

(9)

$$s = -3: 18 = A(-3)(-6) - 18 \Rightarrow 36 = 18A \Rightarrow A = 2$$

$$\therefore \frac{s^2 - 6s - 9}{(s^2 + 9)(s - 3)} = \frac{2s}{s^2 + 9} - \frac{1}{s - 3}$$

Thus

$$\mathcal{L}^{-1} \left\{ \frac{s^2 - 6s - 9}{(s^2 + 9)(s - 3)} \right\} = \mathcal{L}^{-1} \left\{ \frac{2s}{s^2 + 9} \right\} - \mathcal{L}^{-1} \left\{ \frac{1}{s - 3} \right\}$$

$$= 2 \cos(3t) - e^{3t}$$

5c)

$$\mathcal{L} \{ u(t-1) * [te^{-2t}] \} = F(s) \cdot G(s)$$

$$\text{where } F(s) = \mathcal{L} \{ u(t-1) \} = e^{-s}$$

$$\text{and } G(s) = \mathcal{L} \{ te^{-2t} \} = -\frac{d}{ds} \left\{ \frac{1}{s+2} \right\} = \frac{1}{(s+2)^2}$$

$$\therefore \mathcal{L} \{ u(t-1) * [te^{-2t}] \} = \frac{e^{-s}}{s(s+2)^2}$$

(19)