2.8.(二).2

$$LQ'' + RQ' + \frac{1}{C}Q = E(t) \ \ ,R = 7\Omega \ \ ,L = 1H \ \ ,C = 0.1F \ \ ,E(t) = 5t^2$$

$$Q'' + 7Q' + \frac{1}{0.1}Q = 5t^2$$

特徵方程式: $r^2 + 7r + 10 = 0$

$$(r+5)(r+2) = 0$$

$$r = -5 \ \ or \ \ r = -2$$

$$\therefore Q_h = c_1 e^{-5t} + c_2 e^{-2t}$$

$$Let \ \ \left[\times \frac{1}{0.1}\right] Q_p = At^2 + Bt + C$$

$$[\times 7] Q_p' = 2At + B$$

$$[\times 1] Q_p'' = 2A$$

$$5t^2 = 10At^2 + (10B + 14A)t + 10C + 7B + 2A$$

$$\begin{cases} 10A = 5 \\ 14A + 10B = 0 \\ 2A + 7B + 10C = 0 \end{cases}$$

$$\begin{cases} A = \dfrac{1}{2} \\ B = -\dfrac{7}{10} \\ C = \dfrac{39}{100} \end{cases}$$

$$\therefore G.S. \quad Q = c_1 e^{-5t} + c_2 e^{-2t} + \frac{1}{2}t^2 - \frac{7}{10}t + \frac{39}{100}$$

$$\because I = \frac{dQ}{dt}$$

$$\therefore I = c_3 e^{-5t} + c_4 e^{-2t} + t - \frac{7}{10}$$

2.8. (二). 5

$$LQ'' + RQ' + \frac{1}{C}Q = E(t)\ \ ,R = 7\Omega\ \ ,L = 1H\ \ ,C = 0.1F\ \ ,E(t) = 1 + e^{-5t}$$

$$Q'' + 7Q' + \frac{1}{0.1}Q = 1 + e^{-5t}$$

$特徵方程式: r^2 + 7r + 10 = 0$

$$(r+5)(r+2) = 0$$
$$r = -5\ \ or\ \ r = -2$$
$$\therefore Q_h = c_1e^{-5t} + c_2e^{-2t}$$

$$Let\ \ \left[\times\frac{1}{0.1}\right]Q_p = A + Bte^{-5t}$$
$$[\times 7]Q_p' = Be^{-5t} - 5Bte^{-5t}$$
$$= (-5Bt + B)e^{-5t}$$
$$[\times 1]Q_p'' = -5Be^{-5t} - 5(-5Bt + B)e^{-5t}$$
$$= (25Bt - 10B)e^{-5t}$$
$$1 + e^{-5t} = 10A + [(10B - 35B + 25B)t + 7B - 10B]e^{-5t}$$
$$\begin{cases} 10A = 1 \\ -3B = 1 \end{cases}$$
$$\begin{cases} A = \dfrac{1}{10} \\ B = -\dfrac{1}{3} \end{cases}$$

$$\therefore G.S.\quad Q = c_1e^{-5t} + c_2e^{-2t} + \frac{1}{10} - \frac{1}{3}te^{-5t}$$

$$\because I = \frac{dQ}{dt}$$

$$\therefore I = c_3e^{-5t} + c_4e^{-2t} + \left(\frac{5t-1}{3}\right)e^{-5t}$$