PHYSICS (PY101)

(w.e.f. July 2017)

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Unit I: Wave Optics **8**

Methods of formation of coherent sources, Fresnel's Biprism, displacement of fringes, thin film interference, Newton's ring. Fraunhoffer's diffraction at single slit, grating, Rayleigh's criterion of resolution, resolving power of grating.

Unit II:Optical Activity and Modern Optics **8**

Production of plane polarized light by reflection and Double refraction, Nicol prism, Optical activity, polarimeter (Laurentz and Biquartz).

Principle of fiber optics, numerical aperture, attenuation, dispersion in optical fibers, material dispersion, waveguide dispersion, intermodal and intramodal dispersion, Pulse dispersion in step index fiber.

Main components of laser, Einstein's coefficients, He-Ne laser, Nd-YAG laser and their applications.

Unit III: Properties of Matter and Relativistic Mechanics **8**

Viscosity, Poiseulli's equation, Michelson-Morley experiment and its implications, Galilean transformation equations Lorentz transformation equations and their consequences, energy mass relation, relativistic kinetic energy.

Unit IV: Quantum Physics **8**

Compton effect, basic postulates of quantum mechanics, Wave function and its physical admissibility, orthogonality of wavefunctions, normalization of wave functions, Heisenberg's uncertainty principle(no derivation) and its applications (non-existence of electron in nucleus, Bohr's radius), Schrodinger's equation and its application to free particle, particle in one dimensional box.

Unit V: Physics of Materials **8**

Magnetic Properties: Magnetization, Origin of magnetic moment, dia, para and ferro magnetism, Langevin's theory for diamagnetic material, Phenomena of hysteresis and its applications.

Superconductors: Temperature dependence of resistivity in superconducting materials, Effect of magnetic field (Meissner effect), Temperature dependence of critical field, Type I and Type II superconductors, BCS theory (Qualitative), High temperature superconductors and Applications of Super-conductors.

Nano-Materials: Basic principle of nanoscience and technology, structure, properties and uses of Fullerene and Carbon nanotubes, Applications of nanotechnology.

Reference Books:

1. Fundamentals of Optics by Jenkins and White
2. Optical Fiber Communication by Gerd Keiser
3. Concepts of Modern Physics by Arthur Beiser
4. Introduction to Special Theory of Relativity by Robert Resnick
5. Quantum Physics by Eisberg
6. Introduction to Nanotechnology by Poole Owens, Wiley India
7. Solid State Physics by S.O. Pillai, New Age Publications