**LESSON PLAN FOR WEEK ONE ENDING 15TH SEPTEMBER 2023**

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| **THEME:** | Fields |
| **DATE**: | 14 – 09 – 2023 |
| **CLASS**: | SS3 |
| **TIME**: | 08:40am - 10:00am |
| **DURATION** | 80 MINUTES |
| **PERIOD** | 2 |
| **SUBJECT**: | Physics |
| **UNIT TOPIC:** | Simple A.C circuit |
| **LESSON TOPIC:** | Resistance and Capacitance in an A.C Circuit |

**SPECIFIC OBJECTIVE**: By the end of the lesson, learners should be able to

1. Describe resistive circuit and capacitive
2. Show the relationships between voltage and current;
3. Obtain expression for voltage and current

**INSTRUCTIONAL RESOURCES:** Charts showing variation of alternating current and alternating voltage with time.

**LESSON PRESENTATION**

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| **STEP 1** | **PREVIOUS KNOWLEDGE:** The students are conversant with resistors and capacitors. | | Students recall. |
| **STEP 2** | **EXPLORATION:**  The teacher arouses the students’ interests by telling them the reason for the lead and lag between current and voltage in a capacitive circuit, using the chart. | | Students make attempt to answer the questions. |
| **STEP 3** | **DISCUSSION:**  **RESISTANCE IN AN A.C CIRCUIT**  An A.C source connected to a resistor is known as a **resistive circuit.** The symbol of A.C signal is shown in the fig a below. At any instant, the current through the resistor is and the voltage across it is .      **Fig 1.2: Resistance in A.C Circuit; I and V in phase**  The applied voltage is given by: .  Let be the current at any instant of time, . From Ohm’s law we have that  Also,  The voltage and the current are said to in phase or step with each other. This means that both of them attain their maximum, zero and minimum values at the same time.  **Capacitance in an A.C circuit**  We consider a case where an A.C voltage is connected in series with a capacitor of capacitance, C (Farad).    leads by or or by cycle  ***Fig 1.3: Capacitance in an A.C circuit***  Both experiment and theory show that current () and voltage () are not in phase. ***The current is said to lead the voltage or the voltage is said to lag the current***. The phase difference between the current and the voltage is or .  Thus, if the voltage is given by , then the current is .  **Inductance in an A.C circuit**  We also consider a case where an A.C voltage is connected in series with an inductor of inductance,    leads by or or by cycle  ***Fig 1.4: inductance in an A.C circuit.***  The induced e.m.f in the inductor opposes the change in the current. Consequently, the current is delayed in the circuit. ***Thus, the current lags behind the voltage or the voltage leads the current***. The phase difference between the current and the voltage is or .  Hence, if the voltage is given by , then the current is . | | Students listen attentively and take down notes. |
| **STEP 4** | **APPLICATION:**  The D.C meters such as the moving coil type are not used to measure A.C currents/voltages because of their alternating nature. However, hot wire ammeters, moving iron meters and rectified meters are included in A.C circuits to measure ***effective values (i.e., the average values of the squares of the currents/voltages).*** | | Students ask questions on the topic which the teacher answers. |
| **STEP 5** | **EVALUATION:** The teacher evaluates the students using the following:   1. What is a resistive circuit? 2. State one notable relationship between current and voltage in a capacitive circuit? 3. Mention the mathematical expression of root mean square voltage? | | The students answer the questions. |
| **ASSIGNMENT**  A resistance of is connected to an A.C source of . Find:   1. The R.M.S current 2. The maximum instantaneous current in the resistor 3. The time taken by the current to change its maximum value to R.M.S value.   **References**  **Extensive physics for Senior Secondary Schools and Colleges, by OSINUBI SAHEED et al. New School Physics for SS2 by M.W ANYAKOHA {Ph D}. Senior Secondary Physics for SS2 by P. N OKEKE et al.** | |  |

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