Physical Word

Science ("To know") is a systematic attempt to understand natural phenomena in as much detail and depth as possible and use the knowledge so gained to predict, modify and control phenomena".

The scientific method involves several interconnected steps :

1. Systematic Observations
2. Controlled Experiments
3. Quantitative & Qualitantive Reasoning
4. Mathematical modelling
5. Prediction
6. Verification of Theories

PHYSICS

Physics is a branch of science which comes from greek word "fusis" meaning nature.

"Physics can be described as a study of a basic laws of nature & their manifestation in different natural phenomena."

2Basic Principles of Physics :-

(i) Unification

(ii) Reduction

(i) Unification :-

Unification means attempting to explain diverse physical phenomena in terms of few concepts and laws.

(ii) Reductionism :-

Reductionism means attempting to explain derive the properties of a bigger, more complex system from the properties of its constituent simpler parts.

SCOPE AND EXCITMENT OF PHYSICS

Scope of physics can be explained in its 2 sub disciplines :-

1. Macroscopic Domain
2. Microscopic Domain

1. **Macroscopic Domain :-** Macroscopic Domain includes phenomena at labouratory, terestrial and astronomical scales.

2. **Microscopic Domain :-** Microscopic Domain includes atomic, molecules and nuclear phenomena

Classic physics deals mainly with macroscopic phenomena eg - Mechanics, Electro dynamics, optics and thermodynamics.

Microscopic domain of physics deal with the constitution and structure of matter at the minute scales of atoms and nuclei and their interaction with other particles.

The domain intermediate between the macroscopic and the microscopic domain is called mesoscopic domain.

PHYSICS, TECHNOLOGY & SOCIETY

Physics is the study of nature and natural phenomena, physicists try to discover the rules that are operating in nature on the basis of observation, experimentation and analysis some of these rules concerning their discover names are :-

S.No.	Name	Discovery	Country
1.	Archimedes	Principle of buoyancy	Greece
2.	Galileo galille	Law of Inertia	Italy
3.	Christian Huygens	Wave theory of light	Holland
4.	Michael Faraday	Laws of electromagnetic Induction	U.K.
5.	James Clerk Maxwell	Electromagnetic Theory, light- an Electromagnetic wave	U.K.
6.	Jagdish Chandra Bose	Ultra Short radio waves	India

LINK BETWEEN TECHNOLOGY AND PHYSICS

S. NO.	TECHNOLOGY	SCIENTIFIC PRINCIPLES
1.	Steam Engine	Laws of Thermodynamics
2.	Radio & Television	Generation, Propagation & detection of Electromagnetic waves
3.	Computer	Digital logic
4.	Lasers	Light amplification by stimulated emission of radiation.
5.	Rocket Populism	Newton's laws of motion
6.	Electric Generator	Faraday law of electromagnetic induction
7.	Aeroplane	Bernoulli's principle in fluid dynamics

FUNDAMENTAL FORCE IN NATURE

4 fundametal natural forces are found in nature :-

1. **Gravitational forces :-** It is a Universal force. It is a mutual attraction force between any two objects by virtue of their masses. it plays a key role in the large scale phenomena of the universe, such as formation and evolution of stars, galaxies and galactic clusters. It was explained by Newton thats why it is called. Newtons laws of gravitation.

$$F = \frac{G M_1 M_2}{r^2}$$

There

F = Gravitation Force

G = Gravitational constant = 6.67×10^{-11} Nm^2/kg^2

M_1 = Mass of Earth

M_2 = Mass of object/planet

r = Distance between Earth & Object/planet.

This force is weakest force in nature. It is always an attractive force.

The gravitional forse causes the apple to fall as well as planets to resolve around the sun

2. **Electromagnetic Force :-** It is force between charged particles between unlike charges attraction force works and between like charges repulsion force works.

For rest condition :- Charges produce only electric field.

For moving condition :- Both electric and magnetic fields are produced which gives rise to a force on moving charge.

Electric & magnetic effects are generally inseperable thats why it is called Electromagnetic force. It acts over large distance and does not need any intervening medium.

It is a stronger force than gravitational force. It may be attractive or repulsive force.

$$F = \frac{K q_1 q_2}{r^2}$$

F = Electromagnetic force

q_1 = Charge1

q_2 = Charge2

r = Distance between both charges.

$$K = 9 \times 10^9 \frac{Nm^2}{c^2}$$

Strong Nuclear Force :-

Force which binds protons and neutrons in a nucleas. It is charge independent and acts equally between a proton and a proton, neutron and a neutron and a proton and a neutron. These force have the shortest range.

Weak Nuclear forces :-

The weak nuclear forces are the forces of interaction between elementary particles of short life times. These forces were discovered during the study of the phenomenon of β -decay in radioactivity.

$F_G : F_W : F_E : F_S = 1 : 10^{25} : 10^{36} : 10^{38}$