

Chapter – 05

Nature and its physics

(فطرت اور اس کی طبیعیات)

❖ *Introduction:*

On those principles and procedures the Nature works, its research and knowledge is ascertained by the science subject, “Physics”. This knowledge is basically resting upon constant observations and experiences of the Universe, and as a result various theories and hypotheses come forward.

From the same series of theories, there is a theory which is very well known, that is the “Gravitational Attraction” between different bodies of the Universe. This bonding force virtually gives ‘stability in its place’ to the bodies. The Gravitational Attraction is mainly dependent on the mass of the two bodies and the distance between the two things. This theory has been presented by the famous British Scientist Sir Isaac Newton (1642-1727). Newton has also presented various theories of Physics. He gave many hypotheses as regards to the Principles of Nature as well.

❖ *Matter:*

Everything that is present in this Universe is consisted upon different bodies. Each body is comprised of mass and is called as “Matter”. That is why this world has been given with the name of “Material World”.

The simple definition of the ‘Matter’ may be described as; “Matter is any substance that has mass and takes up space”. Matter can be divided into small particles and its smallest particle is known as “Atom”. Atom is mainly based on its central Nucleus that has positive electrically charged Protons and no-charge Neutrons. There are negative electrically charged Electrons that exist in its orbit as well. Different masses have different numbers of Neutrons, Protons and Electrons. Atom means “the thing which could not be divided”. But if it is attempted to divide, enormous energy will be generated.

Matter is commonly available in three states, i.e. solid, liquid and gas. However there is a fourth state that is known as “Plasma”. Plasma is a form of matter in which many of the electrons wander around freely among the nuclei of the atoms. Sun and many other planets are consisted upon this Plasma.

According to Physics a property of matter by which it continues in its existing state of rest or uniform motion in a straight line, unless that state is changed by an external force. Inertia is a word we use when we talk about matter and movement. Matter having no movement is called Inertia. The more weight of the matter is, the more will be its Inertia. Based upon these properties the Scientist Newton has established three Laws of Motion that are very famous all over.

Newton's first law states that every object will remain at rest or in uniform motion in a straight line unless compelled to change its state by the action of an external force. The second law explains how the velocity of an object changes when it is subjected to an external force. The third law states that for every action (force) in nature there is an equal and opposite reaction. Newton also said that bodies existing on Earth, Planets and Stars all move on these principles. He has also proved the resemblance existing between the laws of motion and the Kepler's laws of planetary motion.

German Mathematician and Astronomer Kepler (1571-1630) have presented three laws of planetary motion. The first law says that the orbit of a planet is an ellipse, having the Sun at one of the two centers. According to the second law, a line segment joining a planet and the Sun sweeps out equal areas during equal intervals of time. Third law is more mathematical, that the square of the orbital period of a planet is proportional to the cube of the semi-major axis of its orbit.

In 1905 Einstein has presented an observation that light is the fastest thing which travels in this Universe and nothing could exceed to this speed. Einstein has given a second observation for light that is known as “Double Behavior of Light”. According to this, light can be both a particle and a wave. If light gets any medium it travels in the form of waves and if there is no medium available then it moves in the form of Photons or pockets of energy. His theory of Special Relativity, determined that the laws of physics are the same for all non-accelerating observers, and he showed that the speed of light within a vacuum is the same, no matter the speed at which an observer travels.

