

# Department of Physics

## B.Sc. (Physics)

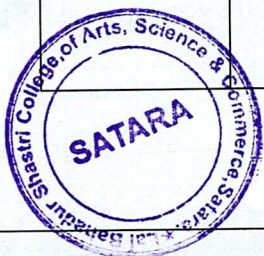
### Programme Specific Outcomes (PSO)

After successful completion of 3-year degree program in Physics students should be able to;

PSO-1	Identifying and describing physical systems with their professional Knowledge.
PSO-2	Getting knowledge of general Physics like sound, waves, friction, forces, and laws of motion and use of mathematics
PSO-3	Getting knowing about the light and its importance in life, its characteristics, Properties and use in various instruments.
PSO-4	Learning about concepts of nuclear physics and nuclear energies and importance of their use for mankind.

### Course Outcomes

Course Outcomes: Department of Physics			
Class and Duration	Course	Course Outcomes	
B.Sc. I (Old) (2017-2018)	Paper I Mechanics I)	CO-1	Understanding and recognizing scalar and vector physical quantities.
		CO-2	Understanding and applying the ordinary differential equations to physical Problems
		CO-3	Understanding the Newton's laws of motion.
		CO-4	Understanding the conservation of momentum and energy and related physical phenomenon.
	Paper II (Mechanics II)	CO-1	Understanding the rotational motion, moment of inertia and able to determine the M. I. of various systems in rotational motion
		CO-2	Applying gravitational laws to a physical problem
		CO-3	Recognizing simple harmonic motions in nature and solve their equations
		CO-4	Understanding properties of matter (e.g. elasticity and surface tension) and apply this knowledge to physical problem.
	Paper III Electricity and magnetism	CO-1	Getting ability to Prove and apply Gauss, Stokes and Greens theorems
		CO-2	Understanding electrostatic field and potential and determine the same for different physical bodies.
		CO-3	Getting knowledge of Capacitor and its types.



Paper IV Electricity and ,magnetism	CO-1	Solving and building desired A. C. circuits
	CO-2	Getting knowledge of magnetic effect of electric current and different magnetic materials.
	CO-3	Understanding how different energies will convert in to electrical energy using magnetic field.
	CO-4	Getting ability of understanding Maxwell's equations and its applications.

### Course Outcomes: Department of Physics

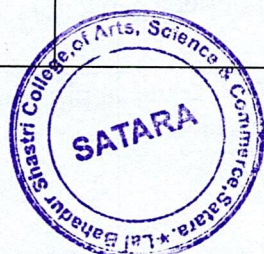
Class and Duration	Course	Course Outcomes	
B.Sc. I (CBCS) (2018-2019 To 2021-2022)	Paper I Mechanics- I	CO-1	Students are able to understand and identify scalar and vector physical quantities in mechanics, vectoralgebraic methods to elementary exercises in mechanics, degree and order of given differential equations
		CO-2	Students are able to solve second order, homogenous ordinary differential equations in mechanics
		CO-3	Students are able to understand the conceptual evolution of conservation laws of momentum and energy for both single and system of particles
		CO-4	Students are able to understand and apply basic concepts of rotational motion
		CO-5	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
	Paper II (Mechanics II)	CO-1	Students are able to understand and apply Newton's Law of Gravitation to celestial objects
		CO-2	Students are able to understand geometry of planetary orbits under the action of central force
		CO-3	Students are able to solve numerical problems based on Kepler's Laws of planetary motion
		CO-4	Students are able to understand simple concepts like weightlessness, Geosynchronous satellite and GPS Students are able to revise basic concepts such as stress, strain and elastic constants of elasticity
		CO-5	Students are able to setup differential equation for simple harmonic motion and its allied cases, calculate time averages of KE, PE and TE
		CO-6	Students are able to derive elastic constants for beam supported at both ends and at one end, elastic constant ( $\eta$ ) of a wire under torsional oscillations (Searle's Method)
		CO-7	Students are able to explain the phenomenon of surface tension on the basis of molecular forces



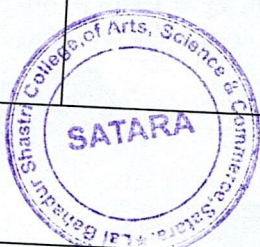
		CO-8	Students are able to derive the relation between surface tension and excess pressure, factors affecting the ST, In general, students are capable of correlating above concepts and methods to both theoretical and experimental domains revealing analytical as well as numerical skills
	Paper III Electricity And Magnetism	CO-1	Students are able to understand the physical significance of gradient, divergence and curl
		CO-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
		CO-3	Students are able to understand and apply concepts of electrostatic field, potential to point charges, electric dipole and geometrically regular charged bodies, concept of capacitor to isolated conductor, parallel plates, cylindrical and spherical capacitors and allied modifications in it
		CO-3	Students are able to understand and apply concept of energy density in electric field
		CO-4	Students are capable of applying above concepts to solve numerical exercise in electrostatics concepts such as magnetization and intensity of magnetization
	Paper IV Electricity and Magnetism	CO-1	Students are able to state Biot-Savart's law and are capable to apply it to straight, circular wires and solenoid
		CO-2	Students are able to understand concept of magnetic vector potential along with Ampere's circuital law
		CO-3	Students are able to understand the explain the phenomenon of hysteresis in magnetism
		CO-4	Students are able to discriminate different magnetic materials based on their characteristic properties

### Course Outcomes: Department of Physics

Class and Duration	Course	Course Outcomes	
B.Sc. I (NEP) (2022- 2023)	Paper I Mechanics- I	CO-1	Students are able to understand and identify scalar and vector physical quantities in mechanics
		CO-2	Students are able to understand and apply vector algebraic methods to elementary exercises in mechanics
		CO-3	Students are able to understand and identify degree and order of given differential equations
		CO-4	Students are able to understand the conceptual evolution of conservation laws of momentum and energy for both single and system of particles



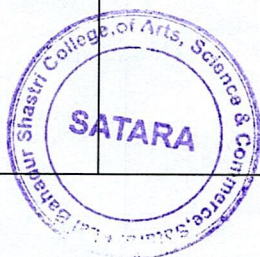
Paper II (Mechanics II)	CO-5	In general, students are capable of correlating above concepts and methods in mechanics to both theoretical and experimental domains revealing analytical as well as numerical skills
	CO-1	Students are able to understand and apply Newton slaw of Gravitation to celestial objects
	CO-2	Students are able to understand geometry of planetary orbits under the action of central force
	CO-3	Students are able to solve numerical problems based on Kepler's Laws of planetary motion
	CO-4	Students are able to understand simple concepts like weightlessness, Geosynchronous satellite and GPS Students are able to revise basic concepts such as stress, strain and elastic constants of elasticity
	CO-5	Students are able to setup differential equation for simple harmonic motion and its allied cases, calculate time averages of KE, PE and TE
	CO-6	Students are able to derive elastic constants for beam supported at both ends and at one end, elastic constant ( $\eta$ ) of a wire under torsional oscillations (Searle's Method)
	CO-7	students are able to explain the phenomenon of surface tension on the basis of molecular forces
	CO-8	Students are able to derive the relation between surface tension and excess pressure, factors affecting the ST, In general, students are capable of correlating above concepts and methods to both theoretical and experimental domains revealing analytical as well as numerical skills
Paper III Electricity And Magnetism	CO-1	Students are able to understand the physical significance of gradient, divergence and curl
	CO-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
	CO-3	Students are able to understand and apply concepts of electrostatic field, potential to point charges, electric dipole and geometrically regular charged bodies, concept of capacitor to isolated conductor, parallel plates, cylindrical and spherical capacitors and allied modifications in it
	CO-3	Students are able to understand and apply concept of energy density in electric field



		CO-4	Students are capable of applying above concepts to solve numerical exercise in electrostatics concepts such as magnetization and intensity of magnetization
	Paper IV Electricity and Magnetism	CO-1	Students are able to state Biot-Savart's law and are capable to apply it to straight, circular wires and solenoid
		CO-2	Students are able to understand concept of magnetic vector potential along with Ampere's circuital law
		CO-3	Students are able to understand the explain the phenomenon of hysteresis in magnetism
		CO-4	Students are able to discriminate different magnetic materials based on their characteristic properties

### Course Outcomes: Department of Physics

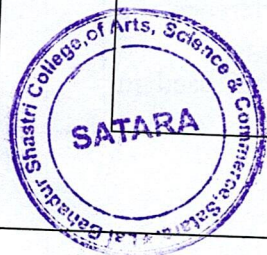
Class and Duration	Course	Course Outcomes	
B.Sc. II (2017-2018 To 2018-2019)	Paper V: General Physics, Sound and Acoustics	CO-1	Getting ability to prove and apply Gauss, Stokes and Greens theorems
		CO-2	Understanding processional motion and its applications
		CO-3	Understanding Properties of matter (e.g. elasticity and viscosity) and apply this knowledge to physical problem.
		CO-4	Understanding acoustic transducers, their working and applications, Understanding acoustics of a building and its applications.
	Physics Paper VI: Electronics and semiconductor devices	CO-1	Understanding CRO and its uses.
		CO-2	Understanding and Built different oscillators
		CO-3	Understanding in detail the OP-AMP, feedback mechanism and uses of Op-amp.
		CO-4	Understanding and design different logic circuits. Understanding two transistors viz UJT and FET and their uses.
	Paper VII Optics	CO-1	Acquiring the basic concepts of wave optics
		CO-2	Describing how light can constructively and destructively interfere
		CO-3	Explaining why a light beam spreads out after passing through an aperture
		CO-4	Summarizing the polarization characteristics of electromagnetic waves
		CO-4	Appreciating the operation of many modern optical devices that utilize wave optics. Understanding optical phenomena such as polarization, birefringence, interference and diffraction in terms of the wave model, Analyzing simple examples of interference and diffraction phenomena. Getting familiar with a range of equipment used in modern optics.



Paper VIII Relativity and Modern Physics	CO-1	Acquiring the knowledge of special theory of relativity.
	CO-2	Understanding the wave particle duality and its quantum mechanics.
	CO-3	Understanding vector atom model and different quantum numbers. Understanding different nuclear energy sources and process of energy production.

**Course Outcomes: Department of Physics**

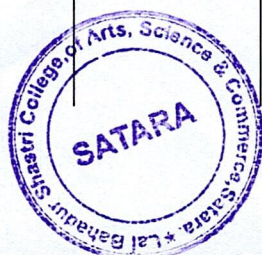
Class and Duration	Course	Course Outcomes	
B.Sc. II (CBCS ) (2019- 2020) To (2022- 2023)	PHYSICS Paper-V DSC- C1 THERMAL PHYSICS AND STATISTICAL MECHANICS - I	CO-1	Maxwell's law of distribution of velocities and its experimental verification, Transport Phenomena: Law of equipartition of energy (qualitative) and its applications to specific heat of monoatomic and diatomic gases.,
		CO-2	Principle of thermometry, Types of thermometers
		CO-3	Thermodynamic system, Applications of First Law (Isothermal process, Adiabatic process, Isochoric, Isobaric), Second law of thermodynamics, Carnot's ideal heat engine,
		CO-4	Carnot's theorem, Entropy (concept & significance), Entropy changes in reversible & irreversible processes, Third law of thermodynamics,
	Paper VI	CO-1	Superposition of two collinear harmonic oscillations for Superposition of two perpendicular harmonic oscillations- for oscillations and Uses of Lissajous figures.
		CO-2	Frequencies of coupled oscillatory systems
		CO-3	Travelling and standing waves on a string, Group velocity and Phase velocity. Applications of ultrasonic waves
		CO-4	Transducers antis types, musical scale. Acoustics of buildings Acoustic aspects of halls Production and measurement of low pressure
	PHYSICS Paper-VII DSC-D1 THERMA L PHYSICS AND STATISTICAL MECHANICS - II	CO-1	Maxwell's thermodynamically relations, Joule-Thomson effect, Clausius- Clapeyron equation.
		CO-2	Blackbody radiation and its importance
		CO-3	Maxwell-Boltzmann distribution
		CO-4	Bose-Einstein distribution law, photon gas, Fermi-Dirac distribution law
		CO-5	Comparison of M.B., B.E., and F.D. statistics.
	PHYSICS	CO-1	Cardinal points of an optical system



Paper VIII DSC- D2 - WAVES AND OPTICS-I	CO-2	Resolving power of optical instrument
	CO-3	production and detection of circularly and elliptically polarized light
	CO-4	Int Fraunhofer diffraction interference in thin parallel films , Wedge shaped films,

### Course Outcomes: Department of Physics

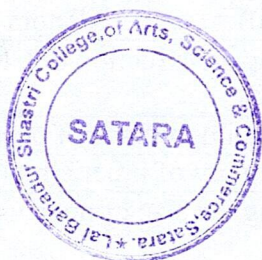
Class and Duration	Course	Course Outcomes	
<b>B.Sc. III New Syllabus from June 2020</b>	<b>Semester V PAPER IX: DSE-E1 Mathematical Physics</b>	CO-1	Understanding micro and macro canonical ensembles, phase space, state.
		CO-2	Knowing about how to distinguish between Mathematical & Statistical Physics.
		CO-3	Improving the mathematical skills to solve to problems in physics.
		CO-4	Understanding different types of differential equations & their solutions.
	<b>PAPER X: DSE-E2 Quantum Mechanic</b>	CO-1	Understanding the idea of wave function & uncertainty relations.
		CO-2	Getting some concepts of physics by quantum mechanics.
		CO-3	Solving problems on barrier potential well, one and three-dimensional potential well
		CO-4	Understanding the Schrodinger's equation for hydrogen atom.
	<b>PAPER XI: DSE-E3 Classical Mechanics and Classical Electrodynamics</b>	CO-1	Understanding the concept of force, constraints, Newton's laws of motions.
		CO-2	Knowing about Formulation of Langrangian equation of motion and solution of problems.
		CO-3	Understanding inertial and non-inertial frame of reference, postulates of special theory of relativity
		CO-4	Understanding motion of charged particle in uniform electric and magnetic field
	<b>Paper: XII DSE-E4 Digital and Analog circuits and Instrumentation</b>	CO-1	Understanding the working of logic gates and its applications in memory device and in counters
		CO-2	Understanding working of amplifiers and role of feed back in amplifiers and oscillators
		CO-3	Understanding construction of CRO and its application's
		CO-4	Understanding importance of operational amplifiers
		CO-5	Understanding use of timer circuits
	<b>Paper XIII DSE-F1: Nuclear and Particle physics</b>	CO-1	Understanding the size of nucleus and all its properties.
		CO-2	Knowing various method of accelerating various types of particles.



	CO-3	Understanding the construction & working of Nuclear Detectors.
	CO-4	Understanding the different Nuclear Energy Levels.

**Course Outcomes: Department of Physics**

Class and Duration	Course	Course Outcomes	
	PHYSICS Paper-XIV DSE- F2 Solid State Physics	CO-1	Developing a clear concept of the crystal classes and symmetries
		CO-2	Understanding the relationship between the real and reciprocal space
		CO-3	Acquiring ability of Calculating the Braggs conditions for X-ray diffraction in crystals Understanding of electronic and vibrational properties of solid-state systems
		CO-4	Understanding Band theory of solids and use in different physical phenomenon
	PHYSICS Paper-XV DSE-F3 Atomic and Molecular Physics and Astrophysics	CO-1	Understand Normal and anomalous Zeeman effect
		CO-2	Understand Rotational energy levels, Rotational spectra, Vibrational energy levels,
		CO-3	Understand Cosmological theory, Milky Way galaxy, Origin of solar system
		CO-4	Understand Evolution of main sequence stars - Red giants and White dwarfs, black holes and neutron stars Surface of the Sun
Paper: XVI DSE-F4 Energy Studies and Materials Science	CO-1	Understanding basics of renewable energy sources	
	CO-2	Understanding Physics and mathematics of wind turbine generator.	
	CO-3	Understanding conversion of solar energy into electric energy, photovoltaic cell, solar PV system and solar potentials.	
	CO-4	Understanding different types of disorder in the crystalline solids and it's important.	
	CO-5	Gaining basic knowledge of superconductivity.	



*[Handwritten Signature]*

**HEAD**  
Department of Physics  
Lal Bahadur Shastri College of  
Arts, Science & Commerce, Satara

