

## DEPARTMENT OF PHYSICS

### Program Specific Outcome

- Students will demonstrate written and oral communication skills in communicating physics-related topics.
- Students will demonstrate proficiency in mathematics and the mathematical concepts needed for a proper understanding of physics.
- Students will utilize a wide range of printed and electronic resources and information technologies to support their research on physical systems and present those results in the context of the current understanding of physical phenomena.
- Students will demonstrate a thorough understanding of the analytical approach to modeling of physical phenomena.
- Student will identifying the key factors and applying appropriate principles and assumptions in the formulation of physics problems.
- Students will show that they have learned laboratory skills, enabling them to take measurements in a physics laboratory and analyze the measurements to draw valid conclusions.
- Students will develop the proficiency in the acquisition of data using a variety of laboratory instruments and in the analysis and interpretation of such data.
- Students will realize and develop an understanding of the impact of physics and science on society.



## Course outcome of Physics Department

Class	Course	Outcome	
F.Y.B.Sc.	PHY 101: BASIC MECHANICS	<ol style="list-style-type: none"> <li>1. Apply the concept of use of knowledge of mechanics to real life problems.</li> <li>2. Understanding of the course will create scientific temperament.</li> <li>3. Learn Newton's Laws of motion.</li> </ol>	
	PHY 102: DYNAMICS AND ELASTICITY	<ol style="list-style-type: none"> <li>1. Understand basic theorems and concepts of physics related to properties of matter and its applications.</li> <li>2. Determine coefficient of viscosity by using Poiseuille's equation.</li> <li>3. Learn Bernoulli's Theorem and its applications: Venturi meter, Pitot tube.</li> <li>4. Acquire knowledge of dynamics of rigid bodies using different pendulums.</li> </ol>	
	PHY 201: ELECTRICITY AND ELECTROSTATICS	<ol style="list-style-type: none"> <li>1. Apply the concept of use of knowledge of Electricity and Magnetism to real life problems.</li> <li>2. Understanding of the course will create scientific temperament.</li> <li>3. Learn to determine Time constant and its physical significances.</li> <li>4. Illustrate the working of Inductors in series and parallel connection.</li> </ol>	
	PHY 202: DIELECTRICS, MAGNETISM AND ELECTROMAGNETISM	<ol style="list-style-type: none"> <li>1. Understand the concept of magnetism and its properties</li> <li>2. Describe the concept of electromagnetic induction, self-induction, and mutual induction.</li> </ol>	
	S.Y.B.Sc.	PHY-231: Waves and Oscillations	<ol style="list-style-type: none"> <li>1. Learn about simple harmonic motion and comparison between two SHM s by obtaining Lissajous figures.</li> <li>2. Understand idea of forced oscillations, resonance and its equations with solution.</li> <li>3. Learn forced oscillations in electrical circuit like LCR circuit.</li> <li>4. Understand the Doppler effect in sound and its apparent frequency and asymmetric nature.</li> <li>5. Understand the working of piezoelectric oscillator and magnetostriction oscillator.</li> </ol>

PHY- 232 (A): Electronics- I	<ol style="list-style-type: none"> <li>1. Understand the PN junction diode, Zener diode.</li> <li>2. Learn the type of rectifier and concept of voltage regulation.</li> <li>3. Understand bipolar junction transistor</li> <li>4. Understand Positive and negative logic, OR, AND, NOT logic gates using DTL in digital circuits</li> </ol>
PHY- 232 (B) - Instrumentation -I	<ol style="list-style-type: none"> <li>1. Able to measure temperature using Non-electrical, Electrical, and radiation methods.</li> <li>2. Learn different flow meters.</li> <li>3. Able to measure magnetic field using Hall gauge meter and search coil method.</li> </ol>
PHY – 241: Modern Physics	<ol style="list-style-type: none"> <li>1. Understand the energy crises and how to overcome these energy crises by learning conventional and non-conventional energy sources.</li> <li>2. Learn about principle of conversion of solar radiation into heat with help of different methods like photovoltaic conversion, solar cell, collectors etc.</li> <li>3. Learn atomic spectra with detailed study of Bohr's and Sommerfield's theories of hydrogen atom.</li> <li>4. Learn Principle, characteristics and application of laser like holography.</li> </ol>
PHY-242: Optics	<ol style="list-style-type: none"> <li>1. Understand ray optics by considering geometrical optics terms like aberration in lenses , achromatism etc.</li> <li>2. Learn wave optics in the light of diffraction phenomena and study Fresnel and Fraunhofer diffraction patterns.</li> <li>3. Understand wave optics by considering light phenomena like interference and to study interference fringes with the Newton's rings apparatus and Michelson interferometer.</li> <li>4. Learn about Brewster's law and polarization by double refraction in uniaxial crystals</li> <li>5. Understand the construction and use of Polaroid, Nicol's prism and polarimeter.</li> </ol>
PHY 233: Practical Course-I	<ol style="list-style-type: none"> <li>1. Understand the basic concepts of waves and oscillations like damping oscillations and resonance with the experiments logarithmic decrements, bottle as a resonator , Ketter's Pendulum De Sauty's bridge etc.</li> <li>2. Understand the basic of Instrumentation by performing the experiments on CRO.</li> </ol>

<b>T.Y.B.Sc.</b>		3. Understand the basics of modern physics like electronic charge, energy gap by performing experiments on pn junction diode.
	PHY 243: Practical Course-II	1. Understand different optical phenomena like refraction, dispersion and interference by performing the experiments on prism and Newton's rings apparatus.
		2. Learn basics of modern physics concepts through the experiments on laser beam, photo cell and photovoltaic cell.
		3. Understand the measurement of magnetic field with Hall probe. 4. Understand the transducer concept using thermister as a temperature transducer.
	PHY 351: Mathematical Physics	1. Can solve ordinary second order differential equations important in the physical sciences; solve physically relevant partial differential equations using standard methods like separation of variables etc 2. Understand the vector analysis, including important mathematical theorems. 3. Student learn vector properties and use the theorems to understand basic physical phenomena. 4. Learn how to use different special functions which are helpful in several physical phenomena. 5. Student will be familiar with examples of physical laws, Lorentz transformation, time dilation, length contraction etc using concept of relativity.
	PHY-352: Classical Mechanics	1. Learn to think about different motions which can be observed in day to day life or in the universe. 2. Apply basic knowledge of physics of motion, force, Newton's laws of motion to solve the related problems 3. Understand phenomena like planetary motion and scattering, inverse square law on basis of central force. 4. Learn advanced mechanics like Lagrangian formulation, Hamiltonian formulation and apply it for different problems in mechanics.
	PHY-353: Atomic and Molecular Physics	1. Understand and observed dependence of atomic spectra lines in externally applied electric and magnetic fields. 2. State and explain the key properties of vector atom model and the importance of the Pauli Exclusion Principle.

	<ol style="list-style-type: none"> <li>Understand the Origin and nature of x-ray, Characteristic x-ray spectra</li> <li>Learn Moseley's law and its importance, regular and irregular doublets and their laws.</li> </ol>
PHY- 354(A): Electronics- II	<ol style="list-style-type: none"> <li>Learn the semiconductor devices, types construction details and symbols used.</li> <li>Understand DC Power Supply, Block diagram of unregulated and regulated power Supply.</li> <li>Learn Operational Amplifier and its applications.</li> </ol>
PHY- 354(B): Instrumentation- II	<ol style="list-style-type: none"> <li>Describe the operation of various analog and digital transducers.</li> <li>Understand the difference between ADC and DAC, and advantages of it.</li> <li>Learn the operation of various output display devices.</li> </ol>
PHY 355: Solid State Physics	<ol style="list-style-type: none"> <li>Learn about crystal systems, packing fraction, various terms related to crystal structure</li> <li>Learn basic knowledge of different crystal structures.</li> <li>Learn the confirmation of solid structure using x ray diffraction technique.</li> <li>Understand the concept of reciprocal lattice and its different properties.</li> <li>Understand the basics of bonding in solids.</li> <li>Learn lattice heat capacity of solids, Classical, Einstein, Debye theory of specific heat of solids</li> </ol>
PHY- 356(D): Microprocessor- I	<ol style="list-style-type: none"> <li>Understand the fundamentals of microprocessor, architecture and operation.</li> <li>Architecture and Instruction of 8085 microprocessor.</li> </ol>
PHY 357: Practical Course-I	<ol style="list-style-type: none"> <li>Understand resistivity of semiconductor materials using four probe method.</li> <li>Learn velocity of sound in different liquid using ultrasonic Interferometer</li> <li>Determination of circular aperture of LASER.</li> </ol>
PHY 358: Practical Course-II	<ol style="list-style-type: none"> <li>Understand characteristics of UJT.</li> <li>Understand characteristics of FET.</li> <li>Design and built Wien bridge oscillator.</li> <li>Understand characteristics of LDR.</li> </ol>

5. Learn characteristics and application OPAMP.

PHY 361: Classical  
Electrodynamics

1. Understand the basics of dielectric materials and behavior of dielectric materials in electrostatic field and also the concepts of permittivity and susceptibility
2. Understand the relation between Electric displacement vector  $D$ , Susceptibility, Permittivity, Dielectric constant.
3. Understand origin of Maxwell's equations in magnetic and dielectric media.
4. Understand Lorentz force on a point charge moving in a magnetic field.

PHY-362: Quantum  
Mechanics

1. Develop a knowledge and understanding of the concept that quantum states live in a vector space.
2. Understand Postulate of quantum mechanics, operators and use of commutation and commutative algebra of operators to solve quantum mechanics problem.
3. Learn to formulate the Schrödinger wave equation in terms of spherical polar coordinates for its application to solve Hydrogen atom problem.
4. Learn to solve quantum mechanics problems.

PHY 363: Nuclear  
Physics

1. Understand nuclear compositions and Elementary particles, charge symmetry and independence, spin dependence of nuclear force.
2. Understand nuclear reactions and conservation laws.
3. Understand nuclear fission on the basis of liquid drop model and nuclear fusion.
4. Learn to state Law of radioactive decay and its application.

PHY 364: Statistical  
Mechanics &  
Thermodynamics

1. Understand basic concepts of probability and probability distribution.
2. Learn to solve Random walk problem in one dimension and Gaussian probability distribution.
3. To state Boltzmann relation for entropy and to perform Statistical calculations of thermodynamic quantities.
4. To derive Maxwell's equations from thermodynamic potentials
5. To state Equipartition theorem and its application to mean K.E. of a molecule in a gas and to Harmonic oscillator.