Current Electricity Questions

Topic 1: Current

Question 1: A battery supplies a steady current of 2 A to a circuit for 5 minutes. How much charge passes through the circuit?

A) 10 C

B) 60 C

C) 600 C

D) 1200 C

Topic 2: Average Current

Question 1: A current varies linearly from 0 A to 10 A over 5 seconds and then drops instantly to 0 A. What is the average current during this 5-second interval?

A) 2 A

B) 5 A

C) 10 A

D) 15 A

Question 2: The current in a circuit is given by $I(t) = 4t$ for $0 \leq t \leq 2$ seconds, and zero thereafter. What is the average current over the interval from $t = 0$ to $t = 2$?

A) 2 A

B) 4 A

C) 8 A

D) 12 A

Question 3: A triangular current pulse rises from 0 A to 6 A in 3 seconds and falls back to 0 A in the next 3 seconds. What is the average current over the 6-second duration?

A) 1 A

B) 2 A

C) 3 A

D) 6 A

Question 4: For a sinusoidal current $I(t) = 8\sin(50t)$, what is the average current over one complete cycle?

A) 0 A

B) 5.09 A

C) 8 A

D) 4 A

Topic 3: Instantaneous Current

Question 1: The instantaneous current in a circuit is given by $I(t) = 5 + 3\sin(100t)$ A. What is the instantaneous current at $t = 0$?

A) 3 A

B) 5 A

C) 8 A

D) 2 A

Question 2: If the instantaneous current is $I(t) = 6t^2$ A, what is the current at $t = 2$ seconds?

A) 12 A

B) 24 A

C) 36 A

D) 48 A

Question 3: A current is defined as $I(t) = 4e^{-2t}$ A. What is the instantaneous current at $t = 1$ second? (Use $e \approx 2.718$)

A) 0.54 A

B) 1.47 A

C) 2.72 A

D) 4 A

Question 4: The instantaneous current in a capacitor charging circuit is $I(t) = 10e^{-t/RC}$ A. If $RC = 2$ seconds, what is the current at $t = 2$ seconds?

A) 3.68 A

B) 5 A

C) 6.32 A

D) 10 A

Topic 4: Ohm's Law

Question 1: A resistor obeys Ohm's law and has a resistance of 8 Ω. If a current of 2 A flows through it, what is the voltage across it?

A) 4 V

B) 8 V

C) 16 V

D) 24 V

Question 2: A 12 V battery is connected to a resistor, and the current is 3 A. If the voltage is increased to 18 V, what is the new current, assuming constant resistance?

A) 2 A

B) 3 A

C) 4.5 A

D) 6 A

Question 3: A circuit element has a voltage of 20 V across it and a current of 5 A through it. Does it obey Ohm's law, and if so, what is its resistance?

A) Yes, 4 Ω

B) No, 4 Ω

C) Yes, 10 Ω

D) No, 10 Ω

Question 4: A variable resistor is adjusted so that the current drops from 4 A to 2 A when connected to a 24 V source. What is the new resistance?

A) 6 Ω

B) 12 Ω

C) 8 Ω

D) 4 Ω

Topic 5: Resistance and Its Dependence on Length

Question 1: A wire of length 2 m has a resistance of 6 Ω. What is the resistance of a wire of the same material and cross-sectional area but with a length of 4 m?

A) 3 Ω

B) 6 Ω

C) 12 Ω

D) 24 Ω

Question 2: The resistance of a conductor is 10 Ω. If its length is tripled, what is the new resistance, assuming the cross-sectional area remains constant?

A) 10 Ω

B) 20 Ω

C) 30 Ω

D) 40 Ω

Question 3: Two identical wires, each of resistance 5 Ω, are joined end-to-end. What is the total resistance of the combination?

A) 5 Ω

B) 10 Ω

C) 15 Ω

D) 2.5 Ω

Question 4: A wire's resistance is directly proportional to its length. If a 1 m wire has a resistance of 2 Ω, what length of the same wire would have a resistance of 8 Ω?

A) 2 m

B) 4 m

C) 6 m

D) 8 m

Topic 6: Resistance and Its Dependence on Area of Cross-Section

Question 1: A wire has a resistance of 20 Ω. If its cross-sectional area is increased by a factor of 4, what is the new resistance?

A) 5 Ω

B) 10 Ω

C) 20 Ω

D) 80 Ω

Question 2: A conductor's resistance is 12 Ω. If its cross-sectional area is halved, what is the new resistance, assuming the length remains constant?

A) 6 Ω

B) 12 Ω

C) 24 Ω

D) 48 Ω

Question 3: Two wires of the same length and material have resistances 8 Ω and 2 Ω. What is the ratio of their cross-sectional areas?

A) 1:4

B) 4:1

C) 2:1

D) 1:2

Question 4: A cylindrical wire has a resistance of 15 Ω. If its radius is doubled (increasing the cross-sectional area), what is the new resistance?

A) 3.75 Ω

B) 7.5 Ω

C) 15 Ω

D) 60 Ω