Sohag university

3^{th} year

Faculty of Engineering

Signals and systems

SHEET NO (5)

3.1. Find the Laplace transform of

(a) $x(t) = -e^{-at}u(-t)$

(b) $x(t) = e^{at}u(-t)$

3.17. Find the inverse Laplace transform of the following $X(s)$:

(a) $X(s) = \dfrac{2s+4}{s^2+4s+3}$, $\text{Re}(s) > -1$

(b) $X(s) = \dfrac{2s+4}{s^2+4s+3}$, $\text{Re}(s) < -3$

(c) $X(s) = \dfrac{2s+4}{s^2+4s+3}$, $-3 < \text{Re}(s) < -1$

3.30. Consider a continuous-time LTI system for which the input $x(t)$ and output $y(t)$ are related by

$$y''(t) + y'(t) - 2y(t) = x(t) \qquad (3.86)$$

(a) Find the system function $H(s)$.

(b) Determine the impulse response $h(t)$ for each of the following three cases: (i) the system is causal, (ii) the system is stable, (iii) the system is neither causal nor stable.

3.18. Find the inverse Laplace transform of

$$X(s) = \frac{5s+13}{s(s^2+4s+13)} \qquad \text{Re}(s) > 0$$

3.25. The output $y(t)$ of a continuous-time LTI system is found to be $2e^{-3t}u(t)$ when the input $x(t)$ is $u(t)$.

(a) Find the impulse response $h(t)$ of the system.

(b) Find the output $y(t)$ when the input $x(t)$ is $e^{-t}u(t)$.

3.23. Find the system function $H(s)$ and the impulse response $h(t)$ of the RC circuit in Fig. 1-32 (Prob. 1.32).

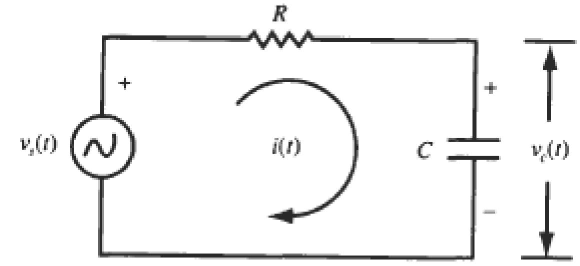

Fig. 1-32 *RC* circuit.