Electrical Circuits
DC Circuit Analysis Quiz

Instructions:

- Answer all questions.
- For Questions 1–5, choose the best option.
- For Questions 6–8, mark True or False.
- For Questions 9–10, write detailed answers with circuit analysis.

1. Three resistors of 6Ω each are connected in parallel. What is the equivalent resistance?

(A) 18Ω

(B) 6Ω

(C) 2Ω

(D) 0.5Ω

2. Kirchhoff's Current Law (KCL) states that:

(A) The sum of voltage drops around a closed loop is zero

(B) The sum of currents entering a node equals the sum leaving

(C) Power dissipated equals I^2R

(D) Voltage is proportional to current

3. A 12V battery is connected to a 4Ω resistor. What power is dissipated?

(A) 3W

(B) 36W

(C) 48W

(D) 144W

4. In a series circuit, which quantity remains the same through all components?

(A) Voltage

(B) Current

(C) Resistance

(D) Power

5. The time constant of an RC circuit is:

(A) R/C

(B) $R \times C$

(C) $1/(R \times C)$

(D) $\sqrt{R \times C}$

6. An ideal voltage source maintains constant voltage regardless of the current drawn. (True/False)

7. Thevenin's theorem states any linear circuit can be replaced by a voltage source in parallel with a resistor. (True/False)

8. The maximum power transfer occurs when load resistance equals source resistance. (True/False)

9. Explain Kirchhoff's Voltage Law (KVL) and Kirchhoff's Current Law (KCL). Demonstrate how to apply both laws to analyze a circuit with multiple loops and nodes.

10. Describe Thevenin's theorem and Norton's theorem. Explain the process to find Thevenin equivalent circuit and demonstrate the relationship between Thevenin and Norton equivalents.