SARDAR PATEL UNIVERSITY
Programme: MSC (Integrated Biotechnology)
Semester: I
Syllabus with effect from: June 2010

Paper Code: PS01CIGB01 **Title Of Paper:** Physics - I	**Total Credits: 3**

Unit	Description in detail	Weightage (%)
1	**OPTICS:** The Electromagnetic Spectrum, Visible Light, Principle of Superposition for Light waves, Interference by division of wavefront- Fresnel's biprism experiment, Interference by division of amplitude- Newton's rings, Michelson's interferometer, Fresnel and Fraunhofer class of diffraction, Resolution & Resolving power, Rayleigh's criterion, Resolving power of Prism, Plane diffraction grating, Resolving power of plane diffraction grating, Polarization of light waves, Production of polarized light - Brewster's law, Malu's law, Double refraction, Huygen's theory of double refraction.	
2	**LENS SYSTEMS:** Refraction through lens, Refraction through thin lens, Deviation produced by a thin lens, Power of lenses, Cardinal points of an optical system, Principal foci and focal planes, Principal point and Principle planes, Nodal points, Aberrations, Spherical aberration in lenses, Coma, Astigmatism, Chromatic Aberration, Achromatic lenses, Huygens eyepiece , Ramsden eyepiece, Comparison of eyepieces.	
3	**LASER AND FIBRE OPTICAL COMMUNICATION:** Absorption, Spontaneous and Stimulated (Induced) Emission of Radiation, Basic principle and operation of a laser, Pumping and Population Inversion, Ruby laser- its construction and working, He-Ne laser- its construction and working, Applications of Laser, Basic principle of Holography, Theory of Holography- Construction of Hologram and Reconstruction of image from it, Applications of Holography, Principle of Optical Fibre, Structure of Optical Fibre, Types of Optical Fibre - Step index and Graded index Fibre, Numerical Aperture, Fibre optics communication System (Network), Applications of Fibre optics communication System (Network).	
4	**MODERN PHYSICS AND SPECTROSCOPY:** Introduction of Photon, Photoelectric effect, X-rays – Discovery & Production, Diffraction of X-rays- Bragg's law, Properties & Applications of X-rays, Compton effect, Matter waves, DeBroglie's Hypothesis, Heisenberg's Uncertainty Principle, Statistical distribution- Maxwell-Boltzmann Statistics, Planck Radiation Law. Introduction to Rutherford and Bohr Model and their limitations, Production of spectra, Types of spectra- Emission and absorption spectrum, The quantum condition, Quantum numbers, Spin-orbit splitting or interaction, L-S and J-J coupling, Pauli's exclusion principle, Introduction, Range, Principle, working and applications of IR and UV-VIS spectroscopy.	
	Practical:	
	• Resolving power / Dispersive power of the prism • Resolving power of a plane diffraction grating	

	• Wavelength of sodium light using a plane diffraction grating • Brewster's Law • Newton's Rings • Michelson's interferometer • Fresnel's biprism • Resolving power of a telescope • Malu's law (Consine square law) • Determination of focal length and Cardinal points of given optical system • Determination of Cauchy's constants • Determination of Band gap using UV absorption spectra • Practical based on LASER & Optical fibre	

Basic Text & Reference Books:

- Optics (3rd Ed.) by Ajoy Ghatak Tata Mc-Graw-Hill Publishing Company Ltd. New Delhi, (ISBN-0-07-058583-0)
- Fundamentals of Optics (4th Ed.) by Francis A. Jenkins and Harvey E. White, Mc Graw-Hill Book Company, (ISBN-0-07-085346-0)
- Concepts of Modern Physics (6th Ed.) by Arthur Beiser, Tata Mc-Graw-Hill Publishing Company Ltd. New Delhi, (ISBN-0-07-049553-X)
- Fundamentals of Physics (6th Ed.) by Halliday/Resnick/Walker John Wiley & Sons, Inc., New York, (ISBN-9971-51-330-7)
- Engineering Physics by R. K. Gaur and S. L. Gupta Dhanpat Rai Publications (P) Ltd., New Delhi
- Solid State Physics by S. O. Pillai New Age International (P) Ltd., (ISBN-81-224- 1430-3)
- Fundamentals of Solid State Physics by B. S. Saxena, R. C. Gupta and P. N. Saxena Pragati Prakashan, Meerut, (ISBN-81-7556-691-4)
- Elements of Spectroscopy by S. L. Gupta, V. Kumar and R. C. Sharma