INTEGRATION

Qus 1 $\int \sin^3(2x+1)\,dx$ ANS $\frac{1}{4}\left[\frac{-3}{2}\cos(2x+1) + \frac{1}{6}\cos(6x+3)\right] + C$

Qn-2 $\int \cos^4(2x)\,dx$ Ans $\frac{1}{8}\left[3x + \frac{\sin(8x)}{8} + \sin(4x)\right] + C$

Qn3 $\int \cos(2x)\cdot\cos(4x)\cos(6x)\,dx$ Ans $\frac{1}{4}\left[\frac{1}{12}\sin(12x) + x + \frac{1}{8}\sin(8x) + \frac{1}{4}\sin(4x)\right] + C$

Qus 4 $\int \dfrac{1}{\sin x \cdot \cos^3 x}\,dx$ ANS $\log|\tan x| + \dfrac{\tan^2 x}{2} + C$

Qn·5 $\int \dfrac{\cos x}{1+\cos x}\,dx$ Ans $-\csc x + \cot x + x + C$

Qn·6 $\int \dfrac{1}{1+\cot x}\,dx$ Ans $\dfrac{x}{2} - \dfrac{1}{2}\log|\cos x + \sin x| + C$

Qn·7 $\int x\sqrt{x+2}\,dy$ Ans $\dfrac{2}{5}(x+2)^{5/2} - \dfrac{4}{3}(x+2)^{3/2} + C$

Qn·8 $\int \dfrac{1}{x^2(x^4+1)^{3/4}}\,dx$ Ans $-\left(1 + \dfrac{1}{x^4}\right)^{1/4} + C$

Qn 9 $\int \dfrac{x+2}{\sqrt{x^2+1}}\,dx$ Ans $\sqrt{x^2+1} + 2\log\left|x + \sqrt{x^2+1}\right| + C$

Qn 10 $\int \dfrac{5x+3}{\sqrt{x^2+4x+10}}\,dx$ Ans $5\sqrt{x^2+4x+10} - 7\log\left|x+2 + \sqrt{x^2+4x+10}\right| + C$

Qn 11 $\int \dfrac{2x-3}{(x^2-1)(2x+3)}\,dy$ Ans $\dfrac{5}{2}\log|x+1| - \dfrac{1}{10}\log|x-1| - \dfrac{12}{5}\log|2x+3| + C$

Qn 12 $\int \dfrac{e^x}{(1+e^x)(2+e^x)}\,dx$ Ans $\log\left|\dfrac{1+e^x}{2+e^x}\right| + C$

Que 13 → $\int \dfrac{3x-2}{(x+1)^2(x+3)}\,dx$ **Ans** $\dfrac{11}{4}\log\left|\dfrac{x+1}{x+3}\right| + \dfrac{5}{2}\dfrac{1}{(x+1)} + C$

Qu. 14 → $\int \dfrac{1}{(x^2+1)(x^2+4)}\,dx$ **Ans** $\dfrac{1}{3}\tan^{-1}x - \dfrac{1}{6}\tan^{-1}\left(\dfrac{x}{2}\right) + C$

Qu. 15 → $\int \sqrt{1-4x-x^2}\,dx$ **Ans** $\left(\dfrac{x+2}{2}\right)\sqrt{1-4x-x^2} + \dfrac{5}{2}\sin^{-1}\left(\dfrac{x+2}{\sqrt{5}}\right) + C$

Qu. 16 → $\int x\cos^{-1}x\,dx$ **Ans** $(2x^2-1)\cdot\dfrac{\cos^{-1}x}{4} - \dfrac{x}{4}\sqrt{1-x^2} + C$

Qu. 17 → $\int x(\log x)^2\,dx$ **Ans** $\dfrac{x^2}{2}(\log x)^2 - \dfrac{x^2}{2}\log x + \dfrac{x^2}{4} + C$

Qu. 18 → $\int e^x\left(\dfrac{2+\sin(2x)}{1+\cos(2x)}\right)dx$ **Ans** $e^x\tan x + C$

Qu. 19 → $\int e^x\cdot\dfrac{x}{(x+1)^2}\,dx$ **Ans** $\dfrac{e^x}{x+1} + C$

Qu. 20 → $\int e^x\sin x\,dx$ **Ans** $\dfrac{e^x}{2}\left(\sin x - \cos x\right) + C$

Qu. 21 → $\int \dfrac{1}{x(x^2+1)}\,dx$ **Ans** $\log|x| - \dfrac{1}{2}\log|x^2+1| + C$

Qu. 22 → $\int e^{3\log x}\cdot(x^4+1)^{-1}\,dx$ **Ans** $\dfrac{1}{4}\log|x^4+1| + C$

Qu. 23 $\int \sqrt{\dfrac{1+x}{1-x}}\,dx$ **Ans** $\sin^{-1}x - \sqrt{1-x^2} + C$

Qu. 24 $\int \tan^2 x\cdot\sec^4 x\,dx$ **Ans** $\dfrac{\tan^5 x}{5} + \dfrac{\tan^3 x}{3} + C$

Qu. 25 $\int \dfrac{x^2}{x^4-x^2-12}\,dx$ **Ans** $\dfrac{1}{7}\log\left|\dfrac{x-2}{x+2}\right| + \dfrac{\sqrt{3}}{7}\tan^{-1}\left(\dfrac{x}{\sqrt{3}}\right) + C$

Qu. 26 $\int \dfrac{1}{2\sin^2 x+5\cos^2 x}\,dx$ **Ans** $\dfrac{1}{\sqrt{10}}\tan^{-1}\left(\dfrac{\sqrt{2}\tan x}{\sqrt{5}}\right) + C$

QN. 27 → $\int \frac{x}{\sqrt{x}+1} dx$

Ans $2\left[\frac{x\sqrt{x}}{3} - \frac{x}{2} + \sqrt{x} - \log|\sqrt{x}+1|\right] + C$

QN. 28 → $\int \frac{\sin x + \cos x}{\sqrt{1+\sin(2x)}} dx$

Ans $x + C$

QN. 29 → $\int \frac{x^2+2}{x+1} dx$

Ans $\frac{x^2}{2} - x + 3\log|x+1| + C$

QN. 30 → $\int \frac{e^{6\log x} - e^{5\log x}}{e^{4\log x} - e^{3\log x}} dx$

Ans $\frac{x^3}{3} + C$

QN. 31 → $\int \frac{3x-1}{\sqrt{x^2+9}} dx$

Ans $3\sqrt{x^2+9} - \log\left|x + \sqrt{x^2+9}\right| + C$

QN. 32 → $\int \sqrt{10-4x+4x^2}\, dx$

Ans $\left(\frac{2x-1}{2}\right)\sqrt{x^2-x+\frac{5}{2}} + \frac{9}{4}\log\left|\left(\frac{2x-1}{2}\right) + \sqrt{x^2-x+\frac{5}{2}}\right| + C$

QN. 33 → $\int (4x+1)\sqrt{x^2-x-2}\, dx$

Ans $\frac{4}{3}\left(x^2-x-2\right)^{3/2} + 3\left[\frac{2x-1}{4}\sqrt{x^2-x-2} - \frac{9}{8}\log\left|\left(\frac{2x-1}{2}\right) + \sqrt{x^2-x-2}\right|\right] + C$

QN. 34 → $\int e^{ax} \cdot \sin(bx+c)\, dx$

Ans $\frac{e^{ax}}{a^2+b^2}\left[a\sin(bx+c) - b\cos(bx+c)\right] + C$

QN. 35 → $\int \csc^3 x\, dx$

Ans $-\frac{\csc x \cdot \cot x}{2} + \frac{1}{2}\log|\cot x + \csc x| + C$

QN. 36 → $\int \frac{x^2-1}{x^4+x^2+1} dx$

Ans $\frac{1}{2}\log\left|\frac{x^2-x+1}{x^2+x+1}\right| + C$

QN. 37 → $\int e^x\left(\frac{\sin(4x)-4}{1-\cos(4x)}\right) dx$

Ans $e^x \cdot \cot(2x) + C$

Ques 38 → $\int \dfrac{x^3}{(x-1)(x-2)(x-3)}\,dx$ **Ans** $x + \dfrac{1}{2}\log|x-1| - 8\log|x-2|$
$$+\dfrac{27}{2}\log|x-3| + c$$

Ques 39 → $\int \dfrac{1}{\sin^2 x + \sin(2x)}\,dx$ **Ans** $\dfrac{1}{2}\log\left|\dfrac{\tan x}{\tan x + 2}\right| + c$

Ques 40 → $\int \dfrac{1}{\sin x + \sqrt{3}\cos x}\,dx$ **Ans** $\dfrac{1}{2}\log\left|\dfrac{1 + \sqrt{3}\tan(x/2)}{3 - \sqrt{3}\tan(x/2)}\right| + c$

Qn. 41 → $\int \dfrac{4\sin x + 5\cos x}{5\sin x + 4\cos x}\,dx$ **Ans** $\dfrac{40}{41}x + \dfrac{9}{41}\log|5\sin x + 4\cos x| + c$

Qn. 42 → $\int \sqrt{\dfrac{x}{a^3 - x^3}}\,dx$ **Ans** $\dfrac{2}{3}\sin^{-1}\left(\dfrac{x^{3/2}}{a^{3/2}}\right) + c$

Qn. 43 → $\int \dfrac{\sin x \cdot \cos x\,dx}{\sqrt{\sin^4 x + 4\sin^2 x + 2}}$ **Ans** $\dfrac{1}{2}\log\left|(\sin^2 x + 2) + \sqrt{\sin^4 x + 4\sin^2 x + 2}\right| + c$

Qn. 45 → $\int \dfrac{1}{\sin^3 x \cos^5 x}\,dx$ **Ans** $\dfrac{-1}{2\tan^2 x} + \dfrac{\tan^4 x}{4} + 3\log|\tan x| + \dfrac{3\tan^2 x}{2} + c$

Qn. 46 → $\int \sin^3 x \cdot \cos^6 x\,dx$ **Ans** $-\left[\dfrac{\cos^7 x}{7} - \dfrac{\cos^9 x}{9}\right] + c$

Qn. 47 → $\int \dfrac{1}{\sqrt{1-2x} + \sqrt{3-2x}}\,dx$ **Ans** $\dfrac{1}{6}(1-2x)^{3/2} - \dfrac{1}{6}(3-2x)^{3/2} + c$

Qn. 48 → $\int \dfrac{1}{(x-1)\sqrt{2x+3}}\,dx$ **Ans** $\dfrac{1}{\sqrt{5}}\log\left|\dfrac{\sqrt{2x+3} - \sqrt{5}}{\sqrt{2x+3} + \sqrt{5}}\right| + c$

Qn. 49 → $\int \dfrac{1}{(x^2-4)\sqrt{x+1}}\,dx$ **Ans** $\dfrac{1}{4\sqrt{3}}\log\left|\dfrac{\sqrt{x+1} - \sqrt{3}}{\sqrt{x+1} + \sqrt{3}}\right| - \dfrac{1}{2}\tan^{-1}(\sqrt{x+1}) + c$

Qn. 50 → $\int \dfrac{1}{(x-1)\sqrt{x^2+4}}\,dx$ **Ans** $-\dfrac{1}{\sqrt{5}}\log\left|\dfrac{1}{x-1} + \dfrac{1}{5} + \sqrt{\dfrac{x^2+4}{5(x-1)^2}}\right| + c$

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