
	INDIAN SCHOOL AL WADI AL KABIR	
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HANDOUTS CHAPTER-1	Topic: PHYSICAL WORLD	NOTE: A4 FILE FORMAT

INTRODUCTION :

Physics is the study of the basic laws of nature and their manifestation.

- Physics is all about explaining diverse physical phenomena with the help of few concepts and laws.
- In Physics, there are two domains of interest macroscopic and microscopic.
- **Macroscopic domain:** It includes phenomena at the laboratory, terrestrial and astronomical scales.
- **Microscopic domain:** It includes atomic, molecular and nuclear phenomena.
- However, recently a third domain of interest between **macroscopic domain** and **microscopic domain** (Mesoscopic) has also come in light. In this domain scientists deal with a few tens or hundreds of atoms, has emerged as an exciting field of research.
- Various theories related to macroscopic domain and microscopic domain are further categorized as given below.
- **Classical Physics**
 - It is the study of macroscopic phenomena. It includes subjects like
 - **Mechanics:**
 - Under mechanics, we study
 - Newton's laws of motion
 - The law of gravitation is concerned with the motion (or equilibrium) of particles, rigid and deformable bodies, and general systems of particles.)

- • **Electrodynamics:**
- It deals with electric and magnetic phenomena associated with charged and magnetic bodies

- • **Thermodynamics:**
- It deals with systems in macroscopic equilibrium and is concerned with changes in internal energy, temperature, entropy, etc., of the system through external work and transfer of heat. The efficiency of heat engines and refrigerators etc.

- **Optics:**
- It is the study of phenomenon connected with light and optical instruments like telescope, microscope etc.

- ***Quantum Theory***
- It is the framework for explaining microscopic phenomena as classical physics can't explain phenomenon at microscopic level (or smaller dimensions like atoms, nuclei etc.)

- **Fundamental Forces in Nature**
- Four fundamental forces in nature that govern the diverse phenomena of the macroscopic and the microscopic world are given below
- • Gravitational Force
- • Electromagnetic Force
- • Strong Nuclear Force
- • Weak Nuclear Force

Basic Properties of Fundamental Forces in Nature

Name	Relative Strength (& Range)	Operates among
Gravitational force	10^{-39} (Infinite)	All objects in the universe
Weak nuclear force	10^{-13} (Very short, Sub-nuclear size: $\sim 10^{-16}$ m)	Some elementary particles, particularly electron and neutrino
Electromagnetic force	10^{-2} (Infinite)	Charged particles
Strong nuclear force	1 (Short, nuclear size $\sim 10^{-15}$ m)	Nucleons, heavier elementary particles

Conservation Laws in Physics

The physical quantities that remain unchanged in a process are called conserved quantities. Some of the general conservation laws in nature include the laws of conservation of energy, mass, linear momentum, angular momentum, charge, parity, etc. Some conservation laws are true for one fundamental force but not for the other.

Name of the physicist	Year	Achievement in unification
Isaac Newton	1687	Unified celestial and terrestrial mechanics; showed that the same laws of motion and the law of gravitation apply to both the domains.
Hans Christian Oersted Michael Faraday	1820 1830	Showed that electric and magnetic phenomena are inseparable aspects of a unified domain: electromagnetism.
James Clerk Maxwell	1873	Unified electricity, magnetism and optics; showed that light is an electromagnetic wave.
Sheldon Glashow, Abdus Salam, Steven Weinberg	1979	Showed that the 'weak' nuclear force and the electromagnetic force could be viewed as different aspects of a single electro-weak force.
Carlo Rubia, Simon Vander Meer	1984	Verified experimentally the predictions of the theory of electro-weak force.

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