**LESSON PLAN FOR WEEK TWO ENDING 22TH SEPTEMBER 2023**

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| **THEME:** | Fields |
| **DATE**: | 21 – 09 – 2023 |
| **CLASS**: | SS3 |
| **TIME**: | 08:40am - 10:00am |
| **DURATION** | 80 MINUTES |
| **PERIOD** | 2 |
| **SUBJECT**: | Physics |
| **UNIT TOPIC:** | Simple A.C Circuit |
| **LESSON TOPIC:** | Power and Resonance in A.C Circuit |

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

1. Obtain the formula for Power in an A.C circuit
2. Define resonance in A.C circuit
3. Highlight applications of resonance.

**INSTRUCTIONAL RESOURCES:** Charts showing, graph of variation of Z, X, R versus f and frequency response of a turned circuit.

**LESSON PRESENTATION**

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| **STEP 1** | **PREVIOUS KNOWLEDGE:** The students are conversant with resistance, reactance and impedance. | | Students recall. |
| **STEP 2** | **EXPLORATION:**  The teacher arouses the students’ interests by showing them the difference between reactance and impedance. | | Students make attempt to answer the questions. |
| **STEP 3** | **DISCUSSION:**    **Power in A.C Circuit**  The **average power** in A.C circuit is given by:  Where I and V are the effective (R.M.S) values of the current and the voltage respectively and is the angle of lag or lead between them. The quantity is known as **power factor** of the device. A power factor of zero (0) means the device is either a pure inductance or capacitance (pure reactance). Thus, no power is dissipated in an inductance or a capacitance.  However, if *I,* is the R.M.S of the current in a circuit containing a resistance (R), the power absorbed in the resistance is given by:  For an A.C Circuit, the ***instantaneous power*** is given by:  where I and V are the instantaneous values of current and voltage respectively.  Also, the power factor is given by:  Where R is the resistance while Z is the impedance.  **Resonance in R,L,C Series Circuit**  Electrica**l** resonance is said to take place in a series when the circuit allows maximum current for a given frequency of the source of alternating supply, and also for which the capacitive reactance becomes equal to the inductive reactance.  The current in a series R,L,C circuit is given by:  At high frequency, is very large and is very small.  At low frequency, is very small and is very large.  If for a particular frequency , then the impedance of R,L,C circuit is given by:  Where, R is the resistance in the circuit. ***Impedance*** in R,L,C circuit is ***minimum*** and hence, ***current*** is ***maximum***. This frequency, is called (electrical) ***resonance frequency.*** The variation of circuit impedance (Z) and frequency (f) is as shown below:  Draw a labelled graph showing the variation of impedanceZof ...  *Fig 2.4: Variation of Z and f*  Conversely, current *I* in the circuit varies with frequency, . This is maximum at when , i.e., at the minimum impedance.  This is as shown in the figure below:  Very urgent please answer Plot a graph showing variation of ...  *Fig 4.4: Variation of Current and frequency*  ***Resonance Frequency***  At resonance,  **Application of Resonance**   * + 1. Resonant circuits (series or parallel) are used in many applications such as selecting the desired stations in radio and TV receivers.     2. Most common application of resonance are based on the frequency dependent response (i.e., tuning into a particular frequency/channel).     3. A series resonant circuit is used as voltage amplifier.     4. A parallel resonant circuit is used as current amplifier.     5. A resonant circuit is also used as a filter. | | Students listen attentively and take down notes. |
| **STEP 4** | **APPLICATION:**  An A.C voltage of amplitude is connected to an series circuit. Given that the resistance in the circuit is while the inductance and capacitance are and respectively, calculate  Resonance frequency,  Maximum A.C current at resonance?  ***Solutions***  Resonance frequency, is given by”  Maximum a.c current is given by  But at resonance, , thus, | | Students ask questions on the topic which the teacher answers. |
| **STEP 5** | **EVALUATION:** The teacher evaluates the students using the following:   1. State the formula for average power in an A.C circuit; 2. Define resonance in an A.C circuit; 3. Mention any application of resonance? | | The students answer the questions. |
| **ASSIGNMENT**  A capacitor, a Ω resistor and a 5. inductor, are connected iv series across a power source. Calculate the voltage readings across the capacitor and the inductor.  **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.** | |  |