

Subject Code:1SE2050403

Subject Title: Applied Crystallography and Bio Physics

COURSE OBJECTIVE:

Physics is a science to understand the nature. This course is designed to get basic understanding of the physical world.

LEARNING OUTCOMES:

- Develop the understanding of Applied Crystallography and Bio Physics

Teaching scheme (hours) per week		Credit		University Examination		Internal Examination		Total
Theory	Practical	Theory	Practical	University Assessment	Practical	Internal Assessment	Practical	
4	--	4	--	60	--	40	--	100

Unit	Content	Lectures	Weight (%)
1	Laue method, Rotation method, Oscillation method, Weissenberg method, Projection-Spherical, stereographic & gnomonic, Precession method, Debye Scherrer Powder method, Powder diffractometry, Measurement of integrated intensity- factors affecting the intensity of diffraction, Determination of lattice parameter: Indexing cubic and Non-cubic structure – Analytical & Graphical Method, Diffraction under non-ideal condition Accurate determination of lattice parameter for polycrystalline materials.	15	25
2	Single crystal X-ray diffractometry, Intensity data collection from single crystal specimen, Normalized structure factor – Wilson plot, Primary & secondary extinction, systematic absences and determination of space group from intensity data. Violation of Friedel's law, Fourier method in structure determination – estimation of relative phases. Refinement of molecular structure and interpretation of the results.	15	25
3	Protein – Amino acids and the primary structure and secondary structure of proteins, tertiary structure, quaternary structure. Organization of nucleic acid - Primary, secondary, tertiary structure of DNA, Structure of RNA, Sequencing of nucleic acids, antigens and antibodies. Crystallization of protein – few general methods of crystallization – vapor diffusion and micro techniques. Biological applications of delocalization in molecules, radiation damage in biological molecules, ESR studies of Myoglobin and haemoglobin molecules, electronic properties of proteins, enzyme studies, carcinogenic activity, NMR applications: biochemistry, biophysics and in medicine.	15	25
4	Spectroscopic techniques used for studying biological molecules : Light scattering, small angle X-ray scattering, Mass Spectrometry : MALDI-TOF, Ultraviolet/visible spectroscopy, circular dichroism(CD)and optical rotatory dispersion(ORD), fluorescence spectroscopy, Infrared spectroscopy, Raman spectroscopy.	15	25

Basic Reference book:

1. Elements of X-Ray diffraction – B. D. Cullity
2. An introduction to X-ray Crystallography –M. M. Woolfson
3. Contemporary Crystallography –M. J. Buerger
4. Elementary Solid State Physics – Ali Omar
5. Elements of Solid State Physics – J. P. Srivastava
6. Biophysics – Vasantha Pattabhi, N. Gautham
7. Bio-Physics, Principles and techniques: M. A Subramanian
8. solid State Physics by M.A.Wahab
9. The Interpretation of X-ray Diffraction Photographs by N.F.M. Henry, H Lipson, W.A. Wooster.
10. Basic Biophysics for biologist by M. Daniel.