LAHORE UNIVERSITY OF MANAGEMENT SCIENCES
Department of Electrical Engineering

EE 240 Circuits I
Quiz 6 Solution

Name: _____

Campus ID: _____

Total Marks: 10
Time Duration: 15 minutes

Question 1 (10 marks)

Study the figures below with ideal voltage and current sources. Given that an initially uncharged capacitor is connected to the configuration in figure a) at $t = 0$ s.

(a) [5 marks] Given that the capacitor is charged by a current source from $t = 0$ s to $t = 4$ s and $v(4^-) = 80$ V, find the value of capacitance C_1.

$$
\begin{aligned}
i_1(t) &= 2\,\text{A} \\
v(t) &= \frac{1}{C_1}\int_{-\infty}^{t} i_c(\tau)\,d\tau \\
v(4^-) &= \frac{1}{C_1}\int_{0}^{4} 2\,d\tau \\
80 &= 8 \times \frac{1}{C_1} \\
C_1 &= 0.1\,\text{F}
\end{aligned}
$$

(b) [5 marks] The switch is now moved to the configuration in figure b) at $t = 4$ s. Find a piecewise function for and sketch the current $i_1(t)$ and $i_2(t)$ for $t \in (-\infty, \infty)$.

$$
i_1(t) = \begin{cases} 0 & t < 0 \\ 2 & 0 \le t < 4 \\ 0 & 4 \le t \end{cases}
$$

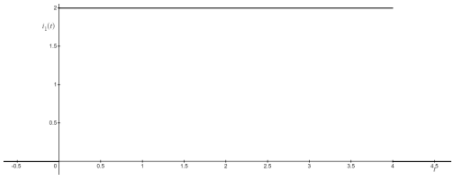

Figure 1: Waveform for $i_1(t)$

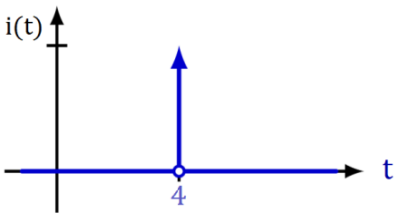

Figure 2: Waveform for $i_2(t)$