Department of Physics.
Course objectives and Outcomes

F.Y.B.Sc.

Sem.-I		
Paper	**Objectives**	**Outcome**
PHY 101: Basic Mechanics	To impart knowledge of basic concepts in Electricity and Magnetism. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory	Learner will be able to : Apply the concept of use of knowledge of mechanics to real life problems. Understanding of the course will create scientific temperament
PHY 102: Dynamics and Elasticity	To impart knowledge of basic concepts in Electricity and Magnetism. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory	Learner will be able to : Apply the concept of use of knowledge of mechanics to real life problems. Understanding of the course will create scientific temperament
PHY 103: Lab-l	To develop observational skills, confidence in using scientific equipment and relate the knowledge of scientific concepts to quantitative and physical measurement Acquire knowledge, skills, working methods and ways of expression which will reflect on all round development of the students' attitudes towards scientific thinking and its applications	Learner will be able to : Able to handle scientific instruments, to conduct proper experiments and developed observational skills among themselves.

Sem.-II		
PHY 201: Electricity and Electrostatics	To impart knowledge of basic concepts in Electricity and Magnetism. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory	Learner will be able to : Apply the concept of use of knowledge of Electricity and Magnetism to real life problems. Understanding of the course will create scientific temperament
PHY 202: Eielectrics, magnetism and electromagnetism	To impart knowledge of basic concepts in Electricity and Magnetism. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory	Learner will be able to : Apply the concept of use of knowledge of Electricity and Magnetism to real life problems. Understanding of the course will create scientific temperament
PHY 203:lab-ll	To develop observational skills, confidence in using scientific equipment and relate the knowledge of scientific concepts to quantitative and physical measurement Acquire knowledge, skills, working methods and ways of expression which will reflect on all round development of the students' attitudes towards scientific thinking and its applications	Learner will be able to : Able to handle scientific instruments, to conduct proper experiments and developed observational skills among themselves.

S.Y.B.Sc.

Sem.-III		
PHY 301: Thermodynamics and Kinetic theory of gases	T o impart knowledge of basic concepts in Thermodynamics and kinetic theory of gases.	Learner will be able to: Apply the concept of use of knowledge of

	To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory.	Thermodynamics and kinetic theory of gases to real life problems. Understanding of the course will create scientific temperament.
PHY 302 (A): Electronics –I	To impart knowledge of basic concepts in Electronics. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory.	Learner will be able to : Apply the concept of use of knowledge of Electronics to real life problems. Understanding of the course will create scientific temperament
PHY 302 (B): Instrumentation	To impart knowledge of basic concepts in Instrumentation. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory.	Learner will be able to : Apply the concept of use of knowledge of Instrumentation to real life problems. Understanding of the course will create scientific temperament
PHY 303: Lab III	To develop observational skills, confidence in using scientific equipment and relate the knowledge of scientific concepts to quantitative and physical measurement Acquire knowledge, skills, working methods and ways of expression which will reflect on all round development of the students' attitudes towards scientific thinking and its applications	Learner will be able to : Able to handle scientific instruments, to conduct proper experiments and developed observational skills among themselves.
PHY 304: Skill Enhancement Course I	Introduction to conventional and non conventional energy sources. Learn about solar energy, Hydro and Biomass energy, Geothermal energy and energy harvesting	Learner will be able to : Learn about conventional and non conventional energy sources as well as solar energy, Hydro and Biomass energy, Geothermal energy and

		energy harvesting
Sem.-IV		
PHY 401: Waves, Oscillations and Acoustics	To impart knowledge of basic concepts in Waves and Sound. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory.	Learner will be able to: Apply the concept of use of knowledge of Waves and Sound to real life problems. Understanding of the course will create scientific temperament
PHY 402: Optics and LASERS	To impart knowledge of basic concepts in Optics and LASERS. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory.	Learner will be able to: Apply the concept of use of knowledge of Optics and LASERS to real life problems. Understanding of the course will create scientific temperament.
PHY 403: Lab IV	To develop observational skills, confidence in using scientific equipment and relate the knowledge of scientific concepts to quantitative and physical measurement Acquire knowledge, skills, working methods and ways of expression which will reflect on all round development of the students' attitudes towards scientific thinking and its applications	Learner will be able to : Able to handle scientific instruments, to conduct proper experiments and developed observational skills among themselves.
PHY 404: Electrical Circuits and Network Skills	Introduction to basic electrical principles, electric circuits, electrical drawings and symbols. To know about generators and transformers, Electric motors, electrical protection and electrical wiring	Learners are able to: Learn basic electrical principles, electric circuits, electrical drawings and symbols. Know about generators and transformers, Electric motors, electrical

		protection and electrical wiring

T.Y.B.Sc.

Sem.-V		
PHY 501: Mathematical physics	To impart knowledge of basic concepts in Mathematical physics. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory.	Learner will be able to: Apply the concept and knowledge of Mathematical physics to understand and solve real life problems. Understanding of the course will create scientific temperament
PHY 502: Solid State physics	To impart knowledge of basic concepts in Solid state Physics. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory.	Learner will be able to: Apply the concept and use of knowledge of Solid state Physics understand and solve the real life problems. Understanding of the course will create scientific temperament
PHY 503: Atomic and Molecular physics	To impart knowledge of basic concepts in Atomic and Molecular Physics. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory.	Learner will be able to: Apply the concept and knowledge of Atomic and Molecular Physics to understand and solve the real life problems. Understanding of the course will create scientific temperament.
PHY 504(A): Electronics-II	To impart knowledge of basic concepts in Electronics and Digital Electronics. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the	Learner will be able to: Apply the concept and use of knowledge of Electronics and Digital Electronics to real life problems. Understanding of the course will create

	related experiments based on the theory.	scientific temperament.
PHY 504(B): Instrumentation-II	To impart knowledge of basic concepts in Instrumentation. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory.	Learner will be able to: Apply the concept and use of knowledge of Instrumentation to understand and to solve real life problems. Understanding of the course will create scientific temperament.
PHY 505: Solar energy and applications	To impart knowledge of basic concepts of clean, safe and affordable energy. To provide the knowledge about variety of solar energy applications. To provide the knowledge and methodology of conversion of solar energy into heat& electricity.	Learner will be able to: Apply the concept of use of knowledge of energy resources, solar radiations and conversion to real life problem. Understanding of the course will create scientific temperament. To impart knowledge of basic concepts of solar cell fundamentals. To provide the knowledge and methodology of conversion of solar energy into electricity.
PHY 506(A): Technical Electronics-I	To impart knowledge of basic concepts in Technical Electronics. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory	Learner will be able to: Apply the concept of use of knowledge of Technical Electronics to real life problems. Understanding of the course will create scientific temperament.
PHY 507: Physics practical -I	To develop observational skills, confidence in using scientific equipment and relate the knowledge of scientific concepts to quantitative and physical measurement Acquire knowledge, skills,	Learner will be able to : Able to handle scientific instruments, to conduct proper experiments and developed observational skills among themselves.

	working methods and ways of expression which will reflect on all round development of the students' attitudes towards scientific thinking and its applications	
PHY 508: Physics practical -I I	To develop observational skills, confidence in using scientific equipment and relate the knowledge of scientific concepts to quantitative and physical measurement Acquire knowledge, skills, working methods and ways of expression which will reflect on all round development of the students' attitudes towards scientific thinking and its applications	Learner will be able to : Able to handle scientific instruments, to conduct proper experiments and developed observational skills among themselves.
PHY 509: Physics practical -III	To develop observational skills, confidence in using scientific equipment and relate the knowledge of scientific concepts to quantitative and physical measurement Acquire knowledge, skills, working methods and ways of expression which will reflect on all round development of the students' attitudes towards scientific thinking and its applications	Learner will be able to : Able to handle scientific instruments, to conduct proper experiments and developed observational skills among themselves.
Sem.-VI		
PHY 601: Quantum mechanics (Credits: 03)	To impart knowledge of basic concepts in Quantum Mechanics. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on	Learner will be able to : Apply the concept and use of knowledge of Quantum Mechanics to real life problems. Understanding of the course will create scientific temperament.

	the theory.	
PHY 602: Material Science	To impart knowledge of basic concepts in Material Science. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory.	Learner will be able to : Apply the concept of use of knowledge of Material Science to real life problems. Understanding of the course will create scientific temperament.
PHY 603: Nuclear Physics	To impart knowledge of basic concepts in Nuclear Physics. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory.	Learner will be able to : Apply the concept and use of knowledge of Nuclear Physics to understand and solve the real life problems. Understanding of the course will create scientific temperament
PHY 604: Modern and Applied Physics	To impart knowledge of basic concepts in Modern and Applied Physics. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory.	Learner will be able to : Apply the concept and use of knowledge of Modern and Applied Physics to understand and solve the real life problems. Understanding of the course will create scientific temperament.
PHY 605: Basic Instrumentation Skills	To impart knowledge of basic concepts in Basic Instrumentation skills. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the related experiments based on the theory.	Learner will be able to : Handle and use various basic mechanical and electrical measuring instruments Understanding of the course will create scientific temperament.
PHY 606(A): Technical Electronics II	To impart knowledge of basic concepts in Technical Electronics. To provide the knowledge and methodology necessary for solving problems in Physics. The course also involves the	Learner will be able to : Apply the concept of use of knowledge of Technical Electronics to real life problems. Understanding of the course will create scientific

	related experiments based on the theory.	temperament.
PHY 607: Physics practical -I	To develop observational skills, confidence in using scientific equipment and relate the knowledge of scientific concepts to quantitative and physical measurement Acquire knowledge, skills, working methods and ways of expression which will reflect on all round development of the students' attitudes towards scientific thinking and its applications	Learner will be able to : Able to handle scientific instruments, to conduct proper experiments and developed observational skills among themselves.
PHY 608: Physics practical -Il	To develop observational skills, confidence in using scientific equipment and relate the knowledge of scientific concepts to quantitative and physical measurement Acquire knowledge, skills, working methods and ways of expression which will reflect on all round development of the students' attitudes towards scientific thinking and its applications	Learner will be able to : Able to handle scientific instruments, to conduct proper experiments and developed observational skills among themselves.
PHY 609: Physics practical -Ill	To develop observational skills, confidence in using scientific equipment and relate the knowledge of scientific concepts to quantitative and physical measurement Acquire knowledge, skills, working methods and ways of expression which will reflect on all round development of the students' attitudes towards scientific thinking and its applications	Learner will be able to : Able to handle scientific instruments, to conduct proper experiments and developed observational skills among themselves.

M.Sc.-I

Sem.-I		
PHY 101: Mathematical Methods for Physics	The main objective of this course is to familiarize students with a range of mathematical methods that are essential for solving advanced problems in theoretical physics. This Course Enables the Student to: Understand the linear equations, vector spaces, Matrix Algebra, Integral transformations, determinants, eigenvalue, eigenvectors, etc. Learn to use Laplace transform methods to solve differential equations. Introduce the Fourier series and its application to the solution of partial differential	After completion of the course a student will be able to: Demonstrate competence with the basic ideas of linear algebra including concepts of linear systems, independence, theory of matrices, linear transformations. Use the method of Laplace transforms to solve initial-value problems for linear differential equations with constant coefficients. Solve a Cauchy problem for the wave or diffusion equations using the Fourier Transform
PHY 102: Classical Mechanics	To understand the dynamics of system of particles. To understand the conservative of linear and angular momentum of system of particles. To understand Legendre's dual transformations. To understand Hamiltonian functions and Hamiltonian equations of motion of particles. To understand canonical transformations and Hamilton – Jacob theory . To understand the physics of small oscillations of parallel pendulum etc.	After completion of this course a student will be able to: Explain Lagrangian and Hamiltonian formulation of Classical Mechanics. State the conservation principles involving momentum, angular momentum and energy. Explain motion of a particle under central force field.

PHY 103: Quantum Mechanics	To know different types of operators which are used to study the different equations of motions. To learn Matrix formulation of Quantum Mechanics, Quantum dynamics, to derive Schrodinger's equation. To know about Eigen values, Eigen functions and Angular Momentum Matrices. To understand Approximation Methods and their application to one dimensional harmonic oscillator.	Students know all types of representations of operators and ways to apply them in different problems. How to write and solve the wave function in Matrix form. How to solve the hydrogen atom problem by using quantum mechanics. Students learned about time independent degenerate and non degenerate perturbations and to apply them in harmonic oscillator. Students got an idea of Pauli spin matrices which are very important in nuclear and particle physics as well as atomic and molecular physics.
PHY 104: Basic Physics Laboratory - I	To implement the theory in Practical.	Verify experimental results with the theoretical values
Sem.-II		
PHY 201: Statistical Mechanics	To know the principle of conservation of density and extension in phase space To understand the Partition function of classical ideal gas. To understand Fermi Dirac statistics . To understand balck body radiation. To understand Curie Weiss theory of magnetic transition	On completion of this course a student will be able to: Define and discuss the concept and role of entropy To evaluate the partition function for quantum monatomic gas and diatomic molecules. To calculate Specific heat from lattice vibrations. To solve Boltzmann non Linear integro differential equation. Define the Fermi-Dirac and Bose-Einstein distributions;

		state where they are applicable; understand how they differ and show when they reduce to the Boltzmann distribution Apply the Fermi-Dirac distribution to the calculation of thermal properties of electrons in metals Apply the Bose-Einstein distribution to the calculation of properties of black body radiation
PHY 202: Classical Electrodynamics	To introduce the concept of Thermodynamic interpretation of Electrostatic energy of dielectrics. To study the propagation of plane waves in non conducting media and in conducting media. Main aim is to feed student's mind by fields and radiations from various types of dipoles and localized sources. They will be taught to calculate power radiated in each case. Students will be introduced by the formation and characteristics of ionosphere and how waves propagate through it. The objective is to introduce them about wave guides and their applications. They will be taught about the transmission lines and propagation of waves through them.	They have understood the difference between covariance and invariance of various quantities and applied it. One of the major advantages of this course is that it is very much related to the real life where the ionosphere is playing very important part. Students now know the basics of scattering and absorption and relate them to real life phenomena. They have learnt about wave guides and transmission lines and propagation of waves through them.
PHY 203: Material Science	To review physics in the context of materials science.	To explain the phase diagram of Isomorphous

	To know the processing methods of Metals & Alloys and their Applications. To study Applications and Processing of Ceramics	system . To Process different type of Metals & Alloys such as Steel, Low & High Carbon Steel Stainless Steel, Alloys of Aluminum, Copper, Ceramics.
PHY 204: Physics of Semiconductor Devices	To understand the concept of Charge Carriers and Fermi level in semiconductors at thermal equilibrium. To solve Continuity Equation. To study p-n junctions and its advance devices. To study characteristic and applications Zener diode, photo voltaic cell. To study Metal-semiconductor junctions. To study BJT with the help of Ebers- Moll model.	Describe the properties of materials and Application of semiconductor electronics. Apply the knowledge of semiconductors to illustrate the functioning of basic electronic devices. Demonstrate the switching and amplification Application of the semiconductor devices. Demonstrate the control Applications using semiconductor devices. Identify the fabrication methods of integrated circuits. Classify and describe the semiconductor devices for special Applications.
PHY 205: Basic Physics Laboratory – II	To implement the theory in Practical	Verify experimental results with the theoretical values

M.Sc.-II

Sem.-III		
PHY 301: Atomic & Molecular Physics	To understand Vector atom models for two ,three and four Valence electrons To understand to determine Moment of inertia and bond	After completion of this course student would be Able to calculate the Zeeman effect and the Lande g-factor.

	length and bond length from rotational spectra. To study rotation-vibrational spectra. To know RAMAN spectra. To understand nuclear spin magnetic moment.	Able to calculate the effects of an electric field on the energy levels of the hydrogen atom (the Stark effect). Able to discuss the rotational spectra of molecules. Able to apply the Simple Harmonic Oscillator to determine the vibrational spectrum of diatomic molecules. . Learn about fine structure of Hydrogen atoms. About rotational and vibrational energy levels of diatomic molecules and Raman spectroscopy.
PHY 302: Material Synthesis Methods	To understand Langmuir-Frankel theory of condensation To understand different steps involved in Thin Film Deposition Techniques. To understand Sputtering process . To know Chemical Vapour, Cemical bath ,Chemical Spray deposition in Thin Film Technology. To understand Thick Film Deposition technique and study electrical properties of Thick and Thin films.	Students are able to develop Thin films. Students are able to develop Thin films.
PHY 303: Computational Methods & Programming Using ‘C’ Language	To understand the programming language design and implementation. Develop an in-depth understanding of functional, logic, structure, union, array and object-oriented programming.	After the completion of the course, Student will be able to: Be capable of specifying the simplified syntax of programming languages C. Student able to solve problem related to function,

	Implement several programs in languages and develop an in-depth understanding of inheritance and polymorphism in object-oriented programming paradigms. Understand design /implementation issues involved with variable allocation and binding, control flow, types, subroutines, parameter passing.	array, structure etc. . Massage passing techniques for communication between objects makes the interface description with external system much simpler..
PHY 304: Special Laboratory – II	To implement the theory in Practical	Students are able to explain the different theories through experiments.
PHY 305: Project Work-I	To develop the thinking ability and creativity to select some work to be done on their own and get it completed.	Builds a confidence in the student to start some own business.
Sem.-IV		
PHY 401: Nuclear Physics	To know the particles and their physics. To know nuclear energy levels and their interactions. To know particle accelerators and Radiation Detectors. To learn different types of particle interactions .	Students have the knowledge of particles. Students will have a detailed knowledge of particle physics, useful in further research work in nuclear physics.
PHY 402: Nano materials: Synthesis, Properties & Applications	To know all about Nano materials and comparison of them with bulk material. To know the techniques of Synthesis of Nano materials. To study the photo conducting and photo luminescence properties of metal chalcogenides . To study Characterization of Nanomaterials.	Explain the fundamental principles of nanotechnology and their application to biomedical engineering. Apply engineering and physics concepts to the nano- scale and non-continuum domain. Identify and compare state-of-the-art nanofabrication methods and perform a critical analysis of the

		research literature. Design processing conditions to engineer functional nanomaterials. Apply and transfer interdisciplinary systems engineering approaches to the field of bioand nanotechnology projects.
PHY 403: Renewable Energy Sources	To know Solar Energy. To know Biomass energy and conversion techniques. To know Wind, Ocean and Geothermal Energies. To understand the emerging trends in Renewable Energy sources.	Describe the environmental aspects of non conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations. Know the need of renewable energy resources Describe the use of solar energy and the various components used in the energy production with respect to applications like heating, cooling, desalination, power generation, drying, cooking etc Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications. Understand the concept of Biomass energy resources and their classification, types of biogas Plants-applications Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations.
PHY 404: Special Laboratory – II	To verify the theoretical knowledge through	Students are able to explain the different theories

	experimental work.	through experiments.
PHY 405: Project Work-II	To develop the thinking ability and creativity to select some work to be done on their own and get it completed.	Builds a confidence in the student to start some own business.