

**SESSION 2020-21**

**GOVT. SHIVALIK COLLEGE NAYA NANGAL**

**DEPARTMENT OF PHYSICS**

**PROGRAMME B.Sc. PHYSICS**

**PROGRAMME CODE – SCIB03PUP**

**PROGRAMME OUT COME:**

**Course: Physics**

At the completion of B. Sc. in Physics, students are able to:

- Demonstrate a rigorous understanding of the core theories & principles of physics, which includes mechanics, electromagnetism, thermodynamics, & quantum mechanics introduced at degree level in order to understand nature at atomic levels.
- Provide knowledge about material properties and its application for developing technology to ease the problems related to the society.
- Understand the set of physical laws, describing the motion of bodies, under the influence of system of forces.
- Understand the relationship between particles & atom, as well as their creation & decay. Relate the structure of atoms & subatomic particles understand physical properties of molecule the chemical bonds between atom as well as molecular dynamics.
- Analyse the applications of mathematics to the problems in physics & develop suitable mathematical method for such application & for formulation of physical theories.

**Programme Specific Outcomes**

- Students get acquainted with techniques which are useful in industry.
- Students get conceptual knowledge of entrepreneurships through the co-curricular activities.
- Learn the organizational skills and working in group.
- Students will be well versed with use of computers.

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#### COURSE SPECIFIC OUTCOME

#### B.Sc. 1<sup>st</sup> Semester

S.NO	COURSE/ CODE	OUTCOME
1.	Mechanics-I SCIB1104T	<ul style="list-style-type: none"><li>➤ Application of Newton's laws of motion to solve various problems related to day today life.</li><li>➤ To learn motion of bodies and to acquire basic knowledge of mechanics, properties of matter and gravitation.</li><li>➤ Understand Collisions in one and two dimensions.</li><li>➤ Derive Kepler's laws, Coriolis force and its expressions</li></ul>
2.	Vibration and waves-I SCIB1105T	<ul style="list-style-type: none"><li>➤ Understand the concepts of mechanics, acoustics and the properties of matter.</li><li>➤ Understand physical characteristics of SHM and obtaining solution of the oscillator using differential equations.</li><li>➤ Calculate logarithmic decrement relaxation factor and quality factor of a harmonic oscillator.</li></ul>
3.	Electricity and magnetism-I SCIB1106T	<ul style="list-style-type: none"><li>➤ Gain Knowledge on the basic concepts of electric and magnetic fields.</li><li>➤ Understand the concept of conductors, dielectrics, inductance and capacitance.</li><li>➤ Gain knowledge on the nature of magnetic materials.</li><li>➤ Understand the concept of static and time varying fields.</li></ul>
4.	Practical SCIB1107L	<ul style="list-style-type: none"><li>➤ Will be able to determine Poisson's ratio for rubber.</li><li>➤ Understand the working of energy meter and differentiate between AC and DC currents.</li><li>➤ Students establish relation between torque and angular acceleration using flywheel and also improve their calculation ability and graphical skill.</li><li>➤ By performing the collision experiment students differentiate between 1-D and 2-D.</li></ul>

#### B.Sc. 2<sup>nd</sup> Semester

S.NO	COURSE/ CODE	OUTCOME
1.	Mechanics-II SCIB1204T	<ul style="list-style-type: none"><li>➤ Understand the relation between scattering cross section and impact parameter.</li><li>➤ Understand the properties of materials.</li><li>➤ Identify and apply the laws of mechanics along with the necessary mathematics for solving numerical.</li><li>➤ Gain knowledge on Central forces – definition and examples, Conservative nature of central forces, Conservative force as a negative gradient of potential energy, Equation of motion under acentral force.</li></ul>
2.	Vibration and waves-II SCIB1205T	<ul style="list-style-type: none"><li>➤ Use Lissajous figures to understand simple harmonic vibrations of same frequency and different frequencies.</li><li>➤ Solve wave equation and understand significance of transverse waves.</li></ul>

		<ul style="list-style-type: none"> <li>➤ Solve wave equation of a longitudinal vibration in bars free at one end and also fixed at both the ends.</li> <li>➤ Gain knowledge on applications of transverse and longitudinal waves.</li> </ul>
3.	Electricity and magnetism-II SCIB1206T	<ul style="list-style-type: none"> <li>➤ Understand the basic mathematical concepts related to electromagnetic vector fields.</li> <li>➤ Apply the principles of electrostatics to the solutions of problems relating to electric field and electric potential, boundary conditions and electric energy density.</li> <li>➤ Apply the principles of magneto statics to the solutions of problems relating to magnetic field and magnetic potential, boundary conditions and magnetic energy density.</li> <li>➤ Understand the concepts related to Faraday's law, induced emf and Maxwell's equations.</li> <li>➤ Apply Maxwell's equations to solutions of problems relating to transmission lines and uniform plane wave propagation.</li> </ul>
4.	Practical SCIB1207L	<ul style="list-style-type: none"> <li>➤ Students know about how to find acceleration due to gravity by different methods.</li> <li>➤ Students know about capacitance and also understand the use of capacitor in different equipments.</li> <li>➤ Students differentiate between logarithmic decrement, co-efficient of damping relaxation time and quality factor.</li> </ul>

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**B.Sc. <sup>3rd</sup> Semester**

S.NO	COURSE/ CODE	OUTCOME
1.	Statistical Physics and Thermodynamics-I SCIB2304	<ul style="list-style-type: none"><li>➤ Various thermodynamic laws gives the knowledge of Carnot cycle heat engine also explains the various thermodynamic scale of temperature and knowledge of entropy.</li><li>➤ Maxwell's thermodynamic relations and their applications also explains about triple point, Joule-Thomson effect and about blackbody radiation.</li><li>➤ Study about M.B, B.E, F.D Statistics and their comparison.</li><li>➤ Students understand distribution of n-particle into compartments and cells.</li></ul>
2.	Optics SCIB2305	<ul style="list-style-type: none"><li>➤ To develop and understanding of Principles of Optics.</li><li>➤ Understand the basic concept of Physical Optics and Wave Optics.</li><li>➤ To develop an ability to compute basic quantities in Optics.</li><li>➤ Observe principles of optics in daily life</li></ul>
3.	Quantum Mechanics-I SCIB2306	<ul style="list-style-type: none"><li>➤ Understand the intuitive ideas of the Quantum physics and Nuclear physics.</li><li>➤ Derive Schrodinger time dependent and time independent wave equations.</li><li>➤ To understand dual nature of matter.</li><li>➤ Gain knowledge on classification of various crystal systems.</li></ul>
4.	Practical SCIB2307	<ul style="list-style-type: none"><li>➤ Understand the concept of probability.</li><li>➤ Student know that how to use spectrometer to find resolving power and refractive index.</li><li>➤ Learn to find plank's constant value.</li><li>➤ Students will also learn how to use measuring instruments and minimize errors, compare results with standard results</li></ul>

**B.Sc. <sup>4th</sup> Semester**

S.NO	COURSE/ CODE	OUTCOME
1.	Statistical Physics and Thermodynamics-II SCIB2404	<ul style="list-style-type: none"><li>➤ Students study thermodynamic potentials, enthalpy, Helmholtz free energy, Gibb's free energy and phase transitions relating to physical systems.</li><li>➤ Students study Maxwell relations and its applications, adiabatic demagnetization and low temperature physics.</li><li>➤ Students study Maxwell's law of distribution of velocities, mean free path, transport phenomena and learn to solve the problems.</li><li>➤ Students study real gasses and behavior of real gases, Vander Waal's equation of state, Low temperature physics and its related applications.</li></ul>

2.	Lasers SCIB2405	<ul style="list-style-type: none"> <li>➤ In This course the students would gain the knowledge basic principles.</li> <li>➤ Studied the various types of lasers, Laser spectroscopy and their applications in science and technology.</li> <li>➤ To know theory of laser, its basic properties.</li> <li>➤ To learn about resonators, transient effect, many laser systems and practical use of laser.</li> </ul>
3.	Quantum Mechanics-II SCIB2406	<ul style="list-style-type: none"> <li>➤ To know generalized angular momenta, Electron's magnetic moment, Energy of a magnetic dipole, Stern-Gerlach experiment.</li> <li>➤ To study Fine structure of hydrogen atoms, atoms in presence of electric and magnetic fields- application of Quantum mechanics for atomic systems.</li> <li>➤ To learn Many electron atoms, identical particles, Pauli principle.</li> </ul>
4.	Practical SCIB2407	<ul style="list-style-type: none"> <li>➤ Understand how to measure height of an building, mountain by new apparatus sextant.</li> <li>➤ Know about variation of wavelength with frequency.</li> <li>➤ Difference between galvanometer and voltmeter.</li> <li>➤ Develop a basis for future learning and work experience.</li> </ul>

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B.Sc. 5<sup>th</sup> Semester

S.NO	COURSE/ CODE	OUTCOME
1.	Condensed Matter Physics-I SCIB3504	<ul style="list-style-type: none"><li>➤ To learn crystal structure, lattice dynamics.</li><li>➤ To understand quantum properties of matter like magnetic property, dielectric property.</li><li>➤ To understand elementary band theory.</li><li>➤ Superconductivity – one of major breakthrough in modern science.</li><li>➤ Studied about SC, BCC, FCC and Reciprocal lattice.</li></ul>
2.	Electronics-I SCIB3505	<ul style="list-style-type: none"><li>➤ Knowledge about semiconductors since it is a basic materials used in many electronic components like diode, transistors FET, JFET, MOSFET etc.</li><li>➤ Characteristics and working of operational amplifiers which are useful in various medical and scientific investigations to amplify the signals.</li><li>➤ Generation of high frequency signals using oscillator circuits and transistors and their types CB,CE,CC etc.</li><li>➤ Concepts of regulated power supply, rectifiers, filters and regulator.</li></ul>
3.	Nuclear and Radiation Physics SCIB3506	<ul style="list-style-type: none"><li>➤ To learn general properties of nuclei, various nuclear models, radioactivity.</li><li>➤ To understand nuclear reactions and interaction of nuclear radiation with matter.</li><li>➤ To know about the detectors for nuclear radiations and particle accelerators.</li><li>➤ To learn and understand fundamentals of particle physics.</li></ul>
4.	Practical SCIB3507	<ul style="list-style-type: none"><li>➤ Clear concept of diodes, transistor, FET.</li><li>➤ Understand the concept of half wave and full wave rectifier.</li> <li>➤ Studied about working of thermistor.</li><li>➤ Students will learn to do practical's as an application of what they study in theory.</li></ul>

**B.Sc. 6<sup>th</sup>Semester**

S.NO	COURSE/ CODE	OUTCOME
1.	Condensed Matter Physics-II SCIB3604	<ul style="list-style-type: none"><li>➤ To study about lattice vibrations, Einstein and Debye model of specific heat.</li><li>➤ To learn about free electron, Fermi gas and Fermi energy.</li><li>➤ Band theory, Kronig-Penney model, Semi conductors.</li><li>➤ Superconductivity and BCS theory.</li></ul>
2.	Electronics-II SCIB3605	<ul style="list-style-type: none"><li>➤ Understand about topics Thyristor SCR, TRIAC, DIAC and their difference.</li><li>➤ Types, construction, characteristics, uses, advantages of thermistor.</li><li>➤ IMPATT and TRAPATT Devices.</li><li>➤ Understand about Transistor biasing, amplifier, FET, diodes.</li></ul>
3.	Nuclear and Particle Physics SCIB3606	<ul style="list-style-type: none"><li>➤ To learn about energy loss, cyclotron, betatron, synchrotron.</li><li>➤ To understand ionization chamber, Proportional counter, GM counter, scintillation counter.</li><li>➤ To learn about detectors and elementary particles.</li><li>➤ Quark model and their qualitative discussion.</li></ul>
4.	Practical SCIB3607	<ul style="list-style-type: none"><li>➤ Working of GM counter understand by the student while performing the experiment.</li><li>➤ Studied about working of thermistor.</li><li>➤ Study about characteristics of transistor.</li><li>➤ Students will apply various methods of calculations such as graphical etc.</li></ul>

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