

Syllabus of Physics I

1.Theory of Relativity:

Frame of reference , Galileo's Transformations, Michelson-Morley experiment and its negative result, Einstein's theory of relativity (postulates), Lorentz Transformation, Time dilation, Length contraction, Twin's Paradox, Doppler's effect, Addition of Velocities, Relativistic mass-Variation of Mass with Velocity, Equivalence of mass and energy.

2. Atomic and Quantum Physics:

Planck's Quantum Hypothesis, Photoelectric effect, X-rays, Properties of X-rays, Bragg's law, Bragg's X-ray spectrometer, Bragg's law and crystal structure, Compton Scattering, Characteristic X-ray spectrum, Moseley's law, Daune-Haun't criteria, Wave particle duality, De Broglie Hypothesis, Properties of matter waves, Davission-Germer Experiment, Heisenberg Uncertainty principle and its elementary proof.

3.Laser

Laser :Light & Laser, Process in Laser: Absorption, Spontaneous emission, Stimulated emission, Principle of laser, laser characteristics, Population Inversion, Metastable State, Pumping, Components of laser: Active medium, Pumping, Optical resonator, Ruby laser, He-Ne laser, Semiconductor diode laser, Applications,
Holography: Basic principle, Recording and reconstruction

4.Fiber optics

Principle of optical fiber, propagation, Types of optical fiber, Acceptance angle & cone, V-number, Numerical aperture for an optical fiber. Applications of optical fibre.

Texts/References:

5.Nuclear Physics:

Structure of atomic nuclei, its properties, Mass defect, Binding energy, Packing fraction, Q value of energy, Criteria of Critical mass, Nuclear cross section, Nuclear fission, Controlled and

uncontrolled chain reaction, Nuclear reactor and its site selection, Nuclear fusion, stellar energy(C-N cycle and P-P cycle)

Radioactivity: Properties of alpha, beta and gamma rays, Natural and artificial radioactivity, Laws of radioactive disintegration, Half life period, Mean life period, Measurements of rate of decay and half life, Age of the rocks and Earths.

Texts/ References:

A. Beiser, Perspectives in Modern Physics, McGraw Hill, 1969.

M.A. Preston and R.K. Bhaduri, Structure of the nucleus, Addison- Wesley, 1975.

M.K. Pal, Theory of Nuclear Structure, Affiliated East West Press, 1982.

B. A. Lengyel, Introduction to Laser Physics, Wiley Interscience 1971.

A. E. Siegman, An Introduction to Laser and Masers, McGraw Hill 1971.

S. H. Patil, Elements of Modern Physics, Tata McGraw Hill, 1989.

A.K. Ghatak and S. Loknathan, Quantum Mechanics, Theory and Applications, McMillan India, 1984.