Bharati Vidyapeeth's

Dr. Patangrao Kadam Mahavidyalaya, Sangli

Department of Physics

B.Sc. (Physics)

Program Outcomes:

1. Apply the basic principles of Physics to the events occurring around us and also in the world.
2. Design and carry out experiments to understand the laws and basic concepts in science.
3. To acquire a wide range of problem-solving skills, both analytical as well as technical and to apply them.
4. To enhance the student's academic abilities, personal qualities, and transferable skills will allow them to develop as responsible citizens.
5. Develop a sense of research to predict cause-and-effect relationships.
6. Involve in independent and lifelong learning.

Program Specific Outcomes:

1. To understand the basic laws and explore the fundamental concepts of Physics.
2. Gain a wide spectrum of skills that will enable them to solve theoretical and experimental problems.
3. Acquire the skill to gauge the physical properties of materials.
4. Providing a hands-on learning experience such as in measuring the basic concepts in properties of matter, heat, optics, electricity and electronics.
5. Apply and verify theoretical concepts through laboratory experiments.
6. Illustrate the principles of electricity, magnetism, thermodynamics, optics and spectroscopy

Shivaji University, Kolhapur

B.Sc. Part-I Physics Syllabus (NEP-2020) with effect from August, 2022

COURSE OUTCOME **SEMESTER-I**		
Course Code	Part	Course Outcome
DSC A1	Mechanics-I	1. Students are able to understand and identify scalar and vector physical quantities apply vector algebraic methods to elementary exercises in mechanics 2. Students are able to solve second order, homogenous ordinary differential equations in mechanics 3. Students are able to understand the conceptual evolution of conservation laws of momentum and energy for both single and system of particles 4. In general, students are capable of correlating above concepts and methods in mechanics to both theoretical and experimental domains revealing analytical as well as numerical skills
DSC A2	Mechanics-II	1. Students are able to understand and apply Newton's Law of Gravitation to celestial objects and geometry of planetary orbits under the action of central force. 2. Students are able to solve numerical problems based on Kepler's Laws of planetary motion and understand simple concepts like weightlessness, Geosynchronous satellite and GPS 3. Students are able to setup differential equation for simple harmonic motion and its allied cases

		Students are able to derive elastic constants for beam supported at both ends and at one end and also able to explain the phenomenon of surface tension on the basis of molecular forces
SEMESTER II		
DSC B1	Electricity and Magnetism-I	1. Students are able to understand the physical significance of gradient, divergence and curl 2. Students are able to apply concepts in vector calculus such as gradient, divergence and curl related to vector and scalar fields using Gauss, Stokes and green`s theorem 3. Students are able to understand and apply concepts of electrostatic field, potential to point charges, electric dipole and geometrically regular charged bodies 4. Students are able to understand and apply concept of capacitor to isolated conductor, parallel plates, cylindrical and spherical capacitors and allied modifications in it, energy density in electric field and solve numerical exercise in electrostatics
DSC B2	Electricity and Magnetism-II	1. Students are able to understand importance of complex numbers in analysis of AC Circuits contacting Inductance(L) Capacitor(C) and Resistance (R) and their various configurations 2. Students are able to define and apply the concepts in AC circuits such as Impedance (Z), reactance (XC and XL), Admittance, Susceptance and Quality Factor (Q) 3. Students are able to understand and design AC bridge: Owen`s Bridge and understand basic working principle of Ballistic galvanometer

		4. Students reveal mastery in basic terminology in network analysis for further studies and apply Network theorems to simple circuits
DSC A	LAB: MECHANICS	1. Students are able to derive elastic constants for beam supported at both ends and at one end 2. Students are able to derive elastic constant (eta) of a wire under torsional oscillations (Searle's Method) 3. Students are able to explain the phenomenon of surface tension on the basis of molecular forces 4. Students are able to derive the relation between surface tension and excess pressure 5. Students are able to perform an experiment to determine ST by Jaeger`s method 6. Students are able to discuss and state the factors affecting the ST 7. In general, students are capable of correlating above concepts and methods to both theoretical and experimental domains revealing analytical as well as numerical skills
DSC B	LAB ELECTRICITY AND MAGNETISM	1. In general, students are capable of applying above concepts in network analysis to both theoretical and experimental domains 2. Students are able to understand simple elementary concepts such as magnetization and intensity of magnetization 3. Students are able to state Biot-Savart`s law and are capable to apply it to straight, circular wires and solenoid 4. Students are able to understand concept of magnetic

		vector potential along with Ampere`s circuital law 5. Students are able to understand the explain the phenomenon of hysteresis in magnetism 6. Students are able to discriminate different magnetic materials based on their characteristic properties
B.Sc.-II		
SEMESTER III		
DSC-C1	(Thermal Physics and Statistical Mechanics - I	1. Know the Zeroth Law, First Law, Second Law and Third Law of Thermodynamics. 2. Describe various types of Thermometers. 3. State the nature of heat transfer, transport phenomena in gases behavior of gases ate different temperatures. 4. Apply the thermodynamics laws for practical use
DSC-C2	Waves and Optics -I	1. Assess fluctuations and acoustic process in nature and technology in various forms. 2. Analyse the mechanism and the machinery noise levels. 3. Distinguish between different sounds and noise levels in the environment. 4. Solve the numerical on sound and acoustics, viscosity and low pressure
SEMESTER IV		
DSC-D1	Thermal Physics and Statistical Mechanics - I	1. Describe various thermodynamic potentials. 2. Know different theories of radiation. 3. Know the Classical Statistics and Quantum Statistics. 4. Solve the numerical problems using mathematical tools

DSC- D2	Waves and Optics -I	1. Explain the phenomenon of interference, diffraction and polarization. 2. Interpret wavelength, resolving power and specific rotation. 3. Calculate wavelength of unknown sources. 4. Understand various applications of the light waves
Group I, II, III and IV	B.Sc. Part II PHYSICS LAB Experiments (DSC C1, C2, D1, D2 Paper V, VI, VII, VIII)	1. To study the various properties of thermal physics like thermal conductivity. 2. To study the working of various thermometers. 3. To study the temperature coefficient of resistance by various methods. 4. To understand the mechanical equivalent of heat through an experiment. 5. To study the motion of coupled oscillation, coefficient of viscosity, 6. To study the optical properties using different instruments.
B.Sc.-III		
SEMESTER V		
DSE-E1	Mathematical Physics	1. Acquire knowledge of methods to solve partial differential equations with examples of important partial differential equations in Physics. 2. Apply the special functions, such as the Hermite polynomial, the Legendre polynomial, the Laguerre polynomial and Bessel functions and their differential equations and their applications in various physical problems 3. Use the beta, gamma and error functions in doing integrations.

		4. Understand maths of complex numbers and application of Cauchy-Riemann Equations.
DSE-E2	Quantum Mechanics	1. Describe de Broglie's hypothesis of matter waves, Davisson–Germer experiment. 2. Apply the knowledge of basic quantum mechanics, to set up one-dimensional Schrodinger's wave equation and its application to a matter wave system. 3. Understand the Schroedinger wave mechanics and operator formalism. 4. Solve the Schroedinger equation for simple 1D time-independent potentials
DSE-E3	Classical Mechanics and Classical Electrodynamics	1. Apply Lagrangian methods to solve for the motion of rigid bodies. 2. Apply the calculus of variations to solve minimization problems and knowledge of the formulation of dynamics in terms of a variational principle. 3. Explain the fundamental concepts of special relativity and how to perform Lorentz transformations. 4. Solve the problems based on the motion of a charged particle in the presence of a uniform electromagnetic field.
DSE-E4	Digital and Analog Circuits and Instrumentation	1. Analyse different types of digital electronic circuits using various tools and know the techniques to prepare the most simplified circuit using various methods. 2. Explain the principles of oscillation and design various oscillator circuits. 3. Acquire the skill in using CRO for various physical measurements. 4. Demonstrate knowledge of analog electrical devices,

		particularly operational amplifiers and their applications.
DSE-F1	Nuclear and Particle Physics	1. Impart knowledge about basic nuclear physics properties and nuclear models for the understanding of related reaction dynamics. 2. Explain how energy and other properties of accelerated particle beams are measured. 3. Describe the properties of radiation used for detection and the parameters that affect the precision, efficiency, and sensitivity of the measurement. 4. Explain the interaction between elementary particles and their classification.
DSE-F2	Solid State Physics	1. Explain the Crystal systems, Crystal planes and directions, and Miller indices. 2. Describe Bragg's Law and its relation to crystal structure. 3. Illustrate the Characteristic features of various types of magnetic materials. 4. Demonstrate an in-depth understanding of the band structure of solids.
DSE-F3	Atomic and Molecular Physics and Astrophysics	1. Explain the change in behaviour of atoms in an externally applied electric and magnetic field. 2. Understand the molecular spectra and find molecular properties from molecular spectra. 3. Interpret the rotational and vibrational Raman Spectra. 4. Acquire knowledge stellar evolution of a small and massive star, pulsars, neutron star and black holes.
DSE-F4	Energy	1. Analyse the viability of wind and alternative energy

	Studies and Materials Science	projects. 2. Explain the field applications of solar energy. 3. Describe the biogas generation and its impact on the environment. 4. Explain the phenomenon of superconductors and its various applications.
B.Sc. Part III	Physics Laboratory Experiments	1. To study the various kind of motion through an experiment 2. To study the elasticity, surface tension, oscillation through an experiment 3. To study the interaction of light with material medium and its properties 4. To empower the student to understand the different aspect of electricity and magnetism. 5. To understand the basic electronics and its application in daily use. 6. To test the skill of various aspect of experimental physics.