Department of Physics

Program Outcomes and Program Specific Outcomes: M. Sc. Physics

Department of Physics	After successful completion of two year degree program in physics a student should be able to
Programme Outcomes	PO-1.Demonstrate, solve and an understanding of major concepts in all disciplines of physics PO-2.Apply the theories learnt and the skills acquired to solve real time problems. PO-3.Acquire a wide range of problem solving skills, both analytical and computational and to apply them. PO-4. Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of Physics experiments. PO-5. Inculcate the scientific temperament in the students. PO-6. Use modern techniques equipments PO 7-. Become professionally trained in the area of electronics, material science, nuclear physics, condensed matter physics, nano technology and lasers
Programme Specific Outcomes	PSO-1. Introduce advanced techniques and ideas required in developing area of Physics. PSO-2. Enhance students‟ ability to develop mathematical models for physical systems. PSO-3 Gain both theory and practical knowledge of Physics . PSO-4. Understand and apply principles of physics for understanding the scientific phenomenon in classical and quantum physics. PSO-5. Understand and apply statistical methods for describing the quantum and classical particles phenomenon in various physical systems. PSO-6. Understand good laboratory practices and safety. PSO-7. Develop research oriented skills. PSO-8. Make aware and handle the sophisticated instruments/equipments.

Course Outcomes M. Sc Physics

COURSE		OUTCOMES After completion of these courses students should be able to ;
Semester I		
1.1	Classical Mechanics	CO1: Learn basic ideas of Newtonian Mechanics. CO2: Understand the Lagrangian approach in classical mechanics and solve problems using it. CO3: Gain the knowledge of motion in central force field CO4: Study Kinematics and Dynamics of rigid body in detail and ideas regarding Euler's equations of motion CO5: Understand the Hamiltonian approach in classical mechanics and solve problems using it CO6: Get knowledge of canonical transformation and Poisson's bracket
1.2	Quantum Mechanics-I	CO1: To understand inadequacy of classical mechanics and origin of Quantum mechanics. CO2: To provide an understanding of the formalism and language of non-relativistic quantum mechanics. CO3: The students will be able to formulate and solve problems in quantum mechanics using Schrödinger and Dirac representation.

		CO4: And to understand the concepts of time-independent perturbation theory and their applications to physical situations. CO5: The students will be familiar with various approximation methods applied to atomic, nuclear and solid-state physics. CO6: To understand the basics of scattering theory
1.3	Mathematical and Computational Methods of Physics-I	CO1: Learn about special type of matrices that are relevant in physics and then learn about tensors. CO3: Analyse the wide range of special functions and their use in solving complex physics problems. CO4: Analyse the various integral transforms of different series and their applications in physics. CO5: Learn Fortran programming.
1.4	Basic Electronics	CO1: The Students will be able to use techniques for analyzing analogue and digital electronic circuits; CO2: Formulate the concepts of operational amplifier and Field Effect Transistors (FET); identify its major properties and main types of FET and op-amps circuits.
1.5	Practical –I Basic Electronics lab	CO1:Apply the knowledge to understand the working of amplifiers, oscillators and multivibrators CO2:Understand analog and digital circuits
1.6	Practical –II General Physics lab-I	CO1: Educate The Basics Of Instrumentation, Data Acquisition And Interpretation of Results CO2: Have a deep knowledge of fundamentals of optics and spectroscopy
	Semester II	
2.1	Statistical Mechanics	CO1: Explain statistical physics and thermodynamics as logical consequences of the postulates of statistical mechanics and Grasp the basis of ensemble approach in statistical mechanics to a range of situations CO2: work out equations of state and thermodynamic potentials CO3:describe the features and examples of Maxwell-Boltzmann, Bose-Einstein and FermiDirac statistics CO4:understand fluctuations in various ensembles CO5:to model Brownian motion and random walk problem
2.2	Electrodynamics	CO1: Understand the laws of electrostatics and magnetostatics CO2: Use Maxwell equations in analysing the electromagnetic field due to time varying charge and current distribution. CO3: Understand the covariant formulation of electrodynamics and the concept of retarded time for charges undergoing acceleration.
2.3	Quantum Mechanics –II	CO1: To understand the concepts of the time-dependent perturbation theory and their applications to physical situations. CO2: The students will be able to grasp the concepts of identical particles, spin and angular momentum, as well as their quantization and addition rules and symmetry principles. CO3: To apply the concepts of relativity to Quantum mechanics and obtain relativistic wave equations and to grasp the concepts of spin arising naturally from the Dirac equation.

		CO4: Understand quantization of wave fields.
2.4	Mathematical and Computational Methods of Physics-II	CO1: Elaborate the understanding of group theory. CO2: Elaborate the understanding of complex variables. CO3: Identify a range of numerical methods that are essential for solving problems in physics CO4: Learn C-programming technique to solve problems in physics.
2.5	Practical III-General Physics lab-II	CO1: Have a deep knowledge of fundamentals of optics.
2.6	Practical IV-Numerical Methods and computation	CO2: Understand the fundamentals of programming CO3: Write C program for simple applications of real life using structures
		Semester III
3.1	Atomic, Molecular and Optical Physics	CO1: The students will have an understanding of quantum behavior of atoms in external electric and magnetic fields; CO2: Describe the spectra of single and multiple electron atoms including fine- and hyperfine structure of hydrogen like atoms, different types of coupling such as L-S and J-J couplings. CO3: Explain the effect of electric and magnetic field on the atomic spectrum CO4: Analyse the spectra of diatomic molecules such as electronic, rotational, vibrational spectra and Raman spectroscopy
3.2	Nuclear Physics (General)	CO1: Acquire basic knowledge about nuclear properties such as mass, spin, radius, binding energy etc. CO2: understand the features of nuclear forces, exchange force and Yukawa'smeson theory. CO3: develop the understanding of various nuclear reactions and models CO4:learn the decay process and interaction of radiation with matter. CO5: learn about the concept nuclear energy, elementary particles and conservation laws.
3.3	Condensed Matter Physics (General)	CO1: understand the concepts of the crystal classes and symmetries CO2: calculate the Braggs conditions for X-ray diffraction in crystals. CO3: create understanding crystal binding and lattice vibrational properties of solid state systems. CO4: learn the basics of the Band theory of solids, Magnetic behaviour materials and defects in solids CO5: gain basic knowledge of semiconductors.
3.4(a)	Nuclear Physics – I (Special)	CO1:Learn Advanced concepts of Nuclear forces CO2: Nucleon- Nucleon interactions at low energy and high energy. CO3:Analyse the statistics of of nuclear particles With the help of Multi channel analyser.
3.4(b)	Condensed Matter Physics –	CO1: to describe the different crystal structures

	I (Special)	CO2: will be able to draw the energy bands, Brillouin zones and Fermi surface. CO3: to formulate basic models for quantization of lattice vibrations and elastic properties of CO3:understand electrical transport in metals and semiconductors.
3.5	General Physics Lab-III	CO1: Educate The Basics Of Instrumentation, Data Acquisition And Interpretation of Results CO2:Study various material properties CO3:to analyze and interpret experimental data using graphs
3.6(a)	Nuclear Physics Lab-I (Special)	CO1: Apply the theory to find the solutions of practical problems. CO2: various simulation techniques which can be used in future by students to analyse the data. CO3: how to handle nuclear materials and nuclear safely management
3.6(b)	Condensed Matter Physics lab -I(Special)	CO1: Understand advanced concepts and mathematical methods of Condensed Matter physics. CO2: Practice problem solving by using selected problems in Condensed Matter physics. CO3: Explore important connections between theory, experiment, and current applications. CO4: Analyze the problem studied through analytical calculation
		Semester IV
4.1(a)	Nuclear Physics – II (Special)	CO1:Advanced topics of Nuclear fission,Gamma decay and elementary particle physics CO2:Understand the construction and working of Nuclear reactors
4.1(b)	Condensed Matter Physics – II (Special)	CO1: know the magnetic properties of materials CO2: CO3:Study the ubiquity of dielectrics. CO4:Understand ferroelectrics.
4.2(a)	Nuclear Physics – III (Special)	CO1: underatand partial wave and perturbation approach of nuclear reactions. CO2:Understand the various nuclear models like shell model, collective model,rotational model and Nilsson model.
4.2(b)	Condensed Matter Physics – III (Special)	CO1:to explain effect of doping in semiconductors. CO2: to explain the transport properties,Magnetic field effects and optical properties of semiconductors. CO3:understand fabrication of semiconductor devices CO4:study low dimensional semiconductor structures CO5:Understand thin film preparation methods and thickness measurements of thin films.
4.3(a)	Atmospheric Science	CO1:Understand dynamics of meterology CO2: Understand dynamics of mansoon CO3:Develop numerical methods for atmospheric models CO4: Understand working of atmospheric instrumentation systems.

4.3(b)	Material Science	CO1:study structure of solids CO2: understand the various techniques involved in Crystal Growth. CO3: the basic concepts on Solid phases and phase diagrams. CO4: understand the phase transformations and diffusion solids.
4.3(c)	Biophysics	CO1: Understand the interdisciplinary applications of physics to life sciences.
4.4(a)	Astrophysics	CO1: Understand the basic concepts of astrophysics. CO2: Apply principles of physics to astronomical objects.
4.4(b)	Physics of Laser and Laser Applications	CO1: characteristics of the laser systems CO2:Know about the basic working principal of different kind of laser systems and use of it in practical applications.
4.4(c)	Physics of Nanomaterials	CO1:Understand the basics of nanotechnology CO2:Understand the Quantum confinement effects. CO3: To learn various approaches for the synthesis and fabrication of nanomaterials, nanostructures and nanoscale devices CO4: To learn various advanced methods of characterization techniques for the in depth characterization of materials at nanolevel.
4.5(a)	Nuclear Physics lab-II(Special)	CO1:Study the characteristics of GM Counter CO2:Study the Backscattering of beta particles
4.5(b)	Condensed Matter Physics lab-II (Special)	CO1:To analyse the X-ray diffraction CO2: Study the variation of resistance with temperature of thin films by using four probe method. CO3:determination of optical constants and energy gap using transmission data
4.6	Project Dissertation and viva-voce	CO1: Understand the importance of experimental and theoretical analysis. CO2: Develop a Scientific approach in solving problems related to physics. CO3: Educate and train the students to write scientific papers.