Department of Physics

Course Specific Outcome: B. Sc. in Physics

Upon completion of this course the students will be able to

1. develop analytical abilities towards real world problems.
2. have the ability to analyze and interpret quantitative results, both in the core areas of physics and interdisciplinary areas.
3. become familiar with current and recent scientific and technological developments.
4. enrich knowledge through problem solving, hands on activities, study visits, projects etc.
5. use contemporary experimental apparatus and analysis tools to acquire, analyze and interpret scientific data.
6. apply the principles of physics to solve new and unfamiliar problems.
7. communicate scientific results effectively in presentations or posters.
8. a thorough quantitative and conceptual understanding of the core areas of physics, such as Mathematical technics, classical mechanics, quantum mechanics, Geophysics, thermodynamics, atomic- molecular-nuclear physics, electrodynamics, solid state physics, Theory of Relativity and electronics at a level compatible with graduate programs in physics at peer institutions.

Course Objectives and Outcomes

Programme	**Objectives:**	**Course (Subject)**	**Expected learning outcomes from the curriculum**
F.Y.B.Sc.	1. To develop analytical abilities towards real world problems. 2. To familiarize with current and recent scientific and	Semester-I Physics –I: Classical Physics	On successful completion of this course students will be able to: 1. Understand Newton's laws and apply them in calculations of the motion of simple systems. 2. Use the free body diagrams to analyze the forces on the object. 3. Understand the concepts of friction and the concepts of elasticity, fluid mechanics and be able to perform calculations using them.

	technological developments. 3. To enrich knowledge through problem solving, hands on activities, study visits, projects etc.		4. Understand the concepts of lens system and interference. 5. Apply the laws of thermodynamics to formulate the relations necessary to analyze a thermodynamic process. 6. Demonstrate quantitative problem solving skills in all the topics covered
		Semester-I Physics –II: Modern Physics	After successful completion of this course students will be able to 1. Understand nuclear properties and nuclear behavior. 2. Understand the type isotopes and their applications. 3. Demonstrate and understand the quantum mechanical concepts. 4. Demonstrate quantitative problem solving skills in all the topics covered.
		Semester-II Physics –I: Mathematical Physics	On successful completion of this course students will be able to: 1. Understand the basic mathematical concepts and applications of them in physical situations. 2. Demonstrate quantitative problem solving skills in all the topics covered.
		Semester-II Physics –II: Electricity and Electronics	On successful completion of this course students will be able to: 1. understand basic concepts of a.c. circuit. 2. become familiar with digital electronics 3. extend the knowledge of electricity and magnetism beyond school level

Programme	**Objectives:**	**Course (Subject)**	**Expected learning outcomes from the curriculum**
S.Y.B.Sc.	Upon completion of the course, students should have acquired the following knowledge and	Semester-III Physics –I: Mechanics and	On successful completion of this course, students will be able to : 1. Understand the concepts of mechanics & properties of matter & to apply them to problems.

	skills: 1. a thorough quantitative and conceptual understanding of the core areas of physics, including mechanics, , thermodynamics, quantum mechanics, electronics at a level compatible with graduate programs in physics at peer institutions. 2. the ability to analyze and interpret quantitative results, both in the core areas of physics and interdisciplinary areas. 3. the ability to use contemporary experimental apparatus and analysis tools to acquire, analyze and interpret scientific data. 4. the ability to apply the principles of physics to solve new and unfamiliar problems. 5. the ability to communicate scientific results effectively in presentations or posters.	Thermodynamics	2. Comprehend the basic concepts of thermodynamics & its applications in physical situation. 3. Learn about situations in low temperature. 4. Demonstrate tentative problem solving skills in all above areas.
		Semester-III Physics –II: Vector calculus ,Analog Electronics	On successful completion of this course students will be able to : 1. Understand the basic concepts of mathematical physics and their applications in physical situations. 2. Understand the basic laws of electrodynamics and be able to perform calculations using them. 3. Understand the basics of transistor biasing, operational amplifiers, their applications 4. Understand the basic concepts of oscillators and be able to perform calculations using them. 5. Demonstrate quantitative problem solving skill in all the topics covered.
		Semester-III Physics –III: Applied Physics – I	On completion of this, it is expected that 1. Students will be exposed to contextual real life situations. 2. Students will appreciate the role of Physics in 'interdisciplinary areas related to materials, Crystal physics, and Acoustics etc. 3. The learner will understand the scope of the subject in Industry & Research. 4. Experimental learning opportunities will faster creative thinking & a spirit of inquiry.
		Semester-IV	On successful completion of this course students will be able to :

		Physics –I: Optics and Digital Electronics	1. Understand the diffraction and polarization processes and applications of them in physical situations. 2. Understand the applications of interference in design and working of interferometers. 3. Understand the resolving power of different optical instruments.\ 4. Understand the working of digital circuits 5. Use IC 555 time for various timing applications. 6. Demonstrate quantitative problem solving skills in all the topics covered.
		Semester-IV Physics –II: Quantum Mechanics	On successful completion of this course students will be able to : 1. Understand the postulates of quantum mechanics and to understand its importance in explaining significant phenomena in Physics. 2. Demonstrate quantitative problem solving skills in all the topics covered.
		Semester-IV Physics –III: Applied Physics – II	On successful completion of this course, students will be able to : 1. Comprehend the basic concepts of Geology and Geophysics. 2. Learn about microprocessor and assembly language programming. 3. introduced to the basics of communication electronics

Programme	Objectives:	Course (Subject)	Expected learning outcomes from the curriculum
T.Y.B.Sc.	Upon completion of the course, students should have acquired the following knowledge and skills: 1. a thorough quantitative and conceptual understanding of the core areas of physics, such as Mathematical technics, classical mechanics, thermodynamics, atomic- molecular-nuclear physics, electrodynamics, solid state physics, , Theory of Relativity and electronics at a level compatible with graduate programs in physics at peer institutions. 2. the ability to analyze and interpret quantitative results, both in the core areas of physics and interdisciplinary areas. 3. the ability to use contemporary experimental apparatus and analysis tools to acquire, analyze and interpret scientific data. 4. the ability to apply the principles of physics to solve new and unfamiliar problems. 5. the ability to communicate scientific results effectively in presentations or posters.	Semester-V Physics –I: Mathematical Methods in Physics, Thermal and Statistical Physics	From this course, 1. the students are expected to learn some mathematical techniques required to understand the physical phenomena at the undergraduate level and get exposure to important ideas of statistical mechanics. 2. The students are expected to be able to solve simple problems in probability, understand the concept of independent events and work with standard continuous distributions. 3. The students will have idea of the functions of complex variables; solve nonhomogeneous differential equations and partial differential equations using simple methods. 4. The units on statistical mechanics would introduce the students to the concept of microstates, Boltzmann distribution and statistical origins of entropy. 5. It is also expected that the student will understand the difference between different statistics, classical as well as quantum.
		Semester-V Physics –II: Solid State Physics	On successful completion of this course students will be able to: 1. Understand the basics of crystallography, Electrical properties of metals, Band Theory of solids, demarcation among the types of materials, Semiconductor Physics and Superconductivity. 2. Understand the basic concepts of Fermi probability distribution function, Density of states, conduction in semiconductors and BCS theory of superconductivity. 3.Demonstrate quantitative problem solving skills in all the topics covered.
		Semester-V Physics –III:	Upon successful completion of this course, the student will understand 1. the application of quantum mechanics in atomic physics

	Applied Component: The objective of these papers is to introduce the students to sensors and transducers, Signal conditioning, data acquisition systems and measuring instruments used in the laboratory. Students are to be exposed to know, in principle, the modern techniques in the field of medical science. To learn PCB designing and working of consumer electronic devices. To develop logic circuit design and implementation. To know advanced programming skills and interfacing techniques. To understand basic building blocks of microcontrollers. To know the terminologies like embedded, CISK and RISK processors. To master Programming and interfacing skills of microprocessor and microcontrollers. To develop object oriented programming skills and programming in C++. To develop various experimental skills.	Atomic and Molecular Physics	2. the importance of electron spin, symmetric and antisymmetric wave functions and vector atom model 3. Effect of magnetic field on atoms and its application 4. Learn Molecular physics and its applications. 5. This course will be useful to get an insight into spectroscopy.
		Semester-V Physics –IV: Electrodynamics	On successful completion of this course students will be able to: 1) Understand the laws of electrodynamics and be able to perform calculations using them. 2) Understand Maxwell's electrodynamics and its relation to relativity 3) Understand how optical laws can be derived from electromagnetic principles. 4) Develop quantitative problem solving skills.
		Semester-VI Physics –I: Classical Mechanics	This course will introduce the students to different aspects of classical mechanics. 1. They would understand the kinds of motions that can occur under a central potential and their applications to planetary orbits. The students should also appreciate the effect of moving coordinate system, rectilinear as well as rotating. 2. The students are expected to learn the concepts needed for the important formalism of Lagrange's equations and derive the equations using D'Alembert's principle. 3. They should also be able to solve simple examples using this formalism. The introduction to simple concepts from fluid mechanics and understanding of the dynamics of rigid bodies is also expected. 4. Finally, they should appreciate the drastic effect of adding nonlinear corrections to usual problems of mechanics and nonlinear mechanics can help understand the irregularity we observe around us in nature.
		Semester-VI Physics –II: Electronics	On successful completion of this course students will be able to: Understand the basics of semiconductor devices and their applications. 1. Understand the basic concepts of operational amplifier: its prototype

			and applications as instrumentation amplifier, active filters, comparators and waveform generation. 2. Understand the basic concepts of timing pulse generation and regulated power supplies 3. Understand the basic electronic circuits for universal logic building blocks and basic concepts of digital communication. 4. Develop quantitative problem solving skills in all the topics covered.
		Semester-VI Physics –III: Nuclear Physics	Upon successful completion of this course, 1. the student will be able to understand the fundamental principles and concepts governing classical nuclear and particle physics and have a knowledge of their applications interactions of ionizing radiation with matter the key techniques for particle accelerators the physical processes involved in nuclear power generation. Knowledge on elementary particles will help students to understand the fundamental constituents of matter and lay foundation for the understanding of unsolved questions about dark matter, antimatter and other research oriented topics.
		Semester-VI Physics –IV: Special Theory of Relativity	This course introduces students to the essence of special relativity which revolutionized the concept of physics in the last century by unifying space and time, mass and energy, electricity and magnetism. This course also gives a very brief introduction of general relativity. After the completion of the course the student should be able to 1. Understand the significance of Michelson Morley experiment and failure of the existing theories to explain the null result 2. Understand the importance of postulates of special relativity, Lorentz transformation equations and how it changed the way we look at space and time, Absolutism and relativity, Common sense versus Einstein concept of Space and time. 3. Understand the transformation equations for: Space and time, velocity,

			frequency, mass, momentum, force, Energy, Charge and current density, electric and magnetic fields. Solve problems based on length contraction, time dilation, velocity addition, Doppler effect, mass energy relation and resolve paradoxes in relativity like twin paradox etc.
		Semester- V and VI Applied Component: Electronic Instrumentation	Learner will be able to: 1. Understand the difference between a transducer and a sensor. 2. Understand the construction, working and uses of different types of transducers. 3. Understand the concept of signal conditioning, devices used and their operations. 4. Get acquainted with the measuring instruments used in laboratory. 5. Get the insight of the modern medical instruments in principle, which are used in day to day life. 6. Analyze/design and implement combinational logic circuits. 7. Develop assembly language programing skills and real time applications of microprocessor. 8. Illustrate how to interface the I/O peripheral (PPI) with 8085 microprocessor 9. Understand architecture, silent features, instruction set, programming and interfacing of 8051 microcontroller. 10. Develop the programming skills in programming Language C++. 11. Train their practical knowledge through lab experiments. 12. Get practical training to interface different programmable peripherals and I/O devices to microprocessor and microcontroller. 2.
