INTEGRATION WORKSHEET NO: 3 (Class No: 4) (1)

Q.No 1 → $\int 4x^3\sqrt{5-x^2}\,dx$

Ans $\frac{4}{5}(5-x^2)^{5/2} - \frac{20}{3}(5-x^2)^{3/2} + C$

Hint: put $5-x^2=t$

Q.No. 2 → $\int \frac{1}{x^2(x^4+1)^{3/4}}\,dx$

Ans $-\left(1+\frac{1}{x^4}\right)^{1/4} + C$

Hint take common and put t

Q.No 3 → $\int \frac{x^5}{\sqrt{1+x^3}}\,dx$

Ans $\frac{1}{10}(2x+3)^{5/2} + \frac{1}{6}(2x+3)^{3/2} + C$

Hint: put $1+x^3=t$

Q.No. 4 → $\int \frac{1}{\sqrt{x}+x}\,dx$

Ans $2\log|1+\sqrt{x}| + C$

Hint $\sqrt{x}$ common

Q.No 5 → $\int \frac{e^{\sqrt{x}}\cdot\cos(e^{\sqrt{x}})}{\sqrt{x}}\,dx$

Ans $2\sin(e^{\sqrt{x}}) + C$

Q.No 6 → $\int 5^{5^{5^x}}\cdot 5^{5^x}\cdot 5^x\,dx$

Ans $\frac{1}{(\log 5)^3}\cdot 5^{5^{5^x}} + C$

Q.No. 7 → $\int \frac{\sin(2x)}{(a+b\cos x)^2}\,dx$

Ans $-\frac{2}{b^2}\left[\log|a+b\cos x| + \frac{a}{a+b\cos x}\right] + C$

Hint $a+b\cos x=t$

Q.No 8 → $\int \frac{(x^4-x)^{1/4}}{x^5}\,dx$

Ans $\frac{4}{15}\left(1-\frac{1}{x^3}\right)^{5/4} + C$

Hint: Take common & put t

Q.No. 9 → $\int \frac{\sin x}{\sqrt{3+2\cos x}}\,dx$

Ans $-\sqrt{3+2\cos x} + C$

Q.No 10 → $\int \frac{\sec x}{\sec(2x)}\,dx$

Ans $2\sin x - \log|\sec x + \tan x| + C$

Q.No 11 → $\int \frac{10x^9 + 10^x\log 10}{10^x + x^{10}}\,dx$

Ans $\log|10^x + x^{10}| + C$

Qn. 12 → $\int \frac{1}{x \log x \cdot \log(\log x)} dx$ Ans $\log|\log(\log x)| + C$

put $\log(\log x) = t$

Qn 13 → $\int \tan(2x) \tan(3x) \tan(5x)\, dx$ Ans $\frac{1}{5}\log|\sec(5x)| - \frac{1}{2}\log|\sec(2x)| - \frac{1}{3}\log|\sec(3x)| + C$

Hint: $5x = 3x + 2x$

Qn 14 → $\int \sqrt{\frac{1-\sin(2x)}{1+\sin(2x)}}\, dx$ Ans $\log\left|\cos\left(\frac{\pi}{4} - x\right)\right| + C$

Qn 15 $\int \frac{\sin(2x)}{a^2\sin^2 x + b^2\cos^2 x}\, dx$ Ans $\frac{1}{a^2-b^2}\log|a^2\sin^2 x + b^2\cos^2 x| + C$

Qn 16 → $\int \frac{\tan x}{a + b\tan^2 x}\, dx$ Ans $\frac{1}{2(b-a)}\log|a\cos^2 x + b\sin^2 x| + C$

Qn 17 → $\int \frac{1+\cos(4x)}{\cot x - \tan x}\, dx$ Ans $-\frac{1}{8}\cos(4x) + C$

Qn 18 → $\int \frac{1}{\sqrt{x+3} - \sqrt{x+2}}\, dx$ Ans $\frac{2}{3}\left[(x+3)^{3/2} + (x+2)^{3/2}\right] + C$

Hint Rationalize

Qn 19 → $\int \frac{1}{\sqrt{1-2x} + \sqrt{3-2x}}\, dx$ Ans $\frac{1}{6}(1-2x)^{3/2} - \frac{1}{6}(3-2x)^{3/2} + C$

Hint: Rationalize

Qn 20 → If $f'(x) = a\sin x + b\cos x$

$f'(0) = 4$; $f(0) = 3$; $f(\pi/2) = 5$

Find $f(x)$

Ans $5x^3 + 7x^2 + C$

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