

25 study guide electromagnetic induction answers key

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25 Study Guide Electromagnetic Induction Answers Key

Paragraph 1

Question 1: What is electromagnetic induction? **Answer:** The process by which a changing magnetic field induces an electromotive force (EMF) or voltage in a conductor.

Question 2: State Faraday's Law of Induction. **Answer:** The induced EMF is directly proportional to the rate of change of magnetic flux: $EMF = -d(\Phi B)/dt$

Question 3: Define magnetic flux. **Answer:** The amount of magnetic field passing through a given area.

Paragraph 2

Question 4: What is Lenz's Law? **Answer:** The induced current in a conductor flows in a direction that opposes the cause of the induction.

Question 5: Explain the difference between self-induction and mutual induction. **Answer:** Self-induction occurs in a single coil where a changing current induces EMF in the same coil. Mutual induction occurs between two or more coils where a changing current in one coil induces EMF in the other.

Question 6: What are eddy currents? **Answer:** Circulating currents induced in a conductor by a changing magnetic field.

Paragraph 3

Question 7: Describe the construction of an AC generator. **Answer:** An AC generator consists of a rotating coil (rotor) inside a stationary magnetic field (stator), producing alternating current (AC).

Question 8: What is the frequency of an AC generator? **Answer:** The number of times the generator's output voltage completes a full cycle per second.

Question 9: How is the voltage of an AC generator determined? **Answer:** By the speed of rotation and the number of turns in the coil.

Paragraph 4

Question 10: Explain the concept of transformer coupling. **Answer:** The transfer of energy between two or more coils through a changing magnetic field.

Question 11: What is the purpose of a step-up transformer? **Answer:** To increase the voltage while decreasing the current.

Question 12: How is the voltage ratio in a transformer determined? **Answer:** By the turns ratio of the primary and secondary coils.

Paragraph 5

Question 13: What are the applications of electromagnetic induction? **Answer:** AC generators, transformers, electric motors, magnetic resonance imaging (MRI), and electromagnetic interference (EMI) shielding.

Question 14: Explain the working principle of an electric motor. **Answer:** An electric motor converts electrical energy into mechanical energy by using electromagnetic induction to create a rotating magnetic field.

Question 15: What is torque in an electric motor? **Answer:** The twisting force produced by the motor, determined by the magnetic field strength and the motor's current.



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