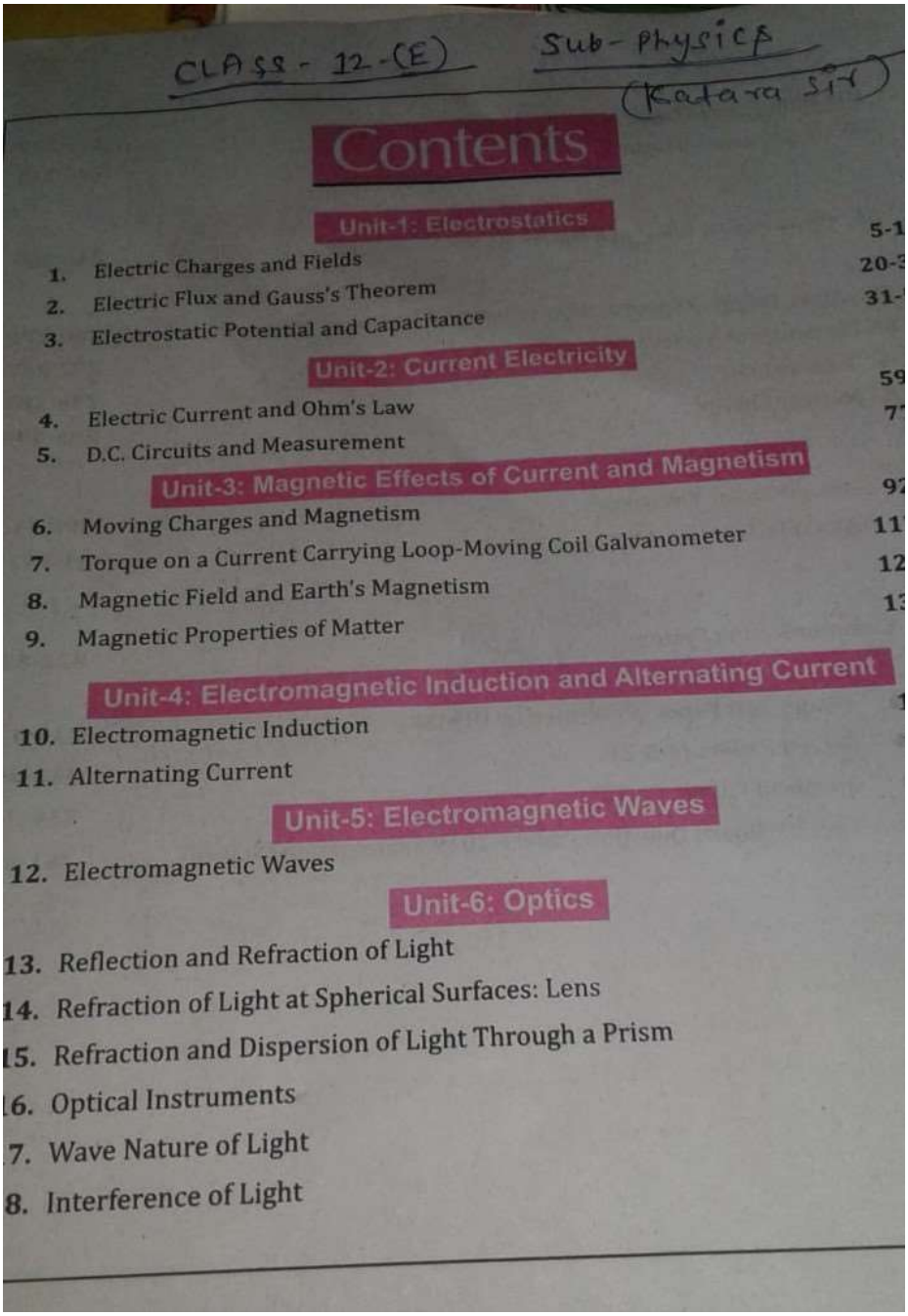
KIDS CORNER HAPPY INTER COLLEGE

FIROZABAD

Dear, Students complete this work and bring it when school opens.

Physics- For class 12th



CLASS - 12-(E) Sub- Physics (Katara Sir)

Contents

19. Diffraction of Light
20. Polarisation of Light

Unit-7: Dual Nature of Radiation and Matter

21. Photoelectric Effect and Matter Waves

Unit-8: Atom and Nucleus

22. Atom, Origin of Spectra: Bohr's Theory of Hydrogen Atom
23. Structure of Nucleus
24. Radioactivity
25. Nuclear Energy

Unit-9: Electronic Devices

26. Semiconductor Electronics
27. Digital Electronics : AND Logic Gates

Unit-10: Communication System

28. Communication System

- Model Test Paper (Published by UPMSP)
- Solved Papers (1 & 2)
- Unsolved Papers (1-10)
- 7 Set UP Board Question Papers-2019 Examination (Solved)

Unit-1 : Electrostatics

CHAPTER 1

ELECTRIC CHARGES AND FIELDS

CHAPTER AT A GLANCE

Electric Charge: Electric charge is fundamental property of the substance due to which it is possible for them to exert or insert the electrical force.

Charges are of two types: Positive charge and negative charge.

- Positively charged object has loss of electrons.
- Negatively charged object has gain of electrons.
- Similar charge repel each other but opposite charge attract each other.

A substance can be charged by three types :

(i) by Friction, (ii) by Induction, (iii) by Conduction.

Both processes of charging only transfer of electrons from one substance to other.

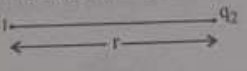
Conservation of Charge: The total charge of isolated system remains constant. It means that charge can neither be created nor be destroyed. This law is law of conservation of charge.

Quantisation of Charge: The charge of a body can be expressed as integral multiple of basic unit of charge. This phenomena is called quantisation of charge.

Then charge $q = \pm ne$, where $n \rightarrow$ Number of electrons and $e \rightarrow$ charge of one electron $= 1.6 \times 10^{-19}$ coulomb

Coulomb's Law: The electric force of attraction or repulsion between two point charges is determined by Coulomb's law.

According to this law, the force of attraction or repulsion between two stationary point charge in vacuum is directly proportional to product of these charges and inversely proportional to the square of distance between them.



$$F \propto q_1 q_2 \quad ...(1)$$

$$F \propto \frac{1}{r^2} \quad ...(2)$$

$$F \propto \frac{q_1 q_2}{r^2} \quad \text{[By eqns. (1) and (2)]}$$

$$F = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$$

Where $\frac{1}{4\pi\varepsilon_0} = 9 \times 10^9\ \text{N-m}^2/\text{C}^2$ is proportionality constant.

The dimensional formula of permeability of free space, $\varepsilon_0 = [M^{-1}L^{-3}T^4A^2]$

In vector form Coulomb's Law: $\vec{F} = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}\hat{r}$

where $\hat{r}$ is a unit vector along 'r'

Principle of Superposition of Electrostatic Forces: The net electric force experienced by a given charge particle q_0 due to a group of charged particles is equal to the vector sum of all forces exerted on it due to all outer charged particles of the group.

Then, $F_0 = F_{01} + F_{02} + F_{03} + F_{04} + \ldots\ldots + F_{0n}$

Electrostatic Force due to Continuous Charge Distribution: The region in which charges are closely spaced is said to be continuous distribution of charges.

The charge distribution are of three types:

(i) **Linear charge distribution :** $dq = \lambda \cdot dl$ where λ is linear charge density. The net force on charge q_0 is

$$F = \frac{q_0}{4\pi\varepsilon_0}\int\frac{\lambda . dl}{r^2}\hat{r}$$

(ii) **Surface charge distribution :** $dq = \sigma \cdot dS$ where $\sigma =$ surface charge density. The net force on charge q_0 is

$$F = \frac{q_0}{4\pi\varepsilon_0}\int_S \frac{\sigma dS}{r^2}\hat{r}$$

(iii) **Volume charge distribution :** $dq = \rho dV$ where $\rho =$ volume charge density. Net force on charge q_0 is

$$F = \frac{q_0}{4\pi\varepsilon_0}\int_V \frac{\rho dV}{r^2}\hat{r}$$

Electric Field Intensity: The electric field intensity at an point due to a charge is defined as the force experienced p unit test charge at that point:

$$\vec{E} = \frac{\vec{F}}{q_0}$$