int \frac{\cos x}{\cos(x-a)} dx = Ax + B \log \cos(x-a)$, then

- (a) $A = \cos \alpha$ (b) $B = \sin \alpha$ (c) $A = \sin \alpha$ (d) $B = \cos \alpha$

ANSWERS FOR ABOVE QUESTIONS

Answers :

1. (c) 2. (b), (d) 3. (a) 4. (a), (b), (c), (d) 5. (c) 6. (c) 7. (b) 8. (c) 9. (c) 10. (a) 11. (b)
12. (a) 13. (b) 14. (a) 15. (b) 16. (a) 17. (b) 18. (c) 19. (b) 20. (a) 21. (c) 22. (a)
23. (a), (c) 24. (a), (b), (d) 25. (a), (b).

- 26) $\int |x| dx$ Ans: $\frac{x}{2} |x| + c$
- 27) $\int \left(10^x + 10x + \frac{10}{x} + \frac{x}{10} + x^{10} + 10^{10} \right) dx$
 Ans: $\frac{10^x}{\log 10} + \frac{101}{20} x^2 + 10 \log |x| + \frac{x^{11}}{11} + 10^{10} x + c$
- 28) $\int \frac{(a^x + b^x)^2}{a^x b^x} dx$ Ans: $\frac{\left(\frac{a}{b}\right)^x}{\log \frac{a}{b}} + \frac{\left(\frac{b}{a}\right)^x}{\log \frac{b}{a}} + 2x + c$
- 29) $\int \frac{1}{1 + \sin x} dx$ Ans: $\tan x - \sec x + c$
- 30) $\int \cos^{-1}(\sin x) dx$ Ans: $\frac{\pi}{2} x - \frac{x^2}{2} + c$
- 31) $\int 3^{-2x} e^{-2x} dx$ Ans: $\frac{(3e)^{-2x}}{-2 \log 3e}$
- 32) $\int \frac{1}{\sin^2 x \cos^2 x} dx$ Ans: $\tan x - \cot x + c$
- 33) $\int \frac{e^{2 \log x} - 1}{e^{2 \log x} + 1} dx$ Ans: $x - 2 \tan^{-1} x + c$
- 34) $\int \sin^2 \left(2 \tan^{-1} \sqrt{\frac{1+x}{1-x}} \right) dx$ $-1 \leq x \leq 1$ Ans: $x - \frac{x^3}{3} + c$
- 35) $\int \frac{\sin x + \cos x}{\sqrt{1 + \sin 2x}} dx$ Ans: $x + c$
- 36) $\int \frac{\sin 2x}{a^2 \cos^2 x + b^2 \sin^2 x} dx$ Ans: $\frac{1}{b^2 - a^2} \log(a^2 \cos^2 x + b^2 \sin^2 x) + c$
- 37) $\int \frac{1 + \sin 2x}{x + \sin^2 x} dx$ Ans: $\log |x + \sin^2 x| + c$
- 38) $\int \frac{\sqrt{\tan x}}{\sin x \cos x} dx$ Ans: $2\sqrt{\tan x} + c$
- 39) $\int \sqrt{\frac{a-x}{a+x}} dx$ Ans: $a \sin^{-1} \frac{x}{a} + \sqrt{a^2 - x^2} + c$
- 40) $\int \frac{1}{e^x - 1} dx$ Ans: $\log |e^x - 1| - x + c$
- 41) $\int \frac{1 + \tan x}{x + \log \sec x} dx$ Ans: $\log |x + \log \sec x| + c$

- 42) $\int \frac{1}{1+\sqrt{x}} dx$ Ans : $2\log(\sqrt{x} + 1) + c$
- 43) $\int x^2 \sqrt[3]{2x-1} dx$ Ans : $\frac{3}{1120}(2x-1)^{4/3}(56x^2 + 24x + 9) + c$
- 44) $\frac{dx}{\sqrt{\sin^3 x \sin(x+\alpha)}}$ Hint : Put $\sqrt{\frac{\sin(x+\alpha)}{\sin x}} = t$ Ans: $\frac{-2}{\sin \alpha} \sqrt{\frac{\sin(x+\alpha)}{\sin x}} + c$
- 45) $\int e^{\sin^2 x} \sin 2x dx$ Ans : $e^{\sin 2x} + c$
- 46) $\int \frac{dx}{a^2 \sin^2 x + b^2 \cos^2 x}$ Ans: $\frac{1}{ab} \tan^{-1}\left(\frac{a \tan x}{b}\right) + c$
- 47) $\int \frac{dx}{(x+1)\sqrt{x^2+1}}$, $x > -1$ Hint : $-x+1 = \frac{1}{t}$ Ans: $-\frac{1}{\sqrt{2}} \log\left\{\frac{1-x \pm \sqrt{2+2x^2}}{x+1}\right\} + c$
- 48) $\int \frac{1}{4+5\cos x} dx$ Ans: $\frac{1}{3} \log\left|\frac{3+\tan^2 \frac{x}{2}}{3-\tan^2 \frac{x}{2}}\right| + c$
- 49) $\int \frac{2\sin x + 3\cos x}{3\sin x + 4\cos x} dx$ Ans : $\frac{18}{25}x + \frac{1}{25} \log|3\sin x + 4\cos x| + c$
- 50) $\int \frac{\sin^{-1} \sqrt{x} - \cos^{-1} \sqrt{x}}{\sin^{-1} \sqrt{x} + \cos^{-1} \sqrt{x}} dx$ Ans : $\frac{2}{\pi} \left\{ \sqrt{x-x^2} - (1-2x)\sin^{-1} \sqrt{x} \right\} - x + c$
- 51) $\int \frac{1}{x^4+1} dx$ Ans: $\frac{1}{2\sqrt{2}} \tan^{-1} \frac{x^2-1}{\sqrt{2}x} - \frac{1}{4\sqrt{2}} \log\left|\frac{x^2-\sqrt{2}x+1}{x^2+\sqrt{2}x+1}\right| + c$
- 52) $\int \sqrt{\tan \theta} d\theta$ Ans: $\frac{1}{\sqrt{2}} \tan^{-1}\left(\frac{\tan \theta - 1}{\sqrt{2} \tan \theta}\right) + \frac{1}{2\sqrt{2}} \log\left|\frac{\tan \theta - \sqrt{2} \tan \theta + 1}{\tan \theta + \sqrt{2} \tan \theta}\right| + c$
- 53) $\int 2^{2^x} 2^x 2^x dx$ Ans: $\frac{1}{(\log 2)^3} 2^{2^x} + c$
- 54) $\int \frac{\sin x + \cos x}{\sin^4 x + \cos^4 x} dx$ Ans: $\frac{1}{\sqrt{2}} \left\{ \frac{1}{2\sqrt{2}+1} \log\left|\frac{\sqrt{\sqrt{2}+1}+t}{\sqrt{\sqrt{2}+1}-t}\right| + \frac{1}{2\sqrt{\sqrt{2}-1}} \tan^{-1} \frac{t}{\sqrt{\sqrt{2}-1}} \right\} + c$
Where $t = \sin x - \cos x$
- 55) $\int \frac{8}{(x+2)(x^2+4)} dx$ Ans: $\log(x+2) - \frac{1}{2} \log(x^2+4) + \tan^{-1} \frac{x}{2} + c$
- 56) $\int \frac{\cos x}{(1+\sin x)(2+\sin x)} dx$ Ans: $\log\left(\frac{1+\sin x}{2+\sin x}\right) + c$
- 57) $\int \frac{\sqrt{\cos 2x}}{\sin x} dx$ Ans: $\frac{1}{2} \log\left|\frac{1+t}{1-t}\right| + \frac{1}{\sqrt{2}} \log\left|\frac{\sqrt{2}+t}{\sqrt{2}-t}\right| + c$ Where $t = \sqrt{1-\tan^2 x}$

$$58) \int \frac{dx}{(\sin x - 2 \cos x)(2 \sin x + \cos x)} \quad \text{Ans: } \frac{1}{5} \log \left| \frac{\tan x - 2}{2 \tan x + 1} \right| + c$$

Hint: divided n r and D r by $\cos^2 x$

$$59) \int \sqrt{\frac{x}{a^3 - x^3}} dx \quad \text{Ans: } \frac{2}{3} \sin^{-1} \frac{x^{3/2}}{a^{3/2}} + c$$

$$60) \int \frac{dx}{x(x^7 + 1)} \quad \text{Ans: } \frac{1}{7} \log \left| \frac{x^7}{x^7 + 1} \right| + c$$

$$61) \int_{\pi/3}^{\pi/2} \frac{\sqrt{1 + \cos x}}{(1 - \cos x)^{7/2}} dx \quad \text{Ans: } \frac{7}{3}$$

$$62) \int_0^{\pi/4} \log(1 + \tan \theta) d\theta \quad \text{Ans: } \frac{\pi}{8} \log 2$$

$$63) \int_0^{\pi/2} \frac{dx}{(a^2 \sin^2 x + b^2 \cos^2 x)^2} \quad \text{Ans: } \frac{\pi(a^2 + b^2)}{4a^3 b^3} \quad \text{Hint: divide Nr and Dr by } \cos^4 x$$

$$64) \int_0^{\pi/3} \frac{\cos x}{3 + 4 \sin x} dx \quad \text{Ans: } \frac{1}{4} \log \left(\frac{3 + 2\sqrt{3}}{3} \right)$$

$$65) \int_0^1 \frac{x}{1 + x^4} dx \quad \text{Ans: } \frac{\pi}{8}$$

$$66) \int_0^{\pi/2} |x \cos \pi x| dx \quad \text{Ans: } \frac{5\pi - 2}{2\pi^2}$$

$$67) \int_0^{\pi/2} \frac{1}{2 \cos x + 4 \sin x} dx \quad \text{Ans: } \frac{1}{\sqrt{5}} \log \frac{3 + \sqrt{5}}{2}$$

$$68) \int_0^2 |x^2 + 2x - 3| dx \quad \text{Ans: } 4$$

$$69) \text{ Evaluate } \int_{-\pi/2}^{\pi/2} \cos^4 x dx \quad \text{Ans: } \frac{3\pi}{8}$$

$$70) \int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx \quad \text{Ans: } \frac{\pi^2}{4}$$

$$71) \int_0^{\pi} \log(1 + \cos x) dx \quad \text{ans: } -\pi \log 2$$

- 72) $\int_0^{\pi} \frac{x \tan x}{\sec x \operatorname{cosec} x} dx$ Ans : $\frac{\pi}{2}$
- 73) $\int_0^1 x(1-x)^n dx$ Ans : $\frac{1}{n+1} - \frac{1}{n+2}$
- 74) $\int_0^{\pi/2} \log \tan x$ Ans : $I = 0$
- 75) $\int_0^{\pi/2} \frac{x dx}{1 + \sin x + \cos x}$ Ans : $\frac{\pi}{2} \log 2$
- 76) $\int_{-\pi/2}^{\pi/2} \cos^4 x dx$ Ans : $\frac{3\pi}{8}$
- 77) $\int_{-5}^8 |x + 3| dx$
- 78) $\int_0^{2\pi} \frac{\sin 2\theta}{a - b \cos \theta} d\theta$ $a > b > 0$ Ans : $I = 0$
- 79) $\int_0^1 \frac{dx}{\sqrt{x+1} + \sqrt{x}}$ Ans : $\frac{2}{3} (3^{3/2} - 1)$
- 80) $\int_0^{\pi/4} \sin 2x \sin 3x dx$ Ans : $\frac{3}{5}$
- 81) $\int_0^{\pi} \frac{x dx}{a^2 \cos^2 x + b^2 \sin^2 x}$ Ans : $\frac{\pi^2}{2ab}$
- 82) $\int_{-\pi/4}^{\pi/4} |\sin x| dx$ Ans : $2 - \sqrt{2}$
- 83) $\int_{-\pi/4}^{\pi/4} |\sin x| dx$ Ans : $2 - \sqrt{2}$
- 84) $\int_0^{\pi/2} \frac{\sin x - \cos x}{1 + \sin x \cos x} dx$ Ans : 0

- 85) $\int_0^a \frac{dx}{x + \sqrt{a^2 - x^2}}$ Ans : $\frac{\pi}{4}$
- 86) $\int_1^4 [|x-1| + |x-2| + |x-3|] dx$ Ans : $\frac{19}{2}$
- 87) $\int_{-\pi}^{\pi} x^{20} \sin^9 x \, dx$ Ans : 0
- 88) $\int_3^9 \frac{\sqrt{12-x}}{\sqrt{x} + \sqrt{12-x}} dx$ Ans : 3
- 89) $\int_{-1}^1 \log\left(\frac{4-x}{4+x}\right) dx$ Ans : 0
- 90) $\int_0^{\pi/2} \frac{1}{2 \cos x + 4 \sin x} dx$ Ans : $\frac{1}{\sqrt{5}} \log \frac{3+\sqrt{5}}{2}$
- 91) $\int_0^{\pi/2} \log(\cos \theta) d\theta$ Ans : $-\frac{\pi}{2} \log 2$
- 92) $\int_{-\pi}^{\pi} \frac{2x(1+\sin x)}{1+\cos^2 x}$ Ans : π^2
- 93) $\int_0^1 x \sqrt{\frac{1-x^2}{1+x^2}} dx$ Ans : $\frac{\pi}{4} - \frac{1}{2}$
- 94) $\int_0^{\pi/2} \frac{1}{\cos(x - \frac{\pi}{3}) \cos(x - \frac{\pi}{6})} dx$ Ans : $2 \log \sqrt{3} + \log 2$
- 95) $\int_{-\pi}^{\pi} (\sin^{-93} x + x^{295})$ Ans : 0
- 96) $\int_0^{16} \frac{x^{1/4}}{1+x^{1/2}} dx$ Ans : $\frac{\pi}{4}$
- 97) $\int_0^{\pi/2} \frac{\sqrt{\tan x}}{1+\sqrt{\tan x}} dx$ Ans : $\frac{\pi}{4}$
- 98) $\int_0^1 \sqrt{\frac{1-x}{1+x}} dx$ Ans : $\frac{\pi}{2} - 1$
- 99) $\int_0^{\pi/4} 2 \tan^3 x \, dx$ Ans : $1 - \log 2$
- 100) $\int_{\pi/6}^{\pi/3} \frac{dx}{1+\sqrt{\tan x}}$ Ans : $\frac{\pi}{12}$

Solve the following problems to test your ability or else consult your teacher

These problems are very important from CBSE point of view

Try Table No.1

Question	Answer to get
1. $\int \sec^4 x \tan x dx$	Ans. $\frac{\sec^4 x}{4} + c$
2. $\int \cos^3(ax+b)\sin(ax+b)dx$	Ans. $-\frac{\cos^4(ax+b)}{4a} + c$
3. $\int (1-x^2)\log x dx$	Ans. $\left(x - \frac{x^3}{3}\right)\log x - x + \frac{x^3}{9} + c$
4. $\int \sec x \log(\sec x + \tan x) dx$	Ans. $\frac{1}{2}[\log \sec x + \tan x]^2 + c$
5. $\int \sin^2 x \cos^3 x dx$	Ans. $\frac{\sin^3 x}{3} - \frac{\sin^5 x}{5} + c$
6. $\int \frac{dx}{1+\sin x}$	Ans. $\tan x - \sec x + c$
7. $\int \frac{2x}{(x^2+1)(x^2+2)} dx$	Ans. $\log\left \frac{x^2+1}{x^2+2}\right + c$
8. $\int \frac{x^3}{x^2-4} dx$	Ans. $\frac{1}{2}x^2 + 2\log x^2-4 + c$
9. $\int \frac{3x+5}{x^3-x^2-x+1} dx$	Ans. $\frac{1}{2}\log\left \frac{x+1}{x-1}\right - \frac{4}{x-1} + c$
10. $\int \frac{(x+1)(x+\log x)^2}{x} dx$	Ans. $\frac{1}{3}(x+\log x)^3 + c$

Try Table No.2

1. $\int \frac{\sin 2x}{a \cos^2 x + b \sin^2 x} dx$	Ans. $\frac{1}{b-a} \log a \cos^2 x + b \sin^2 x + c$
2. $\int \frac{1}{a^2+x^2} dx$	Ans. $\frac{1}{a} \tan^{-1} \frac{x}{a} + c$
3. $\int e^{-x} \operatorname{cosec}^2(2e^{-x}+5) dx$	Ans. $\frac{1}{2} \cot(2e^{-x}+5) + c$

4. $\int \frac{-x^2+4x+3}{(x+2)(x-1)} dx$	Ans. $3\log x+2 +2\log x-1 -x+c$
5. $\int \frac{\cos 2x+x+1}{x^2+\sin 2x+2x} dx$	Ans. $\frac{1}{2}\log x^2+\sin 2x+2x +c$
6. $\int \frac{\cos x - \sin x}{1+\sin 2x} dx$	Ans. $-\frac{1}{\sin x+\cos x}+c$
7. $\int \frac{dx}{x\cos^2(1+\log x)}$	Ans. $\tan(1+\log x)+c$
8. $\int \frac{x^3-x-2}{1-x^2} dx$	Ans. $-\frac{x^2}{2}+\log\left \frac{x-1}{x+1}\right +c$
9. $\int \frac{dx}{(x-1)(x+1)(x+2)}$	Ans. $\frac{1}{6}\log x-1 -\frac{1}{2}\log x+1 +\frac{1}{3}\log x+2 +c$
10. $\int \frac{6x+7}{\sqrt{(x-5)(x-4)}} dx$	Ans. $6\sqrt{x^2-9x+20}+34\log\left x-\frac{9}{2}+\sqrt{x^2-9x+20}\right +c$

RAPID FIRE ON INTEGRATION

Q. 1. Evaluate:

i. $\int \frac{1}{\sin^2 x \cos^2 x} dx$

ii. $\int \frac{x}{4+x^4} dx$

iii. $\int \frac{3x}{1+2x^4} dx$

iv. $\int (e^{a\log x} + e^{x\log a} + e^{a\log a}) dx$

v. $\int \frac{e^x - e^{-x}}{e^x + e^{-x}} dx$

vi. $\int \frac{1+\cos x}{x+\log \sin x} dx$

Q. 2. Evaluate:

i. $\int_{-1}^1 |1-x| dx$

- ii. $\int_0^{1.5} |x^2| dx$
- iii. $\int_0^{\frac{\pi}{2}} \frac{1}{1 + \tan^2 x} dx$
- iv. $\int_0^3 [x] dx$
- v. $\int_0^4 \frac{1}{x + \sqrt{x}} dx$
- vi. $\int_0^{\infty} \frac{\sin(\tan^{-1} x)}{1 + \tan^2 x} dx$
- vii. $\int_0^{\pi} \frac{1}{1 + \sin x} dx$

Q. 3.

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

Q. 4.

Evaluate $\int_1^4 f(x) dx$ Where $f(x) = \begin{cases} 4x + 3, & 1 \leq x \leq 2 \\ 3x + 5, & 2 \leq x \leq 4. \end{cases}$

ANSWERS

1. i. $\tan x - \cot x + c$
- ii. $\frac{1}{4} \tan^{-1} \frac{x^2}{2} + c$
- iii. $\frac{3}{2\sqrt{2}} \tan^{-1}(\sqrt{2}x^2) + c$
- iv. $\frac{a^x}{\log a} + \frac{x^{a+1}}{a+1} + a^a x + c$
- v. $\log(e^x - e^{-x}) + c$
- vi. $\log(\log \sin x + x) + c$
2. i. 2
- ii. $2 - \sqrt{2}$

- iii. $\frac{\pi}{4}$
- iv. 3
- v. $2 \log 5$
- vi. 1
- vii. 1

- 3. 4
- 4. 37