27 Lecture - PHY101

Important Mcqs

A capacitor of capacitance 2 microfarads is charged to 100 V. The energy stored in the capacitor is:

a) 1 J

b) 2 J

c) 4 J

d) 10 J

Answer: c) 4 J

Explanation: The energy stored in a capacitor is given by the formula E = 1/2 CV^2, where C is the capacitance and V is the voltage across the capacitor. Substituting the given values, we get E = 1/2 * 2 * 10^-6 * (100)^2 = 4 J.

Which of the following materials would be the best choice for making a capacitor with a high capacitance?

a) Air

b) Glass

c) Paper

d) Aluminum foil

Answer: d) Aluminum foil

Explanation: The capacitance of a capacitor depends on the area of the plates, the distance between them, and the dielectric constant of the material between them. Aluminum foil has a high surface area and can be rolled up to form a capacitor with a large area. It is also a good conductor, which is important for minimizing resistance and maximizing capacitance.

A capacitor is connected in series with a resistor and a battery. What happens to the voltage across the capacitor as time passes?

a) It decreases exponentially.

b) It increases linearly.

c) It remains constant.

d) It oscillates.

Answer: a) It decreases exponentially.

Explanation: In a series circuit, the same current flows through all the components, so the voltage across the capacitor and the resistor must add up to the voltage of the battery. As the capacitor charges up, the voltage across it increases, but the voltage across the resistor decreases. The rate of change of the voltage across the capacitor is proportional to the current flowing through the circuit and the capacitance of the capacitor. This leads to an exponential decrease in the voltage across the capacitor as it charges up.

What is the time constant of a circuit consisting of a 10 microfarad capacitor and a 1 kilohm resistor?

a) 1 microsecond

b) 10 microseconds

c) 100 microseconds

d) 1 millisecond

Answer: b) 10 microseconds

Explanation: The time constant of an RC circuit is equal to the product of the resistance and the capacitance, ? = RC. Substituting the given values, we get ? = 10 * 10^-6 * 10^3 = 10 * 10^-3 = 10 microseconds.

A capacitor is charged up to a voltage of 12 V and then disconnected from the battery. If the capacitance is 2 microfarads, how much charge is stored on the capacitor?

a) 6 microcoulombs

b) 12 microcoulombs

c) 24 microcoulombs

d) 48 microcoulombs

Answer: b) 12 microcoulombs

Explanation: The charge stored on a capacitor is given by the formula Q = CV, where C is the capacitance and V is the voltage across the capacitor. Substituting the given values, we get Q = 2 * 10^-6 * 12 = 24 * 10^-6 = 12 microcoulombs.

Which of the following is true about the current in a capacitor?

a) The current is always zero.

b) The current is always positive.

c) The current can be positive or negative.

d) The current is independent of the voltage across the capacitor.

Answer: a) The current is always zero.

Explanation: In a DC circuit, a capacitor acts as an open circuit, so