Name :- Olubusin Florence Adeola

Matric no: 19/mhs 01/367

Department: MBBS

1. $\int 2x^2 \ln x \, dx$

let $u = \ln x$, $\frac{du}{dx} = \frac{1}{x}$, $du = \frac{dx}{x}$

$dv = 2x^2$, $v = \frac{2x^3}{3}$

$\int u \, dv = uv - \int v \, du$

$\int 2x^2 \ln x \, dx = \frac{2x^3}{3} \ln x - \int \frac{2x^3}{3} \cdot \frac{dx}{x}$

$= \frac{2x^3}{3} \ln x - \frac{2}{3} \int x^2 \, dx$

$= \frac{2x^3 \ln x}{3} - \frac{2x^3}{9} + C$

$= \frac{2}{3} x^3 \left(\ln x - \frac{1}{3} \right) + C$

2. $\int 3te^{2t} dt$

$u = 3t$, $\frac{du}{dt} = 3$, $du = 3dt$

$dv = e^{2t}$, $v = \frac{1}{2} e^{2t}$

$\int 3te^{2t} = \frac{3te^{2t}}{2} - \int \frac{3e^{2t}}{2} dt$

$= \frac{3te^{2t}}{2} - \frac{3e^{2t}}{4} dt$

$\int 3te^{2t}\,dt = \frac{3te^{2t}}{2} - \frac{3e^{2t}}{4} \cancel{dt} + c$

3. $\int x^2 \sin x\,dx$

$u = x^2, \quad \frac{du}{dx} = 2x, \quad du = 2x\,dx$

$dv = \sin x \qquad v = -\cos x$

$\int x^2 \sin dx \qquad = -x^2 \cos x - \int -2x \cos x\,dx$

$= -x^2 \cos x + \int 2x \cos x\,dx$

$= -x^2 \cos x + 2x \sin x\,dx$

$\int x^2 \sin dx \qquad = 2x \sin x - x^2 \cos x + C$

4. $\int \cos 5x \cos 6x\,dx$

$\cos A \cos B = \frac{1}{2}[\cos(A+B) + \cos(A-B)]$

$= \frac{1}{2}[\cos(5x+6x) + \cos(5x-6x)]$

$= \frac{1}{2}[\cos 11x - \cancel{+} \cos x]$

$\int \cos 5x \cos 6x\,dx = \frac{\cos 11x}{2} \cancel{+} - \frac{\cos x}{2}$

5. $\int \sin 7x \cos 5x\,dx$

$\sin A \cos B = \frac{1}{2}[\sin(A+B) + \sin(A-B)]$

$= \frac{1}{2}[\sin(7x+2x) + \sin(7x-2x)]$

$= \frac{1}{2}[\sin 9x + \sin 5x]$

$\int \sin 7x \cos 5x\,dx = \frac{\sin 9x}{2} + \frac{\sin 5x}{2} + C$