PHY103 MOST LIKELY
DEFENSE QUESTIONS

QUESTIONS ON ELECTRICITY:

1. Define EMF of a cell

EMF of a cell can be defined as the total work done in driving one Coulomb of electricity round a circuit.

It can also be defined as the potential difference between the terminals of a cell when it is an open circuit (a circuit not delivering current to an external resistance)

Mathematically

$$EMF = 1(R + r)$$

2. State Ohm's law

Ohm's law states that the current flowing through a metallic conductor is directly proportional to the potential difference across its ends provided temperature and other physical conditions remain constant.

Mathematically,

$$V = IR$$

3. Write short note on the following:

a) Resistance (b) Current (c) Potential difference.

RESISTANCE:

Resistance is the opposition offered to the flow of current. Generally, Conductors have a lesser resistance compared to insulators and will therefore allow easy passage of current through them. Resistance is measured in ohms (Ω)

CURRENT:

Current is the flow of charges with respect to time. It is measured in Ampere. Mathematically,

$$Current (I) = \frac{Charge (Q)}{time (t)}$$

POTENTIAL DIFFERENCE:

Potential difference is the work done in moving a unit Charge from one point to another in an electric Circuit

4. Identify the following Symbols:

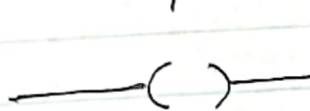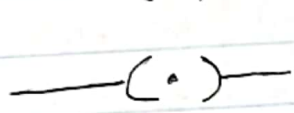———▭——— : Resistor

———▭̷——— : Rheostat Resistor

———(A)——— : Ammeter

———(V)——— : Voltmeter
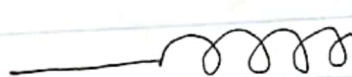
———| |——— : Capacitor

———| |——— : Cell

———( )——— : Key (Open circuit)

———(•)——— : Key (Closed circuit)

———(↑)——— : Galvanometer

———ⅿ̆ⅿ̆ⅿ̆——— : Inductor

———ʌʌʌ——— : Resistor

———ʌʌ̷ʌ——— : Rheostat resistor

———(∿)——— : A·C· Circuit

———|| |||——— : Battery

5. Differentiate between ~~primary~~ Primary Cells & Secondary Cells

   <u>Primary Cells</u> are cells in which current is produced as a result of non-reversible chemical changes within the cell. Primary Cells are non-rechargeable.

   Examples of Primary Cells are:

   a) Daniel Cell

   b) Leclanche' Cell (Wet & Dry type)

   <u>Secondary cells</u> are cells in which the Chemical action that produce Current can be reversed. They are also Call Accumulators. They are rechargeable. Examples are:

   a) Lead Acid Accumulator

   b) Nickel Iron Accumulator

6) Differentiate between Cell and battery

   A Cell is a single unit of a device which Converts Chemical energy to electrical energy.

   A battery is a <u>Collection of</u> Cells which Converts Chemical energy to electrical energy

7) Differentiate between Lost voltage and Terminal P.D.

   Lost voltage is the voltage across internal resistance of a Cell. Internal resistance of the Cell is the opposition to the flow of Current inside the Cell.

   Terminal Potential Difference is defined as the potential difference between the terminals of a Cell when it is delivering current to an external Resistance.

8) Differentiate between Ohmic & Non-Ohmic materials with examples.

   Ohmic materials are materials which Obey Ohm's law or work based on the principle of Ohm's Law. Examples: metals and Resistors

9.) Non-Ohmic materials are materials which do not o[bey]
Ohm's Law. Example: diodes and Semiconductors

10.) ~~What are the~~ State factors that can affect the
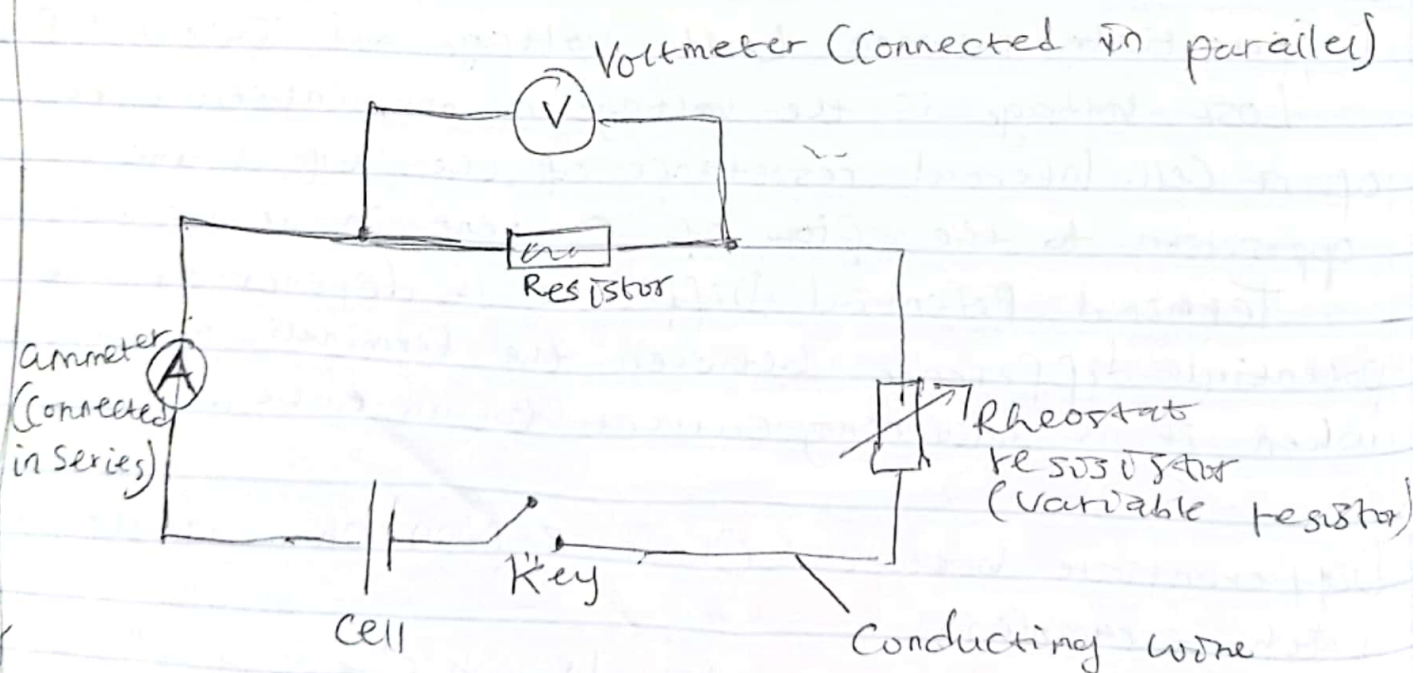Resistance of a Conductor
a.) Length of Conductor
b.) Area of Conductor
c.) Temperature
d.) Type of material or Substance

11.) State methods of measuring resistance
a.) Wheatstone bridge method
b.) Potentiometer
c.) Ammeter - Voltmeter method

12.) CONNECTION OF VOLTMETER & AMMETER IN A CIRCUI[T]
a.) Voltmeters are usually connected in paralle[l]
in a Circuit. This is because they have high resista[nce]
b.) Ammeters are connected in series in a ~~ci~~
Circuit. This is because it has a low resistan[ce]
and will not alter the current it measures.

Voltmeter (connected in parallel)

Resistor

Ammeter (connected in series)

Rheostat
resistor
(variable resistor)

Key

Cell

Conducting wire

13. ## GALVANOMETER-AMMETER CONVERSIONS

To convert a galvanometer to Ammeter, a low resistance shunt is connected in parallel with the galvanometer.

14. ## GALVANOMETER-VOLTMETER CONVERSIONS

To convert a galvanometer to a voltmeter, a high resistance multiplier is connected in series with the galvanometer.

OPTICS

1. Write short notes on the following:
   @ Critical angle ⓑ Snell's law ⓒ Refraction ⓕ Reflection
   ⓓ Laws of Reflection ⓔ Total Internal Reflection.

CRITICAL ANGLE:

Critical angle is the angle of incidence when the angle of refraction is $90°$.

SNELL'S LAW:

Snell's law states that the ratio of sine of angle of incidence to sine of angle of refraction for any given medium is a constant known as Refractive index.

Mathematically, $$\eta = \frac{\sin i}{\sin r}$$

REFRACTION:

Refraction is the change in direction, speed an wavelength of a wave as it moves from one medium to another.

REFLECTION:

Reflection is also a property of wave by which a wave hits an object and bounces off it.

LAWS OF REFLECTION:

a) The ~~B~~ incident ray, reflected ray and the normal lie on the same plane.

b.) The angle of incidence and angle of reflection equal.

TOTAL INTERNAL REFLECTION:

Total internal reflection is the complete reflecti~~on~~ an incident ray of light when the angle of inci~~dence~~ in the denser medium exceeds the critical angle.

Note - For Total internal reflection to occur, ligh~~t~~ must travel from an optically denser medium an optically less dense medium.

LAWS OF REFRACTION

a) The incident ray, refracted ray and normal all on the same plane.

b) The ratio of sine of angle of incidence to sin~~e~~ angle of refraction equals a constant known as r~~efrac~~ tive Index.

2.) Outline the characteristics of images formed by a pla~~ne~~ mirror

(a) Image is the same size as object

(b) Image is virtual

(c) Image is laterally inverted

(d) Image is far behind the mirror as object is in~~ front~~ of the mirror.

(e) Image is upright.

3.) Write Short note on the following:
a) Pole ⓑ Principal Focus ⓒ Focal length

Pole :
pole is the Center of the reflecting surface
of Curved mirrors.

Principal Focus:
Principal focus is the point where rays of light
Converge or appear to ~~dif~~ diverge from after
reflection.

Focal length:
Focal length ~~to~~ is the distance between the
principal focus and reflecting surface of a Curved
mirror.