**PSG Matric Higher Secondary School**
**12th Standard - Physics**
**weekly test chapter 2**

Exam Time: 01:20 Hrs | Date: 2025-08-27

Total Marks: 50

## Questions:

1.State macroscopic form of Ohm's law.

Macroscopic form of Ohm's law is V = IR
Where V - Potential difference
I - current
R - resistance of a conductor.

2.What are ohmic and non ohmic devices?

Devices that follow Ohm's law are called Ohmic conductor. Devices that do not follow Ohm's law are called non - Ohmic conductors.

3.Define electrical resistivity.

Electrical resistivity of a material is defined as the resistance offered to current flow by a conductor of unit length having unit area of cross section.

4.Define temperature coefficient of resistance.

Temperature coefficient of resistance is defined as the ratio of increase in resistivity per degree rise in temperature to its resistivity at $T_o$.
$\alpha = \frac{\rho_T - \rho_0}{\rho_0(T - T_0)}$

5.Write a short note on superconductors?

A superconductor is any material that can conduct electricity with no resistance. In most cases, materials such as metallic elements or compounds offer some resistance at room temperature, but offer less resistance at a temperature known as its critical temperature.

6.What is electric power and electric energy?

**Electric power:**
(i) The electric power P is the rate at which the electrical potential energy is delivered.
(ii) The electric power P is the rate at which the work is done.
$P = \frac{dU}{dt}(or) = \frac{dW}{dt}(or) = VI(or)\frac{V^2}{R}$
Unit: watt (W)
**Electric energy:**
(i) The electric energy is the product of power (P) and duration of the time (t) when electric energy is delivered.
(ii) E = Pt
**Unit:** watt-hour (Wh)

7.Derive the expression for power P=VI in electrical circuit.

Electric power is the rate at which the electrical potential energy is delivered
$P = \frac{dU}{dt}$
$P = \frac{VdQ}{dt} = \mathrm{V}\frac{dQ}{dt}$
Since $\frac{dQ}{dt} = I$, where I - electric current
∴ P = VI

8.Write down the various forms of expression for power in electrical circuit.

(i) Electrical power P = VI

(ii) Erectrical power $P = V\left(\frac{V}{R}\right) = \frac{V^2}{R} \quad \therefore P = \frac{V^2}{R}$

(iii) P = Iv = I(IR) = $I^2R$

(iv) P = $I^2R$

9.State Kirchhoff 's current rule.

It states that the algebraic sum of the currents at any junction of a circuit is zero.

10.State Kirchhoff 's voltage rule.

It states that in a closed circuit the algebraic sum of the products of the current and resistance of each part of the circuit is equal to the total emf included in the circuit.

11.State the principle of potentiometer.

The emf of the cell is directly proportional to the balancing length.

12.What do you mean by internal resistance of a cell?

The internal resistance of a cell is the resistance offered to the flow of current (by the electrolyte) inside the cell.

13.State Joule's law of heating.

It states that the heat developed in an electrical circuit due to the flow of current varies directly as

(i) the square of the current

(ii) the resistance of the circuit and

(iii) the time of flow.

14.What is Seebeck effect?

Seebeck discovered that in a closed circuit consisting of two dissimilar metals, when the junctions are maintained at different temperature an emf is developed.

15.What is Thomson effect?

Thomson showed that, if two points in a conductor are at different temperatures, the density of electrons at these points will differ and as a result the potential difference is created between these points.

16.What is Peltier effect?

Peltier discovered that, when an electric current is passed through a circuit of a thermocouple heat is evolved at one junction and absorbed at the other junction. This is known as Peltier effect.

17.State the applications of Seebeck effect.

Seebeck effect is used in

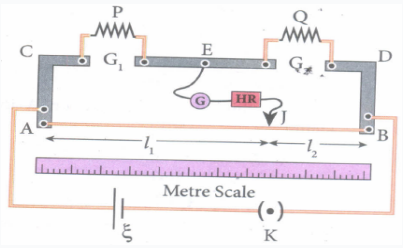
(i) Thermoelectric generators that are used in power plants to convert heat in to electricity.

(ii) In automobiles as automotive thermoelectric generators for increasing fuel efficiency.

(iii) Thermocouples and Thermopile are used to measure the temperature difference between two objects

18.Explain the determination of unknown resistance using meter bridge.

(i) The meter bridge is another form of Wheatstone's bridge. It consists of a uniform manganin wire AB of one meter length.
(ii) This wire is stretched along a meter scale on a wooden board between two copper strips C and D. Between these two copper strips another copper strip E is mounted to enclose two gaps $G_1$ and $G_2$.
(iii) An unknown resistance P is connected in $G_1$ and a standard resistance Q is connected in $G_2$. A jockey (conducting wire) is connected to the terminal E on the central copper strip through a galvanometer (G) and a high resistance (HR).
(iv) The exact position of jockey on the wire can be read on the scale. A Lechlanche cell and a key (K) are connected across the ends of the bridge wire.




(v) The position of the jockey on the wire is adjusted so that the galvanometer shows zero deflection. Let the position of jockey at the wire be at J.
(vi) The resistances corresponding to AJ and JB of the bridge wire now form the resistance R and S of the Wheatstone's bridge. Then for the bridge balance.

$$\frac{P}{Q} = \frac{R}{S} = \frac{r.AJ}{r.JB}$$

where r' is the resistance per unit length of wire

$$\frac{P}{Q} = \frac{AJ}{JB} = \frac{l_1}{l_2}$$

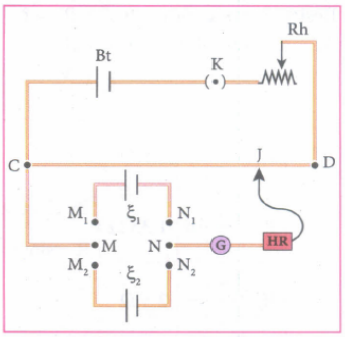
$$P = Q\frac{l_1}{l_2}$$

(vii) By interchanging P and Q, another set of readings are taken and the average value of P is value of unknown resistance.

19.How the emf of two cells are compared using potentiometer?

**Comparision of emf of two cells with a potentiometer:**

(i) To compare the emf of two cells, the circuit connections are made as shown in Figure Potentiometer wire CD is connected to a battery Bt and a key K in series.
(ii) This is the primary circuit. The end C of the wire is connected to the terminal M of a DPDT (Double Pole Double Throw) switch and the other terminal N is connected to a jockey through a galvanometer G and a high resistance HR.
(iii) The cells whose emf $\varepsilon_1$ and $\varepsilon_2$ to be compared are connected to the terminals $M_1$, $N_1$ and $M_2$, $N_2$ of the DPDT switch. The positive terminals of Bt, $\varepsilon_1$and $\varepsilon_2$ should be connected to the same end C.



Comparison of emf of two cells

(iv) The DPDT switch is pressed towards $M_1$,$N_1$ so that cell $\varepsilon_1$ is included in the

secondarycircuit and the balancing length $I_1$ is found by adjusting the jockey for zero deflection.Then the second cell $\varepsilon_2$ is included in the circuit and the balancing length $l_2$ is determined. Let r be the resistance per unitlength of the potentiometer wire and I be the current flowing through the wire.

we have $\varepsilon_1 = Irl_1$ .....(1)

$\varepsilon_2 = Irl_2$ .....(2)

By dividing equation (1) by (2)

$$\frac{\varepsilon_1}{\varepsilon_2} = \frac{l_1}{l_2}$$

(v) By including a rheostat (Rh) in the primary circuit, the experiment can be repeated several times by changing the current flowing through it.