

<b>INSTITUTE</b>	<b>FACULTY OF SCIENCE</b>
<b>PROGRAM</b>	<b>BACHELOR OF SCIENCE (CHEMISTRY)</b>
<b>SEMESTER</b>	<b>3</b>
<b>COURSE TITLE</b>	<b>PHYSICS-III</b>
<b>COURSE CODE</b>	<b>02PY1231</b>
<b>COURSE CREDITS</b>	<b>5</b>

**Course Outcomes:** After completion of this course, student will be able to:

- 1 Apply knowledge of physics in other branches of science to solve scientific problems
- 2 Understand the basics of crystal structure.
- 3 Understand the effect of optical phenomena like Interference and Diffraction
- 4 Examine the relation between atomic structure and X-ray

**Pre-requisite of course:** Students should aware with basic knowledge of Atomic physics, X-rays, Semiconductors, Lasers and its applications.

#### Teaching and Examination Scheme

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
4	0	2	50	30	20	25	25

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Atoms and X-Rays:</b> Some Properties of Atom, Electron Spin, Angular momentum and Magnetic Dipole moments, The Stern-Gerlach Experiment, Magnetic Resonance, The Pauli Exclusion principle,, X-Rays and the Ordering of the element, the continuous X-Ray Spectrum, The Characteristics X-Ray Spectrum, Ordering the Elements	15
2	<b>Crystal Structure:</b> Amorphous and Crystalline Materials, Lattice Translation Vectors, Lattice with a Basis – Central and Non-Central Elements, Unit Cell, , Reciprocal Lattice, Types of Lattices, Brillouin Zones, Diffraction of x-rays by Crystals, Bragg's Law.	15
3	<b>Optical Interference and Diffraction :</b> Light as wave, Diffraction, Young's interference experiment, Coherence, Intensity in Double slit Interference, interference from Thin Films, Michelson's Interferometer, , Diffraction and Wave Theory of Light, Diffraction by a single Slit Locating the minima, Intensity in Single Slit Diffraction, Diffraction by Circular Aperture, Diffraction by Double slit, Diffraction Gratings.	15

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
4	<b>LASER</b> LASER, Properties of LASER, Stimulated absorption, Spontaneous Emission, Stimulated Emission, Einstein's relation between coefficients A and B,, Population inversion, Optical Resonator, Ruby LASER, Gas Laser, Laser Diode, Applications of Laser in Various fields.	15
<b>Total Hours</b>		<b>60</b>

### Suggested List of Experiments:

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Experiment-1</b> To determine of Resistivity and band gap of semiconductor by four probe method of different temperature.	0
2	<b>Experiment-2</b> To determine knee voltage of a given PN Junction diode.	0
3	<b>Experiment-3</b> To construct a Zener diode regulator using Zener diode and check Zener regulation.	0
4	<b>Experiment-4</b> To compare conduction voltage of different coloured LEDs.	0
5	<b>Experiment-5</b> To determine the width of the single slit by diffraction.	0
6	<b>Experiment-6</b> To determine the wavelength of Laser beam using Michelson Interferometer., To find the refractive index ( $\mu$ ) of material of prism using spectrometer.	0
7	<b>Experiment-7</b> To design a full wave rectifier using simple PN junction diodes and check its rectification capabilities of the diodes.	0
8	<b>Experiment-8</b> V. Lab	0
9	<b>Experiment-9</b> To determine the Inverse square relationship between the distance and intensity of radiation. (GM Counter), To study Plateau curve region of GM counter.	0
10	<b>Experiment-10</b> To find the values of bending stresses and young's modulus of elasticity of the material of a cantilever beam and carrying a concentrated load at the end.	0
11	<b>Experiment-11</b> To study and plot the characteristics of Light Dependant Resistor (LDR)	0
<b>Total Hours</b>		<b>0</b>

### References:

- 1 Principles of Physics – Halliday, Resnick and Walker, 10th edition Wiley Publication (2015)
- 2 SEARS AND ZEMANSKY'S University Physics with Modern Physics 13th edition by H. D. Young and R. A. Freedman. Pearson Publication (2012)
- 3 Electronic Devices and Circuit Theory 8th edition by Robert Boylestad , PHI publication. (2009)
- 4 Engineering Physics – R K Gaur and S L Gupta, 8th edition Dhanpat Rai Publications (2011)
- 5 Lectures on Physics Vol. 1, 2, 3 by Feynman, Pearson Publication (2009)

### Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
20.00	30.00	25.00	15.00	10.00	0.00

### Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

### Supplementary Resources:

- 1 <https://nptel.ac.in/courses/104104085/>
- 2 <https://ocw.mit.edu/resources/res-6-005-understanding-lasers-and-fiberoptics-spring-2008/laser-fundamentals-i/>
- 3 <https://ocw.mit.edu/courses/chemistry/5-069-crystal-structure-analysis-spring-2010/lecture-notes/>
- 4 [https://onlinecourses.nptel.ac.in/noc20\\_mm22/preview](https://onlinecourses.nptel.ac.in/noc20_mm22/preview)
- 5 <https://ocw.mit.edu/courses/materials-science-and-engineering/3-60-symmetry-structure-and-tensor-properties-of-materials-fall-2005/video-lectures/crystalline-structure-and-geometry-part-1/>
- 6 <https://ocw.mit.edu/courses/physics/8-03sc-physics-iii-vibrations-and-waves-fall-2016/part-iii-optics/lecture-22/>