

Subject Code: 02PY0201
Subject Name: Physics-III
B.Sc. Year – II (Sem.-III)

Objective: This course aims to make students familiar with fundamental Atomic and Nuclear properties and understand its applications in Semiconductors, X-rays, Lasers and Nuclear Physics.

Credits Earned: 5 Credits

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

- Utilize the knowledge of semiconductor physics in real word electronic devices.
- Apply the knowledge of X-rays, lasers, nuclear physics in modern technology
- Apply knowledge of physics in other branches of science to solve scientific problems

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	Mid Sem (M)	Internal (I)	Viva (V)	Term Work (TW)	
3	-	3	5	50	30	20	25	25	150

Contents:

Unit	Topics	Contact Hours
1.	Structure of Semiconductors and P N junction applications: 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 and its applications, P N Junction Diode, Zener Diode, Light Emitting Diode , Photo Diode and Solar Cell.	15
2.	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
3.	Nuclear Reactions and Energy from Nuclear Reactions: Discovering the Nucleus, Some Nuclear Properties, Radio Active Decay, Alpha and Beta Decay, Radioactive Dating, Measuring Radiation Dosage, The Nuclear Fission The Basic Process, A model for Nuclear Fission, The Nuclear Reactor, Thermonuclear Fusion The Basic Process, Thermonuclear Fusion in the Sun and other Stars.	15
4.	LASER LASER, Properties 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	60

Reference Books :

1. Fundamentals of Physics – Halliday , Resnick and Walker. Wiley Publication. 10th edition (2013)
2. University Physics with Modern Physics by Sears and Zemansky's. Addison-Wesley; 13th edition (2011)
3. The Feynman Lecture on Physics (Vol. 1, 2, 3) by Feynman, Pearson Publication (2006)

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per 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	Understand	Apply	Analyze	Evaluate	Create
20%	20%	30%	15%	10%	5%

Suggested List of Experiments:

1. To study the refractive index of material of the prism by using spectrometer.
2. To study different types of waveforms by using oscilloscope.
3. To study Michelson interferometer.
4. To Study Zener Diode Characteristics.
5. To find the plateau characteristics of a GM Counter and there by obtain its operating voltage.
6. To find out grating element of plane diffraction grating.
7. To study the I-V characteristics of LED.
8. To study the I-V characteristics of photodiode.

Instructional Method:

- a. 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.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- c. Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- d. Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory