**PHY301 Circuit Theory**

Assignment 1 Spring 24

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**Q1.**

1. Is the circuit receiving current from me?

Yes, current will flow through the circuit as long as the battery is not dead and the switch is in the on position. The current can be determined using Kirchhoff's Current Law (KCL), which states that the total current flowing into and out of a junction must be equal.

2. The battery provides the power.

The diagram's label indicates the 12V DC (direct current) that the battery provides. Based on the information given, we are unable to calculate the wattage or amperage.

3. What happens to the current flow in the circuit when a 12-watt lightbulb is turned on?

When the 12W bulb is opened, no current will pass through it; this suggests that the filament is broken and that there isn't a continuous path for current to flow. The other two bulbs will keep glowing as long as there is current flowing through the circuit and both are working as they should. This makes sense because the bulbs are wired in parallel.

**Q2.**

The current through the 5kΩ resistor. Nodal analysis is a technique that leverages Kirchhoff's Current Law (KCL) to analyze electrical circuits by considering the voltages at each junction (node). we have a 12V voltage source, resistors with various resistances, and a 12mA current source

**Q3.**

a) The 40Ω resistor dissipates 1 μW of power. Since the circuit is parallel, the voltage across the resistor is the same as the current source voltage. Using Ohm's law (I = V/R), we calculate the current through the resistor and then use it again (P = I^2\*R) to find the power dissipation.

b) Ohm's law (V = IR) relates voltage (V), current (I), and resistance (R) in a circuit. Voltage acts like pressure, driving current through a conductor. Higher voltage leads to higher current. Resistance opposes this flow, like friction. Higher resistance makes it harder for current to flow for the same voltage.