

Tutorial 1-01-b

Question 1

Determine a differential equation relating the voltage $v(t)$ and the current $i(t)$ for $t \geq 0$ for the electrical network given in Fig. 3-6. Assume the capacitor is uncharged at $t = 0$, the current i is zero at $t = 0$, and the switch S closes at $t = 0$.

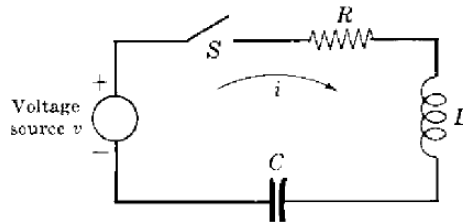


Fig. 3-6

Question 2

(a) Perform partial fraction expansion on:

$$F(s) = \frac{s^2 + 2s + 2}{s^2 + 3s + 2}$$

(b) Find the Inverse Laplace Transform on:

$$F(s) = \frac{1}{(s+1)^2(s+2)}$$

Question 3

Find the Laplace Transform of (a) $d/dt e^{-t}$ and (b) $\int_0^t e^{-\tau} d\tau$

Question 4

(a) Find the initial value of e^{-3t} and

(b) Find the final value of $(1 - e^{-t})$

Question 5

Find the solution $x(t)$ of the differential equation

$$\ddot{x} + 3\dot{x} + 2x = 0, \quad x(0) = a, \quad \dot{x}(0) = b$$

where a and b are constants.