- **Department of Physics.**
- **Course Outcomes.**
- **F Y B Sc.**

- **Semester -1**

PHY-111: Mechanics and Properties of matter.	• Understand basic theorems and concepts of physics related to properties of matter and its applications. • Acquire knowledge of dynamics of rigid bodies using different pendulums. • Understand elastic properties of matter. • Learn concept of surface tension and its relation with excess pressure and radius of curvature. • Able to determine the surface tension by Jaeger's method. • Recognize the concepts of fluid dynamics and viscosity. • Learn Bernoulli's Theorem and its applications: Venture meter, Pitot tube. • Determine coefficient of viscosity by using Poiseuillie's equation. • Acquire basic skills to perform experiments to understand the existing theories of basic physics.
PHY-112: Electricity and Magnetism.	• Able to understand basic concept of current and current density vector. • Analyze basic laws of current and electricity. • Learn to determine Time constant and its physical significances. • Understand the concept of magnetism and its properties. • Describe the concept of electromagnetic induction, self-induction, and mutual induction. • Illustrate the working of Inductors in series and parallel connection. • To understand the operation of transformers, types of transformer, applications efficiency and losses in transformer.
PHY-113: Practical Course - I	• Able to determine least count of various measuring instruments used in Physics laboratory. • Determine Young's modulus using different methods. • Use effectively the analog and digital multi-meter. • Analyze basic laws of current and electricity practically. • Acquire basic skills of physics experimentation.

- **Semester -2**

PHY-121: Heat and Thermodynamics	• Understand equation of states; Andrew's and Amagat's experiments, Vander Wall's equation, Critical constants and concept of Boyle's temperature. • Learn basic concept of thermodynamics and recognize to distinguish between work done due to Adiabatic and isothermal changes. • Learn second and third law of thermodynamics. • Understand Carnot's ideal heats engine, Carnot cycle and its efficiency, Otto and Diesel engines with their efficiencies. • Understand concept of entropy. • Learn elements of refrigeration.
PHY-122: Theoretical Physics.	• Learn Complex number and Argand diagram. • Able solve problems using Euler's formula, De-Moivre's theorem. • Capable to solve relevant theoretical problems. • Learn to solve partial differentiation. • Understand Vector Algebra. • Able to apply vector algebra to interpret physical quantities such as

	angular displacement, angular velocity and angular acceleration. • Application of vector analysis such as vector operator, Gradient, Divergence, Curl of a vector to solve the problems of Physics. •
PHY-123: Practical Course - II	• Able to determine "η" by different methods. • Determine thermal conductivity of materials. • Determine RC time constant of condenser. • Capable to find Electric Power consumed using the energy meter. • Learn to find frequency of AC using vibrating wire and magnet.
• **S Y B Sc.**	
• **Semester -1**	
PHY-231: Waves and Oscillations	• Learn about simple harmonic motion and comparison between two SHM s by obtaining Lissauges figures. • Learn about free oscillations and damped oscillations with study harmonic oscillator and series LCR circuit. • Understand idea of forced oscillations, resonance and its equations with solution. • Learn forced oscillations in electrical circuit like LCR circuit. • Understand the Doppler effect in sound and its apparent frequency and asymmetric nature. • Understand Doppler effect in light and its apparent change in wavelength. • Learn applications of Doppler effect. • Learn about ultrasonic and piezoelectric effect. • Understand the working of piezoelectric oscillator and magnetostriction oscillator. • Learn about detection of ultrasonic waves and their applications
PHY- 232 (B) - Instrumentation -I	• Learn fundamentals of measurements. • The ability to estimate and correct deviations in measurements due to the influence of the instrument and due to the accuracy of the instrument. • The ability to select a suitable measuring instrument for a given application. • Able to measure temperature using Non-electrical, Electrical, and radiation methods. • Determine pressure using different gauges. • Analyze the response of acoustical instruments • Learn different flow meters. • Able to measure magnetic field using Hall gauge meter and search coil method.
PHY 233: Practical Course - I	• 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. • Understand the basics of modern physics like electronic charge, energy gap by performing experiments on pn junction diode • Understand the basic of Instrumentation by performing the

	experiments on CRO.
	• **Semester -2**
PHY – 241: Modern Physics	• Understand the energy crises and how to overcome these energy crises by learning conventional and non-conventional energy sources. • Learn about principle of conversion of solar radiation into heat with help of different methods like photovoltaic conversion, solar cell, collectors etc. • Understand the basic principle of laser with basic processes and types of lasers. • Learn application of laser like holography. • Learn atomic spectra with detailed study of Bohr's and Sommerfield's theories of hydrogen atom. • Understand the basics of quantum mechanics as a new science by studying wave particle duality, De Broglie's hypothesis, uncertainty principle etc.
PHY-242: Optics	• Understand ray optics by considering geometrical optics terms like aberration in lenses , achromatism etc. • Understand wave optics by considering light phenomena like interference and to study interference fringes with the Newton's rings apparatus and Michelson interferometer. • Learn wave optics in the light of diffraction phenomena and study Fresenel and Fraunhofer diffraction patterns. • Learn about diffraction grating and its resolving power. • Understand the interaction of light with matter by the light phenomena; Polarization. • Learn about Brewster's law and polarization by double refraction in uniaxial crystals • Understand the construction and use of Polaroid, Nicol's prism and polarimeter.
PHY 243: Practical Course - II	• Understand different optical phenomena like refraction, dispersion and interference by performing the experiments on prism and Newton's rings apparatus. • Learn basics of modern physics concepts through the experiments on laser beam, photo cell and photovoltaic cell. • Understand the measurement of magnetic field with Hall probe. • Understand the transducer concept using thermister as a temperat1ure transducer.
• **T Y B Sc.**	
	• **Semester -1**
PHY 351: Mathematical Physics	• Have a good grasp on of vector analysis, including important mathematical theorems. Student will be able to apply the vector properties and use the theorems to understand basic physical phenomena. • Able to 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. • Learn how to use different special functions which are helpful in several physical phenomena.

	• Have received the basic concepts and training of special theory of relativity. Student will be familiar with examples of how formulate certain physical laws, Lorentz transformation, time dilation, length contraction etc using concept of relativity. • Be able to solve basic classical variation problems • Have received training in clear argumentation and presentation, and how to present your result in tidy way • Skilled in solving mathematical problems using various mathematical techniques.
PHY-352: Classical Mechanics	• Enters deeply in the subject of mechanics • Learn to think about different motions which can be observed in day to day life or in the universe. • Apply basic knowledge of physics of motion, force, Newton's laws of motion to solve the related problems • Able to discuss about central forces like gravitational force and understand phenomena like planetary motion and scattering, inverse square law on basis of central force. • Learn advanced mechanics like Lagrangian formulation, Hamiltonian formulation and apply it for different problems in mechanics • Learn to apply it for rotating coordinate system, Coriolis force.
PHY- 353: Atomic and Molecular Physics	• To explain the observed dependence of atomic spectra lines in externally applied electric and magnetic fields • To state and Justify the selection rules for various optical spectroscopes in terms of symmetries of molecular vibrations • List different types of atomic and molecular spectra • Describe theories explaining the structure of atoms and the origin og the observed spectra • Identify atomic effect such as space quantization and Zeeman Effect. • To understand X-rays and its characteristic • To understand Moseley's law and its importance, regular and irregular doublets.
PHY-354(B): Instrumentation II	• Recognize the importance of instruments. • Use basic electronic test equipment. • Describe the operation of various analog and digital transducers. • Differentiate between ADC and DAC, and describe the advantages of each. • Describe the operation of various output display devices.
PHY 355: Solid State Physics	• Able to learn about crystal systems, packing fraction, various terms related to crystal structure • Have basic knowledge of different crystal structures • Able to learn about the confirmation of solid structure using x ray diffraction techniques • Learn to calculate different physical parameters like lattice constant, inter planer distances using the concepts involved in diffraction technique • Understand the concept of reciprocal lattice and its different properties • Will learn the concept of UV spectroscopy • Understand the basics of bonding in solids

	• Learn various types of bonding in solids • Able to calculate Madelung constant and energy for NaCl • Learn lattice heat capacity of solids, Classical, Einstein, Debye theory of specific heat of solids • Understand vibrational modes of monoatomic lattice • Learn about Drude- Lorentz theory, Somerfield model, 1- D, 3-D density of states in concern to free electron model • Able to know about Fermi energy, position of Fermi energy in semiconductors • Able to distinguish between metals, semiconductor and insulators • Understand concept of hole
PHY- 356 (A): Technical Electronics - I	• Analyze components associated with analog electronic systems. • Demonstrate proficiency in the use of electronic equipment and devices. • Communicate effectively in technical and non-technical environments. • Assist in design of PCB making. • Describe the application of transducers. • List and explain the different data convertors. • Apply basic electronics concepts to technical problem solving. • Use effectively the basic electronics measuring instruments.
PHY 357: Practical Course-I	• Acquire skills of physics experimentation. • Able to determine the movement of inertia by Bifilar suspension. • Determine elastic properties of different materials. • Determine the resolving power of grating. • Able to find out resistivity of semiconductor materials using four probe method. • Able to find out velocity of sound in different liquid using ultrasonic Interferometer. • Determination of circular aperture of LASER.
PHY 358: Practical Course-II	• Understand characteristics of UJT. • Recognize application of UJT. • Understand characteristics of FET. • Recognize application of FET. • Design and built Wien bride oscillator. • Built and test DAC using R-2R ladder network. • Learn use of function generator. • Learn characteristics and application OPAMP. • Understand characteristics of LDR.
• **Semester -2**	
PHY 361: Classical Electrodynamics	• With revision of electrical charge, field, potential and coulombs law the student will learn Gauss law and its applications • understand the basics of dielectric materials and behavior of dielectric materials in electrostatic field and also the concepts of permittivity and susceptibility • learn about magnetic induction and behavior of magnetic materials in current carrying loop also the concepts of permeability and magnetic susceptibility

	• learn different laws of classical electrodynamics lie faraday's law, Ampere's law, Maxwell's equations etc • learn the nature of electromagnetic energy and its propagation in free space like poynting vector
PHY 362: Quantum Mechanics	• Understand basics of quantum mechanics using Schrödinger wave equation • Learn to apply Schrödinger wave equation to different quantum mechanical problems and solve • Learn complete theory of Hydrogen atom with quantum mechanical approach and to define four quantum numbers • Learn new ideas about operators in quantum mechanics and their types and to apply it for momentum, position energy etc. • Able to know about Eigen energy values, parity etc.
PHY 363: Nuclear Physics	• Learn about basic constituents of nucleus and its properties like mass, shape, size , charge , Parity, nuclear magnetic moments etc • Understand the phenomena of radioactivity and its application to different fields • Learn about half life, mean life, radioactive decay law • Understand the use of different nuclear models like shell model, liquid drop model to seek the information about nucleus behavior • Learn the nuclear reaction and outcome of these reactions in the form of energy • Learn how to calculate the release of large amount of energy in these reactions. Students are also made aware to know the different kind of nuclear processes like fission n fusion, energy available in these processes, to utilize these energies what experimentation required and how to build and control nuclear reactors. • Learn how to detect the energetic particles like alpha beta, gamma etc. How to design n build the nuclear detectors. • Understand how these detectors can be used in different experiments to know about wonders of nature as the penetration of ionizing radiations into the matter has been of theoretical as well as practical importance. • Learn to recognize particles with such experiments. Student will also learn the Nuclear particle Accelerators; principle construction and applications
PHY: 364: Statistical Mechanics & Thermodynamics	• learn basic concepts of statistics like probability distribution , binominal distribution and Gaussian distribution • understand macroscopic and microscopic states of the systems, statistical ensembles • learn about phase space and calculation of microstates of an ideal monoatomic gas • learn thermodynamic equilibrium, constraints and Boltzmann's relation of entropy • learn First law of thermodynamics and statistical calculations of thermodynamic quantities • learn applications of canonical distribution such as curie's law of paramagnetism and Maxwell's law of velocity distribution

	• understand partition function and partition function for ideal gas • understand thermodynamic potentials and Maxwell's relations • learn First and Second equation of T ds • learn energy equation and Joule –Thomson effect
PHY 365: Elements of Material Science	• Understand Different types of materials their properties ,classification. • Understand advance , smart, nano materials • Learn Mechanical, Thermal , Electrical Properties of material • Understand basic concept of Dislocations and Plastic deformation • Understand Atomic Diffusion and its mechanism • learn state Fick's laws • Study and understand Phase diagram, classification, interpretation. • Learn Binary phase diagram.
PHY 366(A): Technical Electronics - II	• Analyze components associated with sound systems. • Recognize basics of planning and installation of public address system. • Work in a team using technical knowhow, common tools and environments to achieve project objectives. • Communicate effectively about environment cautiousness regarding sound pollution. • Able to test analog & digital electronic systems for given specifications. • Describe the application of transducers. • Know basics of medical instrumentation. • Describe & list the application of modern home appliances.
PHY 367: Practical Course–III	• Determine the surface tension by different method. • Will test thermal conductivity of rubber by tubing method. • Verify laws of probability distribution by different variables. • Determine characteristics of G.M. counter. • Find out the ration of e/m using Thomson's method. • Understand the directional characteristics of unidirectional microphone. • Able to find out viscosity of various liquids by rotating cylinder method.
PHY 368: Practical Course–IV	• Will perform experiments on Material Science, Thermodynamics, and Electronics. • Test the specific heat of different materials at different temperatures. • Determine characteristics of thermistors. • Built and test modulus of counters. • Built and test precision rectifier. • Study use of OPAMP.
PHY 359 & 369: Project work	• Learn Project Selection. • Understand Literature Search Strategy and Literature Review. • Able to plan Project. • Communicate effectively during the seminar on the selected topics. • Will learn to prepare project presentation by PPT on LCD projector. • Perform Experimental work. • Characterize the samples, if any. • Analyze the results. • Draw conclusions.