

LAHORE UNIVERSITY OF MANAGEMENT SCIENCES
Department of Electrical Engineering

EE240 Circuits I
Quiz 01 - Section 2

Name: _____

Campus ID: _____

Total Marks: 10

Time Duration: 15 minutes

Question 1 (10 marks)

- (a) [7 marks] The voltage $v_c(t)$ across the capacitor of capacitance $\frac{1}{4}F$ is shown in Figure 1 below. Determine the current through the capacitor. Also plot the current for $0 \leq t \leq 5$.

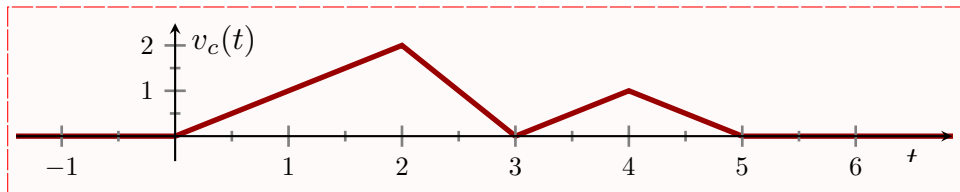


Figure 1: Voltage across the Capacitor.

Solution: Current through the capacitor is given by (The plot is given below):

$$i_c(t) = C \frac{dv_c(t)}{dt}$$
$$i_c = \begin{cases} 0 & t \leq 0 \\ \frac{1}{4} & 0 < t \leq 2 \\ -\frac{1}{2} & 2 < t \leq 3 \\ \frac{1}{4} & 3 < t \leq 4 \\ -\frac{1}{4} & 4 < t \leq 5 \\ 0 & 5 < t \end{cases}$$

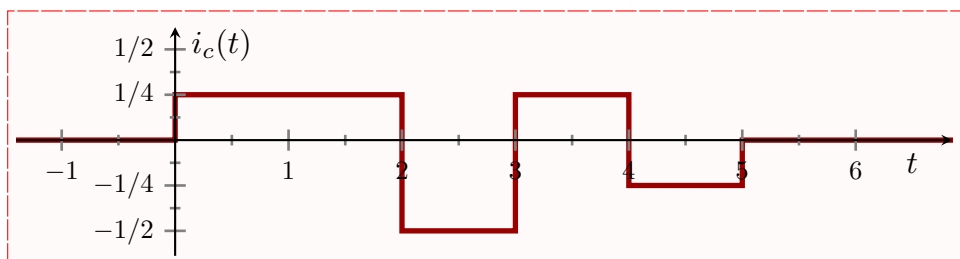


Figure 2: Current through the Capacitor.

- (b) [3 marks] Consider a circuit consists of a 12V voltage source connected in series with a light bulb. If the battery supplies a current of 1.5 A for 2 minutes to the bulb, calculate the energy dissipated by the bulb.

Solution: $W = 12 \times 1.5 \times 120 = 2.16 \text{ kJ}$.