

PAPER: IDC (INTERDISCIPLINARY): FRONTIERS IN PHYSICS

1. Nature of Science: Role of proper reasoning and experiments, with examples. Inductive and deductive logic. The character of physical laws, including universality. Difference between science and pseudoscience.

2. Universe: The Copernican revolution, Kepler's laws and the Solar system, Galileo and birth of Telescopic Astronomy, Modern observations: Stars and galaxies, Life cycle of stars. Birth of the Universe, Big Bang and Hubble expansion, Dark matter and dark energy. Origin of life & exoplanets.

3. Matter:

Atoms and molecules: The physical basis of the Periodic table.

Heat and Thermodynamics: Basic idea about the kinetic theory of gases; Distinction between ideal and real gases; The three laws of thermodynamics. Concept of Entropy.

Radioactivity: Alpha, beta & gamma decay; X-Rays – Properties.

Structure of the atom: Electron, Nucleus: proton and neutron. Mention of the Standard Model of particles & interactions.

4. Forces: Laws of falling bodies, Inertia, Gravitation, Electricity and Magnetism, Light and its dual property.

The microscopic world of Quantum Mechanics.

Special and General Theory of Relativity (brief and qualitative ideas only)
