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 DEPARTMENT: MBBS

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

let  $u = \ln x$ ,  $dy/dx = \frac{1}{x}$ ,  $dy = dx/x$   
 $du = 2x^2$ ,  $u = 2x^3/3$

$$\int 2x^2 \ln x dx = uv - \int v du$$

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

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

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

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

$u = 3t$ ,  $\frac{du}{dt} = 3$ ,  $du = 3dt$   
 $dv = e^{2t}$ ,  $v = \frac{1}{2} e^{2t}$

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

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

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

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

$u = x^2$ ,  $du/dx = 2x$ ,  $du = 2x dx$   
 $dv = \sin x$ ,  $v = -\cos x$

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

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

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

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

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

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

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

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

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

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

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

$$= \frac{1}{2} [\cos(5x+7x) + \cos(5x-7x)]$$

$$\int \cos 5x \cos 6x dx = \frac{\sin 9x + \sin 5x}{2} + C$$