Department :B.Sc Physics

(2015-16 to 2020-21)

PROGRAMME OUTCOMES

The scientific knowledge, mathematical and analytical skills will equip the student to work across a wide range of industries including material science. Engineering physics, aerospace, electronics, semiconductors, communications, computing, medical physics and education.

Programme Specific Outcomes:

- Gain depth of knowledge in various aspects of Physics
- Expertise in Experimental and Theoretical Physics
- Acquire analytical and logical skills-Train to take up jobs.
- Acquire knowledge to take up competitive exams

COURSE OUTCOMES

S.NO	SEMESTER	COURSE	OUTCOME
1	I	Mechanics	• Understanding the fundamentals of mechanical systems and to recognize the different force systems, moments and couple • To understand and learn the concepts of centre of gravity and moment of inertia, importance of frictional force, advantages of using machines, and effect of forces in different phenomenon when the bodies are in motion.
2	II	Thermal Physics	• Understand the various thermodynamical concepts • Recognize specific heat capacity and the different theories on specific heat capacity. • Acquire knowledge in theoretical and practical principles and different methods to produce low temperature liquefaction of gas. • Comprehend the basic concepts of thermodynamics, the first and the second law of thermodynamics • Learn the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations. • Learn about Maxwell's thermodynamic relations

3		Skill - Programming in C language	• Gain basic knowledge about flow chart and algorithm. They have the programming ability in C Language.
4	III	Properties of matter and Sound	• Understand the basic concepts of properties of matter such as elasticity, surface tension, diffusion, viscosity and their practical applications. • Learn the fundamentals of harmonic oscillator model, including damped and forced vibrations • Study the basic properties, production and detection of ultrasonic waves by different methods and applications
5		Skill - Space Science	• Get the concept of stellar co-ordinate system, distance measurement and stellar classification. • Understand the basics of cosmology and the dynamics of an expanding universe.
6	IV	Optics	• Understand the physics behind various optical phenomenon. • Comprehend the theory and experiment of interference using air wedge, Newton's rings and Michelson interferometer. • To understand the natural behaviour of aberration in lens • Understand the principles of wave motion and superposition to explain the Physics of polarisation, interference and diffraction • Knowledge about fibre optics and their applicationsin different fields.
7	V	Electricity and Magnetism	• Acquire basic knowledge of the electric field, electrostatic energy and magnetic field. • Acquire knowledge of electric current, resistance and capacitance in terms of electric field and electric potential. • To understand the relation between electric field and potential
8		Basic Electronics	• Learn the characteristics of transistor and transistor biasing circuits and equivalent circuits, coupled amplifiers and feedback in amplifiers and oscillators. • Comprehend the operation and characteristics of FET, MOSFET, SCR and UJT • Get an idea about Multivibrators and operational amplifiers

9			Solid State Physics	- Learn the nature of crystalline and amorphous substances, about lattice, unit cell, miller indices, reciprocal lattice, concept of Brillouin zones - Understand the concept of X- ray diffraction of by crystalline materials and Bragg's law. - Acquire knowledge of lattice vibrations, phonons and in depth of knowledge of Einstein and Debye theory of specific heat of solids. - Understand different types of magnetism from diamagnetism to ferromagnetism and hysteresis loops and energy loss. - To acquire knowledge about dielectric and ferroelectric properties of materials.
10			Energy Physics	- Enable students to understand various renewable energy technologies. - Qualitative ideas about Solar energy, Physical principle of conversion of solar energy into heat energy, solar energy harvesting devices like solar cells, solar cookers, solar greenhouses etc - Create awareness among students about non-conventional sources of energy technologies.
11			Bio - Medical Instrumentation	This course will provide students with knowledge necessary to understand the working of most common biomedical equipment like Ultrasound scanning, MRI Scan, ECG, EEG machines etc.
12			Digital Electronics	- Get an insight about the basic introduction of digital electronics like binary, hexadecimal conversions to convert different type of codes and number systems which are used in digital communication and computer systems. - Understand the binary arithmetic, logics and Boolean functions - Apply the concept of Boolean laws - Understand basics of Karnaugh Map to reduce Boolean expressions. - Understand the functions and working of flip-flop circuits registers and counters
13	VI		Atomic Physics	- Students will learn thedifferent atomic models - Learn about the importance of vector atom

			model
			• To understand basics of Stark-Effect and Zeeman Effect and Paschen back effect.
14		Nuclear Physics	• They will gain a clear picture of nuclear composition and various nuclear models. • Understanding the properties of nuclei like density, size, binding energy, nuclear forces • To understand the structure of atomic nucleus, liquid drop model and nuclear shell model • Learn about mass defect and different terms involved in Weizacker's mass formula. • Understand about principles of radioactivity • Learn about lifetime of radioactive decays like alpha, beta, gamma decay. Neutrinos and its properties and role in theory of Fermi beta decay. • Understand fission and fusion as well as nuclear processes to produce nuclear energy in nuclear reactor and stellar energy in stars.
15		Quantum Mechanics and Relativity	• To understand the of development of quantum mechanics and various quantum mechanical concepts. • Understand the idea of wave function and the uncertainty relations. • To acquire knowledge about fundamental principles of the general theory and special theory of relativity.
16		Electronics and Communication	• To gain knowledge about fundamentals of Analog communication systems. • Learn the basic components of communication system and concept of modulation and its need. • Modulation, different types of modulation and about super heterodyne receivers.
17		Electrical Appliances	• Students will able to state how different electrical appliances operate. Additionally, students will be aware of how technology has evolved.
18		Microprocessor and its applications	• Students will be familiar with the architecture and the instruction set of an Intel microprocessor. • Learn Assembly language programming will be studied as well as the design of various types of digital and analog interfaces.

PROGRAMME OUTCOMES

Department:M.Sc Physics

The Master of Science in Physics programme provides the candidate with knowledge, general competence, and analytical skills on an advanced level, needed in industry, consultancy, education, research and public administration.Students will be capable of taking up higher studies of interdisciplinary nature. They will be able to recognize the need for continuous learning and develop throughout for the professional career.

Programme Specific Outcomes:

Understanding the basic concepts of physics particularly concepts in classical mechanics, quantum mechanics, statistical mechanics and electricity and magnetism to appreciate how diverse phenomena observed in nature follow from a small set of fundamental laws through logical and mathematical reasoning.Students will explore themselves in the new areas like nano science and nanotechnology by understanding the implications of quantum mechanical concepts in physics.

COURSE OUTCOMES

S.NO	SEMESTER	COURSE	OUTCOME
1	I	Classical & Statistical Mechanics	• Students will know the classical background of classical mechanical conceptsand get familiarized with Poisson brackets and Hamilton -Jacobi equation. • Understand Lagrange and Hamilton equations. • They will gain the knowledge of statistical system and its co-ordinate together with application of MB, FD and BE statistics.
2		Mathematical Physics	• Learn the basic properties of matrices, different types of matrices viz., Hermitian, skew Hermitian, orthogonal and unitary matrices and their correspondence to physical quantities • Learn some basic properties of tensors, theirand mixed tensors and their transformation properties under coordinate transformations. • Learn about the complex numbers and their properties, poles and residue theorem and its applications in evaluating definite integrals.

			• Learn about the Fourier transform, the inverse Fourier transform, their properties and their applications in physical problems. Laplace transform, the inverse Laplace transforms, their properties and their applications in solving physical problems.
3		Quantum Mechanics-I	• To understand basic concepts of Quantum Mechnaics using Dirac representation. • To acquire knowledge of spin and angular momentum, as well as their quantization and addition rules. • To understand the concepts of approximation methods applied to atomic, nuclear and solid-state physics.
4		Nano Science & Technology	• To understand the basic concepts of Nanoscience • To Acquire knowledge of fabricating nanostructures. • To understand size dependent properties of materials, quantum confinement on the electronic structure and corresponding physical and chemical properties of materials at nanoscale.
5		Electronics	• Acquire knowledge about the characteristics and working principles of semiconductor diodes, Bipolar Junction Transistor and able to use it in electronic circuits. • Elucidate and design the linear and non-linear applications of an OP-AMP.
6		Electromagnetic Theory	• Gain knowledge for the calculation of electric and magnetic field due to various charge and current distributions • Gain knowledge of propagation of electromagnetic energy through transmission lines.
7	II	Condensed Matter Physics	• Get clear concept of the crystal classes and symmetries and to understand the relationship between the real and reciprocal space. • Able to formulate basic models for electrons and lattice vibrations for describing the physics of crystalline material. • Develop an understanding of relation between band structure and the electrical properties of a material.
8		X-ray Crystallography & Bio Physics	• Learn the types of information that x-ray diffraction can provide on the structure of a wide variety of samples. • Learn to interpret real data and extract structural information and will gain a greater insight into their own characterization problems.

9	III	Computational Methods & Programming	• Acquire the fundamentals of the C++ programming languages and understand the building blocks of the C++ program. • Learn the fundamentals of the C++ programming languages and their applications in solving simple physical problems involving interpolations, differentiations, integrations, differential equations as well as finding the roots of equations.
10		Microprocessor & Microcontroller	• Intend to impart knowledge of Microprocessors and microcontrollers to enable students gain the knowledge of basics of Modern computation. • Able to design circuits for various applications using microprocessor and microcontroller.
11		Nuclear and Particle Physics	• Understanding of the structure of the nucleus, radioactive decay and nuclear reactions with matter. • To analyze the energy released by the nucleus during the fission and fusion process. • To acquire knowledge in particle Physics
12		Materials Synthesis and Characterization	• This course will develop an understanding of different materials systems and know the origins of physical, chemical and functional properties of different materials. • Study the basic principles of synthesis and characterization of materials.
13	IV	Molecular spectroscopy	• Gain knowledge about the rotational, vibrational and Raman spectroscopy of molecules. • Able to realize the instrumentation techniques that are used in different regions of spectra. • Understanding NMRspectra and visualize the physical phenomenon
14		Quantum Mechanics – II	• Able to use the perturbation theory and variational approach to solve questions in atomic physics. • Learn the principles of different approximation and use these principles to explain time evolution in simple quantum systems.
15		Communication Electronics	• To understand the antenna arrays, aperture antenna and special antennas such as frequency independent and broad band. • Get ability to discriminate between antennas on the basis of their electrical performance.
16		Optoelectronics	• Use principles of physics, Students will able to analyze and design the optoelectronic components like LEDs, lasers, photodiodes, and photovoltaics.

PROGRAMME OUTCOMES

Department : M.Phil., Physics

This course equips the students to become effective teachers and researchers in Physics to contribute the needs of the society by providing an environment of learning and knowledge creation through academic rigor and innovation. Helps to inculcate research aptitude to pursue research leading to Ph.D

COURSE OUTCOMES

S.NO	SEMESTER	COURSE	OUTCOME
1	I	Scientific Research and Methodology	- Students will able to understand some basic concepts of research and its methodologies. - They will identify various sources of information for literature review and develop skills in qualitative and quantitative data analysis and presentation. - Learn how to write a research report and thesis.
2		Advanced Physics	This course will improve the basic concepts of core areas of Physics especially in mathematical Physics, X-ray Crystallography, Lasers and Non Linear Optics, Vibrational Spectroscopy, Crystal Growth and Thin Film Physics for unraveling the diverse phenomena observed in nature.