UDOFIA, ETIMBUK VICTORY 19/MHS01/410 MBBS

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

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

$u = 2x^2, \; du = 4x$

$dv = \ln x \, dx \quad v = x \ln x - x$

$\int 2x^2 \ln x \, dx = 2x^2 \times (x \ln x - x) - \int x \ln x - x \times 4x \, dx$

$\int 2x^2 \ln x \, dx = 2x^3 \ln x - 2x^3 - \int 4x^2 \ln x - 4x^2$

$\int 2x^2 \ln x \, dx = 2x^3 \ln x - 2x^3 - \int 4x^2 (\ln x - 1)$

$\int 2x^2 \ln x \, dx = 2x^3 \ln x - 2x^3 - \frac{4x^3}{3} \int \ln x - 1$

$\int 2x^2 \ln x \, dx = 2x^3 \ln x - 2x^3 - \frac{4x^3}{3} ((x \ln x - \cancel{x}) - \cancel{x}) - 2x$

$\int 2x^2 \ln x \, dx = 2x^3 \ln x - 2x^3 - \frac{4x^4 \ln x}{3} - \frac{8x^4}{3}$

$\int 2x^2 \ln x \, dx = 2x^3 \left(\ln x - \frac{2x \ln x}{3} - \frac{4x}{3} - 1 \right) + C$

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

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

$u = 3t \quad , du = 3 \quad dv = e^{2t}dt \quad v = \frac{e^{2t}}{2}$

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

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

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

$\int 3te^{2t}dt = \frac{3te^{2t}}{2} - \frac{3e^{2t}}{4} + C$ or $\frac{3e^{2t}}{2}\left(t - \frac{1}{4}\right)$

4) $\int \cos 5x \cos 6x \, dx = \frac{1}{2}\int [\cos(A+B) + \cos(A-B)]$ $(A = 5x, B = 6x)$

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

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

$= \frac{1}{2}\left[\frac{\sin 11x}{11} - \sin x\right]$

$= \frac{\sin 11x}{22} - \frac{\sin x}{2}$

) $\int \sin 7x \cos 2x \, dx = \frac{1}{2}\left[\sin(7x+2x) + \sin(7x-2x)\right]$ (A = 7x, B = 2x)

$$= \frac{1}{2}\int(\sin 9x + \sin 5x)\,dx$$

$$= \frac{1}{2}\left[\frac{-\cos 9x}{9} + \frac{-\cos 5x}{5}\right]$$

$$= \frac{-\cos 9x}{18} - \frac{\cos 5x}{10}$$