BSc Physics and Computer Applications

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- **Programme Outcome(PO)**
- **Programme Specific Outcome (PSO)**
- **Course Outcome (CO)**

PROGRAMME OUTCOMES (PO)

The programme is designed with the intension that the graduate will be able to accomplish the following programme outcomes at the completion of the FDP in Physics

NO.	PROGRAMME OUTCOMES
PO – 1	**CRITICAL THINKING: -** Instill an attitude of being inquisitive, develop a capacity to become an active leaner through self-governing and reflective thinking in order to identify and analyze the logic connections between theoretical Physics and its applications
PO – 2	**EFFECTIVE COMMUNICATION: -** Competent proficiency in communication to deliver the acquired knowledge, problem solving skills, analyzing capacity formally or informally to a spectrum of spectators.
PO – 3	**SKILL DEVELOPMENT:** - Practical oriented and problem- solving approach provide opportunity to develop knowledge and skills to the best of their potential.
PO – 4	**INDIVIDUAL AND TEAM WORK:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO – 5	**DIGITAL COMPETENCE:** Ability to use techniques, skills and modern information technology tools at their study and work place.
PO – 6	**SOCIAL ACUITY AND OBLIGATION: -** Impart perception about social issues, human values, foster scientific temper, practice inclusiveness for the betterment of the society and disseminate scientific knowledge in appropriate situation.
PO – 7	**ENVIRONMENTAL AWARENESS: -** Discern the environmental issues and involves in promoting ethics and attitudes that endorse coexistence and sustainable living with reduced, minimal, or no damage upon ecosystems
PO – 8	**MULTIDISCIPLINARY APPROACH:** -Interdisciplinary and multidisciplinary approaches permit to gain a solid foundation in various disciplines of science and provide a basis for higher studies and research
PO – 9	**SUSTAINABLE LEARNING: -** make the students to realize that acquiring knowledge and skills suitable for their professional developments is a never-ending process
PO – 10	**ETHICAL STANDARDS:** - Inspire the students to recognize values such as justice, equity, trust, kindness and to develop a commitment and upholding standards of ethical behavior in all walks of life.

PROGRAMME SPECIFIC OUTCOMES (PSO)

The Programme Specific Outcomes that the graduates will be able to attain on completion of FDP in Physics are the following: -

No.	Upon completion of B.Sc. Physics Degree programme, the graduates will be able to	PO. No.
PSO – 1	Conceptual understanding of Physics and its practical applications and scope in the present world.	PO – 1
PSO – 2	Analyzing the theory part with practical experiments, interpretation of experimental results, finding out errors, suggestions to improve the errors.	PO – 1 PO – 2 & PO – 3
PSO – 3	Develop and construct practical model systems from their conceptual knowledge.	PO – 1 PO – 2 & PO – 3
PSO – 4	Acquire conceptual understanding of properties of matter, fundamentals of mechanics and their practical applications	PO – 1 & PO – 3
PSO – 5	Acquire knowledge about basics of thermodynamics and working of heat engines and their practical applications	PO – 1 PO – 3 & PO – 7
PSO – 6	Acquire the theoretical basis of electrodynamics, Magnetism, Super conductivity, Classical, Statistical and Relativistic Mechanics, Optics, Solid State Physics, Quantum Mechanics, Nano technology	PO – 1& PO – 8
PSO – 7	Distinguish Microscopic Macroscopic Systems and statistical distributions	PO – 1
PSO – 8	Acquire conceptual understanding of Physics to General real-world situations.	PO – 1 & PO – 6
PSO – 9	Integrate the Quantum Mechanics to understand the fundamentals of other branches of Physics such as Vibrational, Raman, Electronic, Resonance Spectroscopy	PO – 1 & PO – 6
PSO – 10	Identify possible atomic and molecular energy levels and transitions and predict the existence of new elements	PO – 1
PSO – 11	Develop an idea regarding X-rays, and different spectroscopic techniques	PO – 1
PSO – 12	Acquire the knowledge of the basic idea about Electronics, Digital Electronics and working of different electronic components	PO – 1&

		PO – 2
PSO – 13	Apply the Langrangian and Hamiltonian formalisms to solve various dynamical problems which involve constraints.	PO – 1 & PO – 3
PSO – 14	Basic understanding and concepts of the causes, effects, and control of various types of environmental pollution.	PO – 1& PO – 7
PSO – 15	Students will use the knowledge of Mechanics to describe the motion of objects in different force fields.	PO – 1
PSO – 16	Develop Basic idea about linear and non- linear optical phenomena and their practical application in real world	PO – 1 & PO – 3
PSO – 17	Use advanced computer language for problem solving and practical applications	PO –3 PO – 5 PO – 8& PO – 9
PSO – 18	Acquire knowledge about the concept of project and methodology in research	PO – 4 PO – 5 PO – 8 & PO – 10
PSO-19	Develop the ability to collaborate with peers in a scientific/lab atmosphere.	PO – 2 PO – 4

COURSE OUTCOMES (CO)

SEMESTER 1

PC1121: MECHANICS, THERMODYNAMICS & PROPERTIES OF MATTER

CO. No	Upon completion of this course student will be able to	Cognitive Level
CO -1	Understand the Moment of inertia of various bodies and apply this to find moment of inertia of rigid bodies	**U, An**
CO -2	Interpret the flavor of classical fields from oscillations	**U, Ap**
CO -3	Apply the laws of thermodynamics to various processes and systems. Solve problems related to thermodynamic systems	**U, Ap**
CO -4	To develop a fundamental understanding of entropy in different processes	**U**
CO -5	Understand the basic principles of heat transfer	**U, An**
CO -6	To understand the basic ideas of moduli of elasticity. Apply basic concepts of properties of matter in solving problems efficiently. To find practical applications of moduli of elasticity in different situations	**U, An, Ap**
CO -7	Understand the concepts of surface tension and viscosity	**U**

R: Remember, U: Understand, Ap: Apply, An: Analyze, E: Evaluate, C: Create

SEMESTER 3

PC 1341-ELECTRODYNAMICS AND CIRCUIT THEORY

CO. No.	Upon completion of this course student will be able to	Cognitive Level
1	To define, explain and illustrate fundamental concepts from electricity, magnetism , electromagnetism and circuit theory	**R,U**
2	To apply fundamentals laws like Gauss's law etc. to solve and analyze problems and formulations from electricity, magnetism and electrodynamics	**Ap,An**
3	To explain and illustrate alternating current and analyze AC circuits	**Ap,An**
4	To illustrate and design electric circuits using circuit theory.	**An,C**

SEMESTER 4

PC1441: CLASSICAL MECHANICS AND THEORY OF RELATIVITY

CO No.	Upon completion of this course, students will be able to	Cognitive Level
CO-1	Familiarize with Newtonian Mechanics	**R**
CO-2	Understand various theories of classical mechanics	**U**
CO-3	Solve mechanical problems using Lagrangian Dynamics	**U, Ap**

PC1442: OPTICS

CO. No	Upon completion of this course, students will be able to	Cognitive Level
CO-1	Get knowledge on the basic concepts of light such as Interference, Diffraction, Dispersion and Polarisation	**U**
CO-2	Study the production and detection of polarized light.	**U**
CO-3	Understand the working principles of laser and optical fibers.	**U**
CO-4	Extend their knowledge in explaining different phenomena of light based on interference and diffraction.	**U , Ap**

SEMESTER 5

PC 1541: STATISTICAL AND QUANTUM MECHANICS

CO. No.	Upon completion of this course, students will be able to	Cognitive Level
CO – 1	Able to define phase space, microstate, macrostate and ensemble	U
CO – 2	Learn to distinguish different statistical distributions and judge which distribution applies to a given system	Ap

PC 1542: ELECTRONICS (72 hrs. - 4 Credits)

CO. No.	Upon completion of this course, students will be able to	Cognitive Level
1	Understand the working of semiconductor diodes and analyze diode circuits for rectifiers and voltage regulators	**U, An**
2	UExplain the working of bipolar junction transistors and analyze transistor biasing circuits	**An, Ap**
3	Design and analyze Single Stage Common Emitter amplifier	**An, Ap**
4	Understand feedback principles and construct sinusoidal oscillator circuits	**U, An**
5	Design and analyze basic operational amplifier circuits	**An. Ap**

PC1641: SOLID STATE PHYSICS

CO. No	Upon completion of this course, students will be able to	Cognitive Level
CO-1	Understand the crystal structure of different materials and lattice dynamics.	**U**
CO-2	Understand the X ray diffraction.	**U**
CO-3	Extend their knowledge in theoretical fundamentals of electron theory	**U, Ap**
CO-4	Explain the concept of phonons and lattice vibrations.	**U**
CO-5	Understand the properties of dielectric and ferroelectric materials.	**U, Ap**
CO.6	Describe the concept of superconductivity.	**U, Ap**

PC 1642- ATOMIC, MOLECULAR AND NUCLEAR PHYSICS

CO. No	Upon completion of this course, students will be able to	Cognitive Level
CO-1	Understand the fundamental aspects of atomic Physics	**U**
CO-2	Understand the behavior of atoms in electric and magnetic fields.	**U**
CO-3	Examine the construct of many electron atoms spectra.	**U, Ap**
CO-4	Understand the rotational and vibrational spectra of molecular structure	**U, Ap**
CO-5	Understand the general facts and fundamental properties of nucleus.	**U**
CO-6	Illustrate the various nuclear models such as Liquid drop model, Nuclear shell model.	**U, Ap**
CO-7	Describe the nuclear decays and nuclear reactions along with their occurrence probabilities.	**U, Ap**

PC1661.1: ASTRONOMY AND ASTROPHYSICS

CO No	On successful completion of the course, students will be able to	Cognitive Level
CO 1	Familiarize and appreciate the field of astronomy	**U**
CO 2	Comprehend astronomical scales and basic concepts of positional astronomy and can understand about stellar parameters and spectral classification.	**U, Ap**
CO 3	Basic information about the formation of stars, their magnitudes and luminosity	**R,U**

PRACTICALS

Students must be given a brief description of units, errors, significant figures and graphs. They must be familiarised with screw gauge, Vernier calipers, travelling microscope etc. using simple experiments.

SEMESTER 1 & 2

PC1242- MECHANICS, PROPERTIES OF MATTER, HEAT AND ACOUSTICS

CO.NO.	Upon completion of this course, students will be able to	Cognitive Level
CO1	Familiarize with the precautions and steps of systematic recording of an experiment.	**U, Ap**
CO2	Understand multiple experimental techniques for determining physical quantities.	**U, Ap**
CO3	Develop skill in setting up of apparatus for accurate measurement of physical quantities.	**U, Ap**
CO4	Apply and illustrate the concepts of mechanics, heat and acoustic experiments	**U, Ap**

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SEMESTER 3 & 4

PC1443- ELECTRICITY AND MAGNETISM

CO.NO.	Upon completion of this course, students will be able to	Cognitive Level
CO1	Understand and differentiate between different circuit elements and their use in a circuit	**U, Ap**
CO2	Familiarize with the precautions and steps of systematic and accurate recording of an experiment.	**U, Ap**
CO3	Understand multiple experimental techniques for determining physical quantities.	**U, Ap**

CO4	Develop skill in setting up apparatus for accurate measurement of physical quantities.	**U, Ap**
CO5	Develop skill in identifying and rectifying the errors in a circuit connection	**An , Ap**
CO6	Apply and illustrate the concepts of electricity and magnetism experiments.	**U, Ap**

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SEMESTER 5 & 6

PC 1643 OPTICS AND BASIC ELECTRONICS

CO No	**On successful completion of the course, students will be able to**	**Cognitive Level**
CO 1	Understand how to use a spectrometer	**U**
CO 2	Obtain a practical understanding of the refraction of light by a prism	**U, Ap**
CO 3	Use basic laws to study the spectral and optical properties of the given prism and grating	**U, Ap**
CO 4	Apply the knowledge to understand the working of PN junction diode and Zener diode	**U, Ap**
CO 5	Apply basic laws and theories to construct basic circuits involving diodes and transistors	**Ap**

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PC 1644: Digital Electronics, Computational Physics and Project work (core)

CO No	On successful completion of the course, students will be able to	Cognitive Level
CO 1	Understand the working of gates and verify their operation	**U**
CO 2	Design and construct basic combinational circuits	**U, Ap**
CO 3	Design and construct basic sequential circuits	**U, Ap**
CO 4	Basic understanding of python programming	**U**
CO 5	Apply python programming skills to solve computational physics problems	**Ap**
CO 6	Be initiated into the basics of research	**U**
CO 7	Imbibe sound moral and ethical values	**Ap**

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COMPUTER APPLICATION

PC1171: COMPUTER FUNDAMENTALS AND ORGANIZATION

CO1	Remember the basic concepts of computer
CO2	Understand the functional knowledge about PC hardware, operations and concepts.
CO3	Understand the functional units of a standard PC and it's working.
CO4	Understand the memory organization in a computer.

PC1221: PROGRAMMING IN C

CO1	Remember the basics of computer
CO2	Understand the structure of program writing
CO3	Apply control structures and pointers
CO4	Analyze user defined functions
CO5	Evaluate dynamic memory allocation
CO6	Create string handling functions

PC1371: MICROPROCESSORS

CO1	Remember the basic concepts of computers.
CO2	Understand the functional units of a standard PC and its working.
CO3	Understand the architectural features of 8086 processor.
CO4	Create assembly language programs for 8086 processor.
CO5	Apply the tools debug, TASM/ MASM.

PC1372: DATA STRUCTURES

CO1	Remember purpose of Data Structures
CO2	Understand different Data Structures
CO3	Apply programming languages
CO4	Analyze working of different data structures
CO5	Evaluate expressions
CO6	Create different Data Structures

PC1471: SOFTWARE ENGINEERING

CO1	Understand the importance of having a process for software development.
CO2	Familiarize with various software testing techniques and tools.
CO3	Apply various models in the software development projects.
CO4	Analyze the process of software development

PC1472: PYTHON PROGRAMMING

CO1	Remember the concepts of python programming
CO 2	Understand data types and differences
CO3	Apply CGI programming
CO4	Analyze the concepts of database programming in python
CO5	Evaluate the usage of Python package installer PIP
CO6	Create programs using libraries such as Flask, SQLAlchemy, Pandas, numpy etc..

PC1571: DATABASE MANAGEMENT SYSTEMS

CO1	Understand the concept of database.
CO2	Develop skills to design an ER diagram.
CO3	Create database using SQL and perform operations in SQL.
CO4	Familiarize the management of concurrent transactions.
CO5	Apply the design concepts and normalization in database easily.

PC1671: COMPUTER NETWORKS AND SECURITY

CO1	Remember various network technologies, design issues and characteristics
CO2	Understand the purpose of computer networks and the basic issues in information security
CO3	Apply the use of layer architecture for networking systems, information security measures
CO4	Analyze the concept of different models of network and the working of various ciphers

PC1672: OPERATING SYSTEMS

CO1	Understand working of various Operating Systems
CO2	Apply constrained resource allocation, process scheduling and memory management techniques
CO3	Evaluate synchronization of processes and protection of an Operating System
CO4	Analyse salient features available to various Operating Systems