

DEPARTMENT OF PHYSICS

Programme: M.Sc., Physics

Plan, execute and report the results of an extended experimental/theoretical physics based project in a research environment.

PO No.	Programme Outcomes Upon completion of the M.Sc. Degree Programme, the graduate will be able to
PO-1	Gain mastery in the field of Physics and be able to effect a constructive impact in multi-disciplinary areas.
PO-2	Plan, execute and report the results of an extended experimental / theoretical physics based project in a research environment.
PO-3	Apply theoretical knowledge of physical principles and mathematical techniques to practical problems
PO-4	Be adept in the usage of the techniques, skills and modern physics tools for sustained professional development.
PO-5	Compete in competitive examinations to take up assignment in public/private sectors.

PSO No.	Programme Specific Outcomes Upon completion of these courses the student would
PSO-1	Students should be able to Learn the Systemic Physical Concepts, Principles and theories and along with their Application.
PSO-2	Students should be able to know the Advance Techniques and ideas in the Area of Classical and Quantum Mechanics, Mathematical Physics, Condensed Matter Physics, Thermodynamics and Statistical Physics, Nuclear and Particle Physics, Atomic and Molecular Spectroscopy, Advanced Electronics and Material Science.
PSO-3	To give an Extended Knowledge about the Laboratory Experiments and Data Analysis through Conceptual Physics.
PSO-4	To Enhance the Current Research Skills and Encourage the Students to Develop the Research Based Activity.
PSO-5	Students are Motivated to do the Scientific Communication for their Research Projects.

Course Title	CLASSICAL MECHANICS	
CODE	23PHPC101	
CO No.	Course Outcomes	Knowledge Level
CO-1	Understand the Newton's laws of motion to solve problems involving the dynamic motion of classical mechanical systems	K2
CO-2	Analyze the kinematics of Elastic and Inelastic scattering and to explore the dynamics of rigid body	K4
CO-3	Realize the elementary concepts of mechanics, and attain profound knowledge in the principles of Lagrangian and Hamiltonian	K2
CO-4	Evaluate the different types of generating functions by means of Canonical transformation	K5
CO-5	Build the mechanics of small oscillations applicable to different systems	K3

Course Title	MATHEMATICAL PHYSICS – I	
CODE	24PHPC102	
CO No.	Course Outcomes	Knowledge Level
CO-1	Apply to solve ordinary second order differential equations essential in physical problems	K4
CO-2	Acquires Knowledge about the special mathematical functions such as Legendre and Bessel	K3
CO-3	Acquires Knowledge about the special mathematical functions such as Hermite and Laguerres	K3
CO-4	Relate Laplace transform methods to solve elementary differential equations of interest in physics and engineering	K2
CO-5	Expand periodic functions using Fourier series under a valid condition	K2

Course Title	COMPUTATIONAL METHODS AND PROGRAMMING	
CODE	23PHPC103	
CO No.	Course Outcomes	Knowledge Level
CO-1	Understand the basic idea about finding solutions using computational methods	K2
CO-2	Explore the concepts involved in eigen values and interpolation and learn how to interpret and analyze data visually	K4
CO-3	Employ the tools needed to formulate numerical differentiation and integration	K3
CO-4	Compute the solution of differential equations and apply it to real-world problems	K3
CO-5	Assess numerical algorithms through MATLAB and visualize the results of the computations	K5

Course Title	QUANTUM MECHANICS – I	
CODE	24PHPC104	
CO No.	Course Outcomes	Knowledge Level
CO-1	Familiarize the concept of linear vector space, Hermitian operator and Heisenberg Uncertainty Principle	K2
CO-2	Understand the role of uncertainty in quantum physics and establishing the commutation relationship between components of angular momentum	K2
CO-3	Apply Schrödinger equation to obtain wave functions for some basic, physically important types of potential in one dimension and three dimension	K3
CO-4	Analyze the approximate methods needed to formulate quantum mechanical problems	K4
CO-5	Evaluate the solution of many electron system by integrating the ideas of Central field approximation, Thomas Fermi model and Hartree Folk equation	K5

Course Title	MATHEMATICAL PHYSICS – II	
CODE	23PHPC205	
CO No.	Course Outcomes	Knowledge Level
CO-1	Analyze a formal treatment of probability theory and to equip with essential tools for statistical analysis	K4
CO-2	Understand the basic concepts underlying complex analysis	K2
CO-3	Apply group theory and integral transforms to solve mathematical problems of interest in physics	K3
CO-4	Establish the relation for linearly dependent and independent vectors	K4
CO-5	Build up a solid background of tensor analysis required to understand the properties of materials and their structures	K5

Course Title	ADVANCED ELECTRONICS	
CODE	23PHPC206	
CO No.	Course Outcomes	Knowledge Level
CO-1	Know about the current voltage characteristics of semiconductor devices	K2
CO-2	Develop their knowledge in understanding the various parameters of operational amplifiers and their linear applications	K3
CO-3	Explain the combinational and sequential logic circuits	K5
CO-4	Examine the design aspects of I/O and memory interfacing circuits	K4
CO-5	Acquire knowledge of the 8086 instruction set to utilize it in programming and to distinguish the properties of Microprocessors & Microcontrollers	K3

Course Title	QUANTUM MECHANICS – II	
CODE	23PHPC207	
CO No.	Course Outcomes	Knowledge Level
CO-1	Apply the concept of time dependent perturbation theory to develop Fermi Golden Rule	K3
CO-2	Understand the interaction of particles through scattering theory	K2
CO-3	Impart the knowledge of theory of radiations on the basis of semi classical treatment	K2
CO-4	Analyze the behavior of particles at high energies and velocity comparable to the speed of light using relativistic wave equations	K4
CO-5	Focus the dynamics of quantum field theory	K5

Course Title	CORE PRACTICAL-I GENERAL EXPERIMENTS	
CODE	23PHPCP01	
CO No.	Course Outcomes	Knowledge Level
CO-1	Understand the basics of physics involved in experiments and to compare the results with theoretical calculations.	K2
CO-2	Develop the skill of performing experiments accurately.	K3
CO-3	Gain knowledge of new conception in the solution of practical oriented problems and to virtually visualize the experiments through MATLAB programming.	K3
CO-4	Explore the concepts of measurement technology, usage of new instruments and real time application in day to day requirements.	K4
CO-5	Enhance the basic communication skills in the course of performing the laboratory experiments in groups and by interpreting the results	K6

Course Title	CORE PRACTICAL-II ELECTRONICS	
CODE	23PHPCP02	
CO No.	Course Outcomes	Knowledge Level
CO-1	Acquire knowledge on the different experimental techniques involved in electronics.	K3
CO-2	Explain the functions of various semiconductor devices and op amps characteristics.	K5
CO-3	Develop the link connecting theory and designing workable circuits	K3
CO-4	Analyze, design, build and troubleshoot the combinational circuits using digital ICs.	K4
CO-5	Think innovatively and also improve the creative skills that are essential for present day requirements.	K4

Course Title	CONDENSED MATTER PHYSICS	
CODE	23PHPC308	
CO No.	Course Outcomes	Knowledge Level
CO-1	Know the basic idea about Crystal defect	K4
CO-2	Analyse the lattice vibration and Thermal Properties	K3
CO-3	Gain the knowledge Energy band and Semiconductor crystal	K3
CO-4	Know about Dia and Para magnetic material and its application	K2
CO-5	Realize the concept of Superconductivity	K2

Course Title	ELECTROMAGNETIC FIELDS AND WAVES	
CODE	23PHPC309	
CO No.	Course Outcomes	Knowledge Level
CO-1	Understand the solid foundation of the behaviour of static electric fields and to solve Laplace equation	K2
CO-2	Acquire Knowledge about the basic laws in static magnetic fields to find the various parameters with the related problems	K3
CO-3	Analyze Maxwell's equations in differential and integral forms and attain intense knowledge in the Poynting's theorem for the electromagnetic fields	K4
CO-4	Evaluate and solve electromagnetic wave equation in different propagating media and to study reflection/ transmission of plane waves	K5
CO-5	Formulate and solve problems in relativistic electrodynamics in four-dimensional space-time	K6

Course Title	CRYSTAL GROWTH AND THIN FILM PHYSICS	
CODE	23PHPE321	
CO No.	Course Outcomes	Knowledge Level
CO-1	Know the fundamentals of crystal growth	K1
CO-2	Acquire adequate knowledge about the different methods of preparation of crystal growth	K2
CO-3	Understand the fundamentals of thin film and preparation techniques	K2
CO-4	Gain knowledge about the growth mechanism and techniques involved in the measurement of thickness of thin films	K3
CO-5	Discuss electrical and optical aspects of thin films relevant to their applications	K3

Course Title	NUCLEAR AND PARTICLE PHYSICS	
CODE	23PHPC410	
CO No.	Course Outcomes	Knowledge Level
CO-1	Explain the origin of the various terms in the semi-empirical mass formula and the properties of nuclear ground and excited states based on the shell model	K2
CO-2	Demonstrate the radioactive laws to acquire the knowledge of alpha, beta and gamma decays and with models for calculating these decays	K3
CO-3	Analyze different type of nuclear reactions by applying conservation laws and understand the theoretical cross section of nuclear reactions	K4
CO-4	Explain experimental techniques used in neutron and nuclear detectors and understand the classification of neutrons	K5
CO-5	Describe the four fundamental interactions and concepts of elementary particles	K6

Course Title	MOLECULAR SPECTROSCOPY	
CODE	23PHPC411	
CO No.	Course Outcomes	Knowledge Level
CO-1	Know about the rotational spectrum of diatomic and polyatomic molecules by using microwave and Raman spectroscopy	K2
CO-2	Acquire the knowledge of Infrared spectroscopy and to study the functional groups of molecules	K4
CO-3	Impart the ideas and concepts associated with electronics spectroscopy in atoms	K2
CO-4	Gain knowledge the vibrational spectra and their progressions of molecules by electronic spectroscopy	K5
CO-5	Introduces the ideas of spin resonance spectroscopy	K3

Course Title	THERMODYNAMICS AND STATISTICAL MECHANICS	
CODE	23PHPC412	
CO No.	Course Outcomes	Knowledge Level
CO-1	Understand the Entropy and Second law of thermodynamics and the concept relating Thermodynamic Equilibrium	K2
CO-2	Analyze the basic concepts of Phase space and ensemble and to explore the Density distribution in phase space	K4
CO-3	Familiarize the basic difference exists between Microstates and Macro states by adopting the Principle of equi-partition of energy	K2
CO-4	Relate the different types of Statistical systems and interpreting with the Thermodynamic parameter and to acquire knowledge on Specific heat of solids	K5
CO-5	Explore the relation connecting the energy and pressure of ideal Bose Einstein gas and Fermi-dirac gas and their applications	K6

Course Title	CORE PRACTICAL-III ADVANCED EXPERIMENTS	
CODE	23PHPCP03	
CO No.	Course Outcomes	Knowledge Level
CO-1	Understand the concept of optics and to measure various parameters by advanced experiments	K2
CO-2	Develop the skill of performing experiments accurately and to compare the results with theoretical calculations	K3
CO-3	Gain knowledge and to determine the values with advanced experimental methods	K3
CO-4	Explore the concepts of solid state physics such as hall effect in a practical way	K4
CO-5	Enhance the basic research idea in thin film technology by dip coating method	K6

Course Title	CORE PRACTICAL - IV SPECIAL ELECTRONICS	
CODE	23PHPCP04	
CO No.	Course Outcomes	Knowledge Level
CO-1	Achieve practical knowledge by designing different counters	K3
CO-2	Explain the functions of microprocessor for developing programs to interfacing with circuits	K5
CO-3	Develop the link in connecting theory with designing practical circuits	K3
CO-4	Analyze and design the applications of digital ICs and diodes	K4
CO-5	Improve the creative skills and advanced level of thinking in designing the logic circuits	K4