Form 4 Physics Midterm Exam: Electricity

Section A: Multiple Choice Questions

Instructions: Choose the most appropriate answer for each question.

1. Which of the following statements about electric current is correct?

A. Electric current is the flow of protons.

B. Electric current is measured in joules.

C. Electric current flows from positive to negative.

D. Electric current depends only on resistance.

2. When resistors are connected in series, the total resistance:

A. Decreases

B. Increases

C. Remains the same

D. Becomes zero

3. What is the voltage across a 10-ohm resistor with a current of 2 amps flowing through it?

A. 5 V

B. 12 V

C. 20 V

D. 0.2 V

4. A 12 V battery is connected to a circuit with two resistors in parallel, 4 ohms each. What is the total current drawn from the battery?

A. 1 A

B. 2 A

C. 3 A

D. 4 A

5. Which of the following devices converts electrical energy into mechanical energy?

A. Capacitor

B. Resistor

C. Electric motor

D. Diode

Section B: Short Answer Questions

Instructions: Answer all questions concisely and clearly.

6. Explain how Ohm's law is applied to calculate current in a circuit. Include an example calculation.

7. Define capacitance. How does the capacitance of a capacitor change if the distance between the plates is increased? Explain.

8. Describe how an ammeter is connected in a circuit to measure current. Include any precautions that should be taken.

Section C: Problem-solving Questions

Instructions: Show all your work clearly and include units in your answers.

9. Calculate the total resistance of the following circuit:

![Circuit Diagram](image-link)

10. A 6 V battery is connected to charge a 100 μF capacitor through a 500-ohm resistor. Calculate:

a) The time constant of the circuit.

b) The charge on the capacitor after 5 seconds of charging.

Section D: Extended Response Question

Instructions: Answer one question in detail.

11. Discuss the advantages and disadvantages of using parallel and series circuits in household electrical wiring.