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Department of Physics
Course Learning Outcomes of Physics in B.Sc
Session 2025 – 26

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	01st Sem.	DSC	PHSC-01T	Mechanics

Total Marks: 100	Minimum Passing Marks: 40	Credit Value: 03 Credits

Course learning outcome

➢ Analyze and apply the laws of motion to various dynamical situations.
➢ Explain and demonstrate the principle of conservation of momentum and energy including their application in real-world scenario such as collision and energy transformation.
➢ Evaluate and calculate moment of inertia for objects of different shapes and analyze how these properties affect the motion or rotating bodies.
➢ Analyze flow of fluids.
➢ Describe special relativistic effects and their effects on the mass and energy of a moving object.

Keywords: Aryabhatta, Vectors, Newton's Laws, Angular Momentum, Elasticity, Gravitation, Oscillations, Relativity.

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	01st Sem.	DSC	PHSC-01P	Mechanics

Total Marks: 50	Minimum Passing Marks: 20	Credit Value: 01 Credits

Course learning outcome

➢ Assemble required parts/devices and arrange them to perform experiments.
➢ Record/observe data as required by the experimental objectives.
➢ Analyze recorded data and formulate it to get desired results.
➢ Interpret results and check for attainment of proposed objectives related to laws of mechanics and its applications.

Keywords: Moment of Inertia, Pendulum, Vernier Calipers, Screw Gauge, Travelling microscope, Elastic Constant, Searle's Method, Stoke's Method, Capillary Rise Method, Viscosity, Surface Tension.

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	02nd Sem.	DSC	PHSC-02T	Electricity and Magnetism
Total Marks: 100		Minimum Passing Marks: 40		Credit Value: 03 Credits	

Course learning outcome

➢ State various laws related with electrostatics, dielectric, electric current, magnetism and electromagnetic induction.
➢ Apply vector (electric field, Coulomb's law) and scalar (electric potential, electric potential energy) formalisms of electrostatics.
➢ Compare rise and decay of current in LR, CR, LCR circuits.
➢ Apply Biot-Savart law for calculation of magnetic field in simple geographic situations.
➢ Derive and analyze Maxwell's equations.

Keywords: **Vector calculus, Electrostatics, Dielectrics and Electric Current, Magnetism, Electromagnetic Induction, Maxwell's Equation and Electromagnetic Wave Propagation.**

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	02nd Sem.	DSC	PHSC-02P	Electricity and Magnetism
Total Marks: 50		Minimum Passing Marks: 20		Credit Value: 01 Credits	

Course learning outcome

➢ Verify various circuit laws, network theorems, using simple electric circuits, Assemble required parts/devices and arrange them to perform experiments.
➢ Verity various laws in electricity and magnetism such as Lenz's law, Faraday's law and lean about the construction, working of various measuring instruments.
➢ Record/observe data as required by the experimental objectives. Analyze recorded data and formulate it to get desired results.
➢ Interpret results and check for attainment of proposed objectives related to laws of Electricity, Magnetism and its applications.

Keywords: **Multimeter, Capacitance Comparison, Magnetic Field, RC Circuit, Series LCR Circuit, Parallel LCR Circuit, Low Resistance Measurement, Electrical Theorems.**

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	03rd Sem.	DSC	PHSC-03T	Heat and Thermodynamics
Total Marks: 100		Minimum Passing Marks: 40		Credit Value: 03 Credits	

Course learning outcome

➢ Demonstrate a deep comprehension of the fundamental principles of thermodynamics, including concepts such as energy, entropy and laws of thermodynamics.
➢ Apply the laws of thermodynamics to analyze and solve problems related with energy

transfer, heat engines, refrigeration system and other thermodynamics processes.

➢ Analyze basic aspects of kinetic theory and transport phenomenon in gases.

Keywords: Zeroth and First Law of Thermodynamics, Second Law of Thermodynamics, Entropy, Thermodynamics Potentials, Maxwell's Thermodynamics Relations, Kinetic Theory of gases, Distribution of Velocities, Molecular Collisions, Real Gases, Laws of Radiation.

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	03rd Sem.	DSC	PHSC-03P	Heat and Thermodynamics
Total Marks: 50		Minimum Passing Marks: 20		Credit Value: 01 Credits	

Course learning outcome

➢ Lab Proficiency: Thermometers, pressure gauges calorimeters, heat transfer apparatus, experimental setup, and data acquisition.
➢ Hands-on Learning: Heat transfer, work done, entropy, phase transitions, experiments.
➢ Data Analysis: Experimental data, theoretical discrepancies, analysis.
➢ Predictive Skills: Thermodynamics behavior, varying conditions, experimentation.
➢ Theory-Practice Integration: theoretical knowledge, practical lab work, synthesis, applications.

Keywords: Thermal conductivity, Thermocouple, Newton's law of cooling, Temperature coefficient of resistance, Heat efficiency, Specific heat ratio, Mechanical equivalent of heat, Planck's constant.

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	03rd Sem.	DSE	PHSE-01	Introduction to statistical Mechanics
Total Marks: 100		Minimum Passing Marks: 40		Credit Value: 03 Credits	

Course learning outcome

➢ Differentiate between macro state and microstate and calculate their numbers.
➢ Comprehend the concept of ensemble and its requirement in study of physical phenomenon.
➢ Correlate and compare the classical and quantum statistical distribution laws
➢ Apply concepts of statistical distribution laws for different physical systems.

Keywords: Macro state and Microstate, Ensemble, Distribution Laws, Bose-Einstein Statistics, Fermi-Dirac Statistics.

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	04th Sem.	DSC	PHSC-04T	Waves and Optics
Total Marks: 100		Minimum Passing Marks: 40		Credit Value: 03 Credits	

Course learning outcome

➢ Analyze the behavior of waves propagating through different mediums and predict how factors such as density, elasticity, and temperature affect wave propagation.

➢ Demonstrate an understanding of interference phenomena, including constructive and destructive interference, and apply this knowledge to solve problems involving wave superposition.

➢ Explain the concept of diffraction and its implications for wave propagation, including how waves bend around obstacles and spread out after passing through narrow openings.

➢ Describe the polarization of waves, including linear, circular, and elliptical polarization, and apply polarization concepts t analyze and manipulate electromagnetic waves.

Keywords: Longitudinal and transverse waves, Principle of Superposition, Haidinger Fringes, Fresnel Diffraction, Fraunhofer Diffraction, Polarization.

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	04th Sem.	DSC	PHSC-04P	Waves and Optics
Total Marks: 100		Minimum Passing Marks: 40		Credit Value: 03 Credits	

Course learning outcome

➢ Gain proficiency in operating laboratory equipment such as light source i.e. mercury, sodium and laser, spectrometers, polarimeter, demonstrating competence in setting up experiments, calibrating instruments, and collecting accurate data.

➢ Develop a deep understanding of optical principles such as refractions in various scientific disciplines.

➢ Analyze recorded data and formulate it to get desired results.

Keywords: Waves Motion – General, Velocity of Waves, Wave Optics, Interference, Interferometer, Diffraction, Polarization, Spectrometer.

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	04th Sem.	DSE	PHSE-02	Mathematical Physics – I
Total Marks: 100		Minimum Passing Marks: 40		Credit Value: 03 Credits	

Course learning outcome

➢ Revise and apply the knowledge of calculus, vectors, vector calculus, Probability and probability distributions in various cases.

➢ Illustrate proficiency in writing and solving Differential equation and solving them for a given physical system.

➢ Apply and interpret the curvilinear coordinates in problems with spherical and cylindrical symmetries.

➢ Use Dirac Delta function for various physical situation, especially in quantum mechanical approaches.

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	3rd Year	Practical	PHY-03 P	LAB 3

Total Marks: 50	Minimum Passing Marks: 17	Credit Value: 02 Credits

Course learning outcome

- Understand the working of semiconductor diode, LED, transistor, and their characteristics.
- Understand the working of rectifier, filter and regulator etc.
- Understand the function of Zener diode as voltage regulator.
- Gain knowledge about amplifier and logic gates.

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	3rd Year	Theory	PHY-05T	Digital, Analogue Circuits and Instrumentation

Total Marks: 50	Minimum Passing Marks: 17	Credit Value: 04 Credits

Course learning outcome

- Understand the basic principles and industrial applications of semiconductor diode, Zener diode and transistor.
- Understand the construction working and applications of transistor.
- Gain the knowledge of analogue and digital circuits.
- Understand the construction and working principles of various instruments that are used in the physics laboratory.
- Develop interest in electronic components.

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	3rd Year	Theory	PHY-06T	Elements of Modern Physics

Total Marks: 50	Minimum Passing Marks: 17	Credit Value: 04 Credits

Course learning outcome

- Gain of advanced theoretical and experimental method including the use of numerical

method.
- ➢ Understand the basic postulates of quantum mechanics.
- ➢ Gain knowledge about physical quantities as operators.
- ➢ Understand the Schrodinger equation and its Applications
- ➢ Gain knowledge about structure of nucleus, nuclear fission and fusion and be familiar of nuclear energy.

Keywords: Planck's Quantum Theory, de-Broglie waves, Davisson Germer experiment, Bohr's Quantization Rule, Heisenberg Uncertainty Principle, Operator, Schrodinger Equation, Eigen value and Function, Potential Barrier, Atomic Nucleus, NZ Graph, Nuclear Force, Semi-empirical mass formula, Radioactivity, Decay, Fission and Fusion, Nuclear Reactor.

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	1/3/5 Sem.	VAC	PHVAC-01	Renewable Energy and Energy Harvesting
Total Marks: 50		**Minimum Passing Marks: 20**		**Credit Value: 02 Credits**	

Course learning outcome

- ➢ Energy crisis at national and international scenario.
- ➢ Renewable sources of energy and their importance.
- ➢ Availability of renewable energy sources in India.
- ➢ Knowledge about energy harvesting technology.

Keywords: Fossil Fuel, Renewable Energy Sources, Solar Energy, Biomass Energy, Electromagnetic Energy Harvesting, Piezoelectric Energy Harvesting.

Program Level	Program Name	Class	Course Type	Course Code	Course Name
U.G.	B.Sc.	2/4/6 Sem.	SEC	PHSEC-01	Basic Electrical Skill
Total Marks: 50		**Minimum Passing Marks: 20**		**Credit Value: 02 Credits**	

Course learning outcome

- ➢ Understanding importance of accuracy in measuring physical quantities.
- ➢ Using basic mechanical tools.
- ➢ Using various measuring instruments.
- ➢ Fault finding and repairing simple domestic applications.

Keywords: Measurement, DC and AC Circuits, Heating & Lighting effect of Current, Safety Measurements, Screwdriver, Pliers, Hacksaw, Spanner, Electric Kettle, press, Cooler, Geezer and Invertor repairing.

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