INSTITUTE	**FACULTY OF SCIENCE**
PROGRAM	**BACHELOR OF SCIENCE (CHEMISTRY)**
SEMESTER	**3**
COURSE TITLE	**MODERN PHYSICS AND OPTICS**
COURSE CODE	**02PY0241**
COURSE CREDITS	**4**

Objective:

1 This course aims to make students to be able to interpret and apply the fundamentals of Atomic physics, X-rays, Semiconductors, Lasers and its applications

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: Fundamental knowledge of materials and optics

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	**Atoms and X-Rays:** 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	**Semiconductor Physics:** Energy Level in solids, Valence Band, Conduction Band, Forbidden Band, Conductor, Semiconductors and Insulators, Chemical bonds in semiconductors like Germanium and Silicon, Intrinsic and Extrinsic Semiconductors, Conductivity of Semiconductor materials, P N Junction Diode, Junction Transistor	15

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Contents : Unit	Topics	Contact Hours
3	**Optical Interference and Diffraction:** 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
4	**LASER** 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
Total Hours		**60**

Textbook :

1 Principles of Physics , Halliday, Resnick and Walker, Wiley Publication , 2015

2 SEARS AND ZEMANSKY'S University Physics with Modern Physics 13th edition , H. D. Young and R. A. Freedman, Pearson Publication , 2012

3 Electronic Devices and Circuit Theory 8th edition , Robert Boylestad , PHI publication, 2009

References:

1 Engineering Physics , Engineering Physics , R K Gaur and S L Gupta, Dhanpat Rai Publications , 2011

2 Lectures on Physics Vol. 1, 2, 3, Lectures on Physics Vol. 1, 2, 3, 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 / Creative
20.00	20.00	30.00	15.00	15.00	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

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Instructional Method:

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 1 https://archive.nptel.ac.in/courses/115/101/115101003/ 2

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