

## LESSON PLAN 4. SUBJECT : PHYSICS CLASS: XII

### CHAPTER 6: ELECTROMAGNETIC INDUCTION

### CHAPTER 7: ALTERNATING CURRENT

BRIEF DESCRIPTION- CONCEPT OF MAGNETIC FLUX. FARADAYS LAW OF EMI, MOTIONAL EMF CONCEPT, CONCEPT OF SELF AND MUTUAL INDUCTANCE AND ITS APPLICATIONS LIKE TRANSFORMERS AND AC GENRATORS

PROPERTIES OF ALTERNATING CURRENT, DIFFERENT TYPES OF AC CIRCUITSAND ITS POWER EXPRESSIONS, QUALITY FACTORS CONCEPT AND RESONANCE CONDITION.

**KPI 01:** Students face problems in solving the problems based on lenzs law.

**KPI 02 :** Students face problems in solving numerical portion/ mathematical calculations based on ac circuits

**KPI 03 :** Students Face problem in solving problems based on tranformerand generator

**KPI 04:** students face problem in framing a particular diagram/graph for any particular set of problems.

**KPI 05:** Students wont be able to understand the general properties related with motional emf

### **BOBJECTIVE:**

#### **Subjective:**

1. "Explain the concept of electromagnetic induction and its applications in generators and transformers."
2. "Discuss the differences between direct current (DC) and alternating current (AC), including their generation and transmission."
3. "Analyze Lenz's Law and Faraday's Law of electromagnetic induction, illustrating their significance."
4. "Describe the working principles of transformers and their role in voltage conversion and power distribution."
5. "Examine resonance in AC circuits and its importance in electrical engineering."

1. "State Faraday's Law of electromagnetic induction and provide an example of its application."
2. "Calculate the induced electromotive force (emf) in a coil when the magnetic field changes at a given rate."
3. "Explain why a transformer can step up or step down voltage in an AC circuit and provide the necessary formulas for voltage ratios."
4. "Describe the concept of reactance in AC circuits and calculate capacitive and inductive reactance."
5. "In a given AC circuit, calculate the impedance and phase angle of a resistor, capacitor, and inductor in series."

## BEHAVIORIAL

1. **Construct and Analyze Circuits:** Design and build circuits involving AC sources, resistors, capacitors, and inductors, demonstrating proficiency in circuit analysis and voltage/current calculations.
2. **Apply Electromagnetic Induction Principles:** Apply Faraday's and Lenz's laws to predict the direction and magnitude of induced emf in various scenarios, including changing magnetic fields and coil arrangements.
3. **Evaluate Transformer Functionality:** Explain the operation of transformers, calculate voltage ratios, and analyze their importance in electricity transmission and power distribution.
4. **Distinguish AC Characteristics:** Differentiate between AC and DC, including their generation, properties, and applications, and analyze the advantages of AC in power transmission.
5. **Demonstrate Resonance Understanding:** Understand the concept of resonance in AC circuits, calculate resonant frequencies, and describe its significance in electronics and communication.
6. **Solve Complex AC Circuit Problems:** Solve problems involving impedance calculations, phase angles, and impedance matching in AC circuits, demonstrating critical thinking and problem-solving skills.
7. **Communicate Effectively:** Communicate findings, insights, and solutions related to EMI and AC principles through written reports, presentations, and discussions.
8. **Apply Ethical Considerations:** Recognize ethical considerations in the use and generation of electrical energy and discuss the environmental impact of various energy sources.
9. **Safety Awareness:** Demonstrate knowledge of safety precautions when working with electrical circuits and devices, emphasizing safety in electrical experiments."

## **ASSESSMENT:**

### **1. Written Examinations:**

- Create written tests that include a mix of multiple-choice, short-answer, and essay questions covering key concepts, formulas, and applications related to EMI and AC.

### **2. Practical Experiments:**

- Conduct hands-on experiments related to electromagnetic induction, AC circuits, and transformers.
- Assess students based on their ability to set up experiments, collect data, make observations, and analyze results.
- Require students to write formal lab reports describing their experimental procedures and findings.

### **3. Problem Solving and Calculations:**

- Assign complex problems related to AC circuit analysis, transformer calculations, and electromagnetic induction scenarios.
- Evaluate students on their problem-solving skills, including the correct use of formulas and units.

### **4. Project Work:**

- Assign projects that require students to design and build circuits, transformers, or devices that demonstrate EMI and AC principles.
- Assess projects based on design creativity, functionality, and the depth of understanding displayed.

### **5. Oral Assessments:**

- Conduct oral quizzes or presentations where students explain concepts related to EMI and AC.
- Evaluate students' ability to communicate complex ideas clearly.

### **6. Homework and Assignments:**

- Assign regular homework and assignments that reinforce theoretical concepts and calculations.
- Provide feedback on homework to help students improve their understanding.

### **7. Class Participation:**

- Assess students' engagement in class discussions, question-and-answer sessions, and peer teaching activities.

### **8. Formative and Summative Assessments:**

- Use formative assessments (ongoing evaluations) to gauge understanding during the learning process and summative assessments (final exams or projects) to evaluate overall mastery of the subject.

### **9. Online Quizzes and Interactive Simulations:**

- Use online platforms for interactive quizzes and simulations to engage students and reinforce theoretical concepts.

#### 10. **Group Work and Collaboration:**

- Encourage group projects or collaborative activities to promote teamwork and a deeper understanding of the topics.

#### 11. **Concept Maps and Mind Maps:**

- Ask students to create concept maps or mind maps that visually represent the interconnectedness of EMI and AC concepts.

#### 12. **Peer Assessments:**

- Incorporate peer assessments where students evaluate each other's understanding and contributions in group activities or presentations.

#### 13. **Ethical Considerations and Environmental Impact Discussions:**

- Include discussions or assignments related to the ethical use of electricity and its environmental impact.

#### 14. **Real-world Applications:**

- Assess students' ability to apply EMI and AC principles to real-world scenarios, such as power generation, transmission, and electronic devices.

### **LEARNING OUTCOMES:**

#### 1. **Understanding EMI Principles:**

- Explain the concept of electromagnetic induction and its role in generating electrical current in a coil.
- Understand and apply Faraday's Law to predict induced electromotive force (emf) in various scenarios.

#### 2. **AC Circuit Analysis:**

- Analyze and solve complex AC circuits involving resistors, capacitors, and inductors.
- Calculate impedance, phase angles, and voltage/current relationships in AC circuits.

#### 3. **Transformer Operation:**

- Describe the working principles of transformers and their importance in voltage conversion and power distribution.
- Calculate voltage ratios and understand the relationship between primary and secondary coils.

#### 4. **Differentiating AC and DC:**

- Differentiate between direct current (DC) and alternating current (AC) in terms of generation, properties, and applications.

- Explain the advantages and disadvantages of using AC for power transmission.

#### **5. Resonance Phenomenon:**

- Define resonance in AC circuits and calculate resonant frequencies.
- Describe the significance of resonance in electrical engineering, particularly in filters and communication systems.

#### **6. Problem-Solving Skills:**

- Apply mathematical concepts and principles to solve problems related to EMI and AC, including circuit analysis and transformer calculations.
- Develop critical thinking and analytical skills for troubleshooting electrical circuits.

#### **7. Experimental Proficiency:**

- Perform hands-on experiments related to EMI and AC, including constructing circuits and collecting and analyzing data.
- Write detailed lab reports that demonstrate the ability to apply theoretical knowledge to practical situations.

#### **8. Effective Communication:**

- Communicate findings, explanations, and solutions related to EMI and AC concepts effectively through written reports, presentations, and discussions.

#### **9. Ethical Awareness:**

- Recognize ethical considerations in the use and generation of electrical energy.
- Discuss the ethical implications of energy consumption and environmental impact.

#### **10. Safety Practices:**

- Demonstrate a thorough understanding of safety precautions when working with electrical circuits and devices.
- Practice electrical safety measures in experiments and practical applications.

#### **11. Real-World Applications:**

- Apply EMI and AC principles to real-world scenarios, such as power generation, transmission, and the functioning of electronic devices.
- Understand the practical implications of EMI and AC in various industries and technologies.

#### **12. Interdisciplinary Connections:**

- Recognize the interdisciplinary nature of EMI and AC, linking them to physics, mathematics, engineering, and technology.
- Appreciate the relevance of these concepts in modern society and technological advancements.

