$$\mathcal{L}[e^{-t}] = \frac{1}{s+1}$$

$$\mathcal{L}[e^{-2t}] = \frac{1}{s+2}$$

$$\mathcal{L}[A] = \frac{A}{s}$$

$$\mathcal{L}^{-1}\frac{4}{s(s^2+3s+2)}$$

$$\mathcal{L}^{-1}[2] + \mathcal{L}^{-1}\frac{-4}{s+1} + \mathcal{L}^{-1}\frac{-6}{s+2}$$

$$y(t) = 2 - 4e^{-t} - 6e^{-2t}$$

$$\frac{s+1}{(s+2)(s+3)} = \frac{A}{s+2} + \frac{B}{s+3}$$

$$A = \frac{(s+2)(s+1)}{(s+2)(s+3)} = \left.\frac{s+1}{s+3}\right|_{s=-2} = \frac{-1}{+1}$$

$s+2=0 \Longrightarrow s=-2$

$$\boxed{A=-1}$$

$$B = \left.\frac{(s+3)(s+1)}{(s+2)(s+3)}\right|_{s=-3} =$$

$$B = \left.\frac{s+1}{s+2}\right|_{s=-3} = \frac{-3+1}{-3+2} = \frac{-2}{-1}$$

$$= 2$$

$$y(t) = \mathcal{L}^{-1}\frac{A}{s+2} + \mathcal{L}^{-1}\frac{B}{s+3}$$

$$= Ae^{-2t} + Be^{-3t}$$

$$y(t) = -e^{-2t} + 2e^{-3t}$$