National University

of Computer & Emerging Sciences

Applied Physics (NS-1001) **Quiz # 5A** **Fall 2025**

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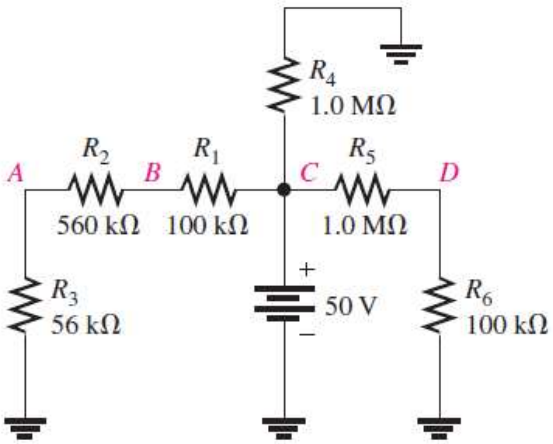
Name: **Roll #:**

Section: BCS-A **CLO3** **Date: 01-12-2025**

Q.1: Determine the resistance of the circuit in Figure 1 as seen from the voltage source. (7M)



Step 1: Calculate the total resistance of each parallel branch

The circuit has three parallel branches.

- Branch 1: R_1, R_2, R_3 in series with values $R_1 = 100\,\text{k}\Omega$, $R_2 = 560\,\text{k}\Omega$, $R_3 = 56\,\text{k}\Omega$.
- Branch 2: R_5, R_6 in series with values $R_5 = 1\,\text{M}\Omega$, $R_6 = 100\,\text{k}\Omega$.
- Branch 3: A single resistor R_4 with value $R_4 = 1\,\text{M}\Omega$.

The total resistance of each branch is:

- $R_{\text{Branch1}} = R_1 + R_2 + R_3 = 100\,\text{k}\Omega + 560\,\text{k}\Omega + 56\,\text{k}\Omega = 716\,\text{k}\Omega$.
- $R_{\text{Branch2}} = R_5 + R_6 = 1\,\text{M}\Omega + 100\,\text{k}\Omega = 1000\,\text{k}\Omega + 100\,\text{k}\Omega = 1100\,\text{k}\Omega$.
- $R_{\text{Branch3}} = R_4 = 1\,\text{M}\Omega = 1000\,\text{k}\Omega$.

Step 2: Calculate the total equivalent resistance of the parallel circuit

The total equivalent resistance (R_{eq}) for the three parallel branches is calculated using the formula for parallel resistors:

$$\frac{1}{R_{eq}} = \frac{1}{R_{\text{Branch1}}} + \frac{1}{R_{\text{Branch2}}} + \frac{1}{R_{\text{Branch3}}}$$

$$\frac{1}{R_{eq}} = \frac{1}{716\,\text{k}\Omega} + \frac{1}{1100\,\text{k}\Omega} + \frac{1}{1000\,\text{k}\Omega}$$

$$\frac{1}{R_{eq}} \approx 0.0013966\,\text{k}\Omega^{-1} + 0.0009091\,\text{k}\Omega^{-1} + 0.001\,\text{k}\Omega^{-1}$$

$$\frac{1}{R_{eq}} \approx 0.0033057\,\text{k}\Omega^{-1}$$

$$R_{eq} \approx \frac{1}{0.0033057\,\text{k}\Omega^{-1}} \approx 302.5\,\text{k}\Omega$$