Programme outcome (PO)1-M.Sc. Physics

The Master of Science in Physics program provides the candidate with knowledge, general competence, and analytical skills on an advanced level, needed in industry, consultancy, education, and research.

On completion of program, the post graduates will

- Apply the knowledge and skill in the design and development of Electronics circuits to fulfill the needs of Electronic Industry.
- Become professionally trained in the area of electronics, optical communication, nonlinear circuits, materials characterization and lasers.
- Pursue research related to Physics and Materials characterization.
- Demonstrate highest standards of Actuarial ethical conduct and Professional Actuarial behavior, critical, interpersonal and communication skills as well as a commitment to life-long learning.

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Course Outcome (CO):

S.No.	Subject Name	Outcome
CO1.	Mathematical Physics-	Knowledge about Vector calculus, Bessel Functions, Legendre Differential equations, complex variable, Laplace transforms, Fourier Series etc and their physical significance is learnt by students. These mathematical concepts are widely used in various physics derivations. Students will come to know about: • Hermite & Laguerre Polynomials,Tensors, Partial Differential equations and Group Theory. • The Physical Significance of each method is taught to have knowledge about their applications
CO2.	Classical mechanics	This paper enables the students to understand : • The Lagrangian and Hamiltonian approaches in classical mechanics. • The classical background of Quantum mechanics and get familiarized with Poisson brackets and Hamilton -Jacobi equation. • Two body central force problem • Special theory of relativity • Kinematics and Dynamics of rigid body in detail and ideas regarding Euler's equations of motion. • Theory of small oscillations in detail along with basis of Free vibrations. • Theory of rigid body kinematics and dynamics.
CO3.	Quantum Mechanics	After successful completion of this paper, the student will be well-versed in • Linear vector spaces, Hilbert space, concepts of basis and operators and bra and ket notation. • Both Schrödinger and Heisenberg formulations and their applications. • Theory of angular momentum and spin matrices, orbital angular momentum and Clebsh Gordan Coefficients. • Space-time symmetries and conservation laws, theory of identical particles, Oscillators

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CO4.	Electronics-I	On completion of this course the student will learn about : • Field effect transistors, Bipolar junction transistors, amplifiers, Oscillators and their applications. • Feedback in Amplifier and network theorem • Power amplifiers and regulator.
CO5	Communication Skills	• Human Communication • Greeting and Introducing • Science Communication and Personality Development Skill
CO6	IT Fundamentals	• Basic concepts of information technology • MS Office • MATLAB • Information Science

CO7.	Laboratory Practice: (i) Electronics Lab (ii) General Lab	Students will have hand on experience of : • Amplifiers, diodes, FET, MOSFET, Network Theorem, Rectifier and filter circuit. • BH Curve, Fourier Analysis, Flashing and Quenching, Specific Charge for electron by Helical Method • CRO
CO8.	Quantum Mechanics II	After successful completion of this paper, the student will be well-versed in • Time Dependent and independent Perturbation Theory, • Variational Method, • WKB Method, • Collision Theory and Relativistic Quantum Mechanics. • Many Particle Systems
CO9.	Nuclear & Particle Physics	On completion of this course the student will learn about: • have a basic knowledge of nuclear size, shape, binding energy. etc and also nuclear models • Radioactive decays, Nuclear Forces and Nuclear reactions. • Particle Physics

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CO10.	Electronic Devices and Circuits -II	On completion of this course the student will learn about: • Operational amplifiers, comparator and applications, Voltage regulators and features of Timer 555. • Multivibrators and Oscillators • Optoelectronic Devices
CO11.	Physics of Electronic Devices and Fabrication of Integrated Circuits and Systems	On completion of this course the student will learn about: • Microwave devices,photonic devices and all othe electronic devices. • Fabrication of integrated devices
CO12	Solid State Physics	After successful completion of the course, the student is expected to : • have a clear picture of crystal structures and a clear understanding about x-ray diffraction, magnetic and dielectric properties of matter • expected to gain knowledge of superconductivity, its underlying principles and its applications in modern world.
CO13.	Laboratory Practice: 1. Electronics Lab 2. General Lab	Students will have hand on experience of : • Semiconductor Diode Laser, Optoelectronic Devices, Hall coefficient • Operational Amplifier, Multivibrator • GM Counter, Frank Hertz experiment, Dielectric coefficient of Polar and Non-Polar Liquids, Ionization potential of lithium, Stefan Constant
CO14	Seminar	As per current Syllabus
CO15	Open Elective	As per list by the department of university.

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Programme specific outcome (PSO) 2 - (M.Sc. Physics II)

The M.Sc.-II (Physics) Program includes various core courses such as condensed matter physics, statistical mechanics, nuclear and particle physics, spectroscopy and microprocessors. The choice of advanced elective courses offers a glimpse in the frontier areas of research and allows students to work on research projects. The program also provide adequate exposure to the students for pursuing higher education in the field of technology (M. Tech.), Physics (M.Phil./Ph.D.) and other job opportunities in academia and industry. The diverse lab experiments allow students to understand the fundamental aspects of the subject.

Course outcome (CO):

S. No.	Subject Name	Outcome
CO1	Electrodynamics	After successful completion of the course, the student is expected to : • have gained a clear understanding of Maxwell's equations. • know that laws of reflection, refraction are outcomes of electromagnetic boundary conditions. They will also be able design dielectric coatings which act like antireflection coatings. • Boundary value problems in electrostatics • have gained a clear understanding of Maxwell's equations. • have grasped the idea of electrostatics and Magnetostatics along with time varying fields the characteristics of nuclear force in detail. • reactions, Fission and Fusion and their characteristics. • Potential, Fields and Radiation • Electrodynamics and Relativity
CO2.	Atomic and Molecular Physics	After successful completion of the course, the student is expected to: • know about different atom model and will be able to differentiate different atomic systems, different coupling schemes and their interactions with magnetic and electric fields. • Have gained ability to apply the techniques of microwave and infrared spectroscopy to elucidate the structure of molecules. • To become familiar with different resonance spectroscopic techniques and its applications. • to find solutions to problems related • different spectroscopic systems.

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CO3 A	Material Science I	The student will get familiar with • Crystal imperfections • Diffusion in solids and mechanical properties • Phase transformations and heat treatment • Microstructure, Material Processing and Characterization
CO3 B	Radiation Physics	The student will get familiar with • Sources of Radiation and their interaction • Biological effects of ionizing radiation • Principles of Radiological Projection
CO3 C	Physics of Nano Materials	The student will get familiar with • Review of Density of State • Reduced Dimensional System • Synthesis/Fabrication of Nano-Materials/Nano-structures and their characterization
CO4 A	Condensed Matter Physics I	Students will know about: • Introducing basic concepts via diffraction methods, lattice vibrations and free electrons, Hall effect. • Understanding the basic transport properties of metals and semiconductors. • Their introduction to the band structures for studying different materials • Dielectric and Ferroelectrics • Magnetism
CO4 B	Nuclear and Particle Physics	On completion of this course the student will learn about : • acquire knowledge about nuclear decay processes and their outcomes. Have a wide understanding regarding alpha, beta and gamma decay. • understand the basic forces in nature and classification of particles and study in detail conservations laws and quark models in detail • ion accelerators and ion beam interaction in solids • Nuclear reactors
CO5	Electronics I	On completion of this course the student will learn about: • Introduction and number system • Logic gates and Boolean algebra • Combinational circuits , sequential circuits
CO6	Physics Laboratory 1. Electronics Laboratory I 2. Electronic Laboratory II	Students should be able to: • Logic Gates, A/D and D/A convertor • Adder and Subtracter • Semiconductor Diode Laser • Flip Flop • Heat Capacity of Solid • Magnetic Susceptibility • Hall Coefficient • Faraday Law using He-Ne Laser

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CO7	Seminar	As per syllabus provided by university.
CO8	Open Elective II	As per syllabus provided by university.
CO9	Statistical Mechanics	Students should be able to : • Apply the principles of statistical mechanics to selected problems. • Grasp the basis of ensemble approach in statistical mechanics to a range of situations. • To learn the fundamental differences between classical and quantum statistics and learn about quantum statistical distribution laws, Study important examples of ideal Bose systems and Fermi systems • Phase Transitions
CO10	Atomic and Molecular Physics II	Students should be able to: • Atomic Physics • Molecular Physics • NMR Spectroscopy • ESR Spectroscopy
CO11 A	Computational Physics	The students will have detailed theoretical understanding of : • Errors, Differentiation and integration • Solution of Differential equation • Solution of algebra equation and simulation of selected physics problems • Computer fundamentals and programming with Fortran 77
Co11B	Material Science II	After successful completion of the course, the student is expected to: • Material testing • Magnetic Materials • Dielectric, Optical and Ferroelectric materials • Solid surfaces and analysis
CO11C	Experimental techniques in Physics	After successful completion of the course, the student is expected to : • Experimental Techniques to observe the defects in lattice • Surface analytical techniques • Optoelectronic devices • Spectroscopic and scanning probe techniques
CO12A	Condensed Matter Physics II	Students will have hand on experience of : • Electron transport phenomenon • Nanostructures and electron transform • Many particle physics – 2nd quantization formulation
CO12B	Nuclear Physics II	Students will have hand on experience of : • Two nucleon problem • Nuclear reaction theory • Nuclear models I & II

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CO13	Electronics II	Students will have hand on experience of : • Negative resistance devices • Modulation and demodulation • IC Fabrication I & II
CO14	Physics Laboratory 1. General Physics 2. Computational Physics	Students should be able to: • Four Probe method • Michelson interferometer • GM Counter • Dielectric constant • Modulus of rigidity and internal friction in metals • Numerical Integration • Numerical differentiation • Least square fitting • Runge-Kutta Method • Solution of LCR Circuit • Solution of H atom problem • Finding Eigen Values and Eigen Vectors of Square matrices
CO15	Seminar	As per current Syllabus

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