ODM EDUCATIONAL GROUP
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ELECTRICITY

CHAPTER NO.12

SUB: PHYSICS

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LEARNING OUTCOMES

- **Students will be able to** :
- Define charge.
- Discovery of electricity, Electric charge and its properties,
- Define Electric current and circuit

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POINTS TO BE COVERED

- Discovery of electricity, Electric charge and its properties
- Electric current and circuit

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INTRODUCTION

- Define electric charge.
- https://youtu.be/CIv6vu9d73c
- Explain the discovery of charge.
- https://youtu.be/arvwTlem0h8

- **A charge is a physical quantity which is defined by excess or deficiency of electrons on a body.**
- **It is denoted by q.**
- **Its SI unit is Coulomb.**

Magnitude of charge on 1 electron is - 1.6 X 10^{-19} C.
Charge on 1 proton is + 1.6 X 10^{-19} C.
Quantization of charge. (q = ne)
Where n = no. of electrons.
e = charge of electron

Electric current :- is the flow of electrons through a conductor.

The device which causes the flow of electrons through a conductor is called a cell.

Electrons flow from the negative terminal to the positive terminal.

Electric current flows from the positive terminal to the negative terminal.

This is called conventional current.

It is defined as the rate of flow of charge of charge through any cross section of a conductor in unit time.

It is denoted as I.

It is a scalar quantity

$$I = q/t = ne / t.$$

q – quantity of charge

t – time

The SI unit of current is called ampere (A).

One ampere is the current flowing through a conductor if I coulomb of charge flows through it in 1 second.

Electric Current is measured by an ammeter.

It is always connected in series in a circuit.

Solve: 1) A current of 150 mA flows through a circuit for 2 min. Find the amount of charge that flows through the circuit.

Ans: I = 150 mA = 150 X 10-3 A.

T = 2 minutes = 120 s.

Q = I X t. = 150 X 10-3 X 120 = 18 C.

2.) A total of 6 x 1046 electrons flow through a current carrying conductor when connected through an external power supply for 20 s . Find the value of current in the conductor.

Answer: n = 6 X 1046

T = 20 s

I = q/t = ne /t = 6 X 1046 X 1.6 X 10-19 / 20 = 0.48 X 1027 A = 4.8 X 1026 A.

ELECTRIC POTENTIAL

It is defined as the amount of work done when a unit positive charge is moved from infinity to a point.
It is denoted as V
$V = w/q$.
The SI unit of electric potential is Volt.

POTENTIAL DIFFERENCE

It is defined as the work done per unit charge in moving a unit positive charge from one point to another point.

$V = w/q$.

The SI unit of electric potential difference is Volt.

1 V = 1 J /1 C

The electric potential difference between two points is said to be 1 V if 1 J of work is done in moving 1C of charge from one point to another point

Potential difference is measured by a voltmeter.

It is always connected in parallel across the two point between which the potential difference is to be measured.

NUMERICALS

1. How much work is done in moving a charge of 3C across two points having a potential difference 15 V?

ANS W = Vq. = 15 X 3 = 45 J

2. Calculate the potential difference between two terminals of a battery , if 100 J of work is required to transfer the charge of 20 C from one terminal of the battery to the other.

W = 100 J. q = 20 C.

V = W/q = 100 / 20 = 5 V.

3. How much work is done in moving a charge of 2 C from a point of 118 V to a point of 128 V.

Q = 2 C. Va = 118 V. Vb = 128 V.

Potential difference = 128 – 118 = 10 V.

W = V q = 10 X 2 = 20 J.

THANKING YOU

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