2014-2018 Admission (MSc Physics)

Programme Outcomes

Develop the ability to chart out a progressive direction for actions and interventions by learning to recognize the presence of hegemonic ideology within certain dominant notions.

To define a research problem, translate ideas into working models, interpret the data collected, draw the conclusions and report scientific data in the form of a dissertation.

Identify, classify and extrapolate the physical concepts and related mathematical methods to formulate and solve real physical problems.

To disseminate scientific knowledge and scientific temper in the society to contribute towards the greater human cause.

Explore new knowledge independently for the development of the nation and the world and are able to engage in a lifelong learning process.

Programme Specific Outcomes

PSO1: Understand and apply the principles of Classical mechanics, Quantum mechanics, Electronics, Thermodynamics, Mathematical Physics, Computational Physics and Electrodynamics.

PSO 2: Develop the skills of critical analysis and problem-solving required in the application of principles of Physics.

PSO 3: Demonstrate a strong capability of organizing and presenting acquired knowledge both on oral and written platforms.

2019 Admission Onwards (MSc Physics)

Programme Outcomes

Develop the ability to chart out a progressive direction for actions and interventions by learning to recognize the presence of hegemonic ideology within certain dominant notions.

To define a research problem, translate ideas into working models, interpret the data collected, draw the conclusions and report scientific data in the form of a dissertation.

Identify, classify and extrapolate the physical concepts and related mathematical methods to formulate and solve real physical problems.

To disseminate scientific knowledge and scientific temper in the society to contribute towards the greater human cause.

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Programme Specific Outcomes

PSO1: Understand and apply the principles of Classical mechanics, Quantum mechanics, Electronics, Thermodynamics, Mathematical Physics, Computational Physics and Electrodynamics

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Course Outcome

Sl. No.	Name of Course (paper)	Outcomes	
1	PHY1C01 MATHEMATICAL PHYSICS -I	i	Understand Orthogonal matrices-Hermitian Matrices-Unitary matrices-Diagonalisation of matrices
		ii	definition properties-the Beta function
		iii	Understand Orthogonal coordinates, Curvilinear coordinates
		iv	Application of Hermite function- Laguerre functions
2	PHY1C02 CLASSICAL MECHANICS	i	Understand Scattering in a central force field
		ii	Deduction of Hamilton's principle
		iii	Elementary ideas of calculus of variation
		iv	Formulation of the problem-Lagrange's equations of motion for small
		v	Understand the basic concepts of modelling
		vi	Solve Rate of change of a vector
		vii	Estimate Free vibrations of a linear triatomic molecule.
3	PHY1C03 ELECTRODYNAMICS	i	Understand the concept of Electric field, electric potential, magnetic field and magnetic potentials
		ii	Use the principle of superposition and law of Gauss to calculate electric field Intensity
		iii	Determine Electric potential of charge distributions and hence specify electric field intensity
		Iv	Formulate Maxwell's equations and their empirical basis
		v	What is radiation
4	PHY1C04 ELECTRONICS	i	Understand the basics of operational Amplifier- -- Differential amplifier circuit using transistors--
		ii	Understand the structure, operations and characteristics of The ideal Operational amplifier—Open loop and closed loop Op-amp configurations
		iii	Understand the Basic Op-amp circuits—Summing, scaling and averaging amplifier

		Iv	Understand the DE Multiplexers—Applications of Multiplexers
		v	Understand the Microprocessors: Intel 8085—functional block diagram
5	PHY1P01/PHY2P01 – (Practical-I)-BASIC PHYSICS LABORATORY-I	i	Familiarize with apparatus for mechanical, electrical, magnetic and optical experiments.
		ii	Develop skill in setting up an apparatus for accurate measurement of physical quantities.
		iii	Understand multiple experimental techniques for determining physical quantities.
		Iv	Develop skill in systematic way of measurements by minimizing possible errors.a
		v	Develop skill to analyze by plotting graphs using software.
		vi	Develop the skill for systematic troubleshooting.
		vii	Perform error analysis for experiments.
6	PHY2C06 QUANTUM MECHANICS-I	i	troubleshooting
		ii	Explain Schrodinger, Heisenberg and Interaction pictures
		iii	Understand Rutherford, Bohr atom models and concept of energy and angular momentum quantisation
		Iv	Understand Orbital angular momentum – General formalism of angular momentum – Matrix representation of angular momentum
		v	Determine Time independent perturbation theory - non-degenerate and degenerate cases - stark and effect in a Hydrogen atom
		vi	state and explain space-time symmetries, Space translation and conservation of linear momentum
7	PHY2C07 MATHEMATICAL PHYSICS- II	i	Understand the concept of Infinite series-Series of function-Binomial theorem
		ii	One dimensional problem - Problems in two and three dimensions.
		iii	Determine Fourier transform
		Iv	Understand the Abelian and Non-Abelian group
		v	Calculate the Schur's lemmas
		vi	Properties of Laplace

			transform-Laplace convolution theorem-
8	PHY2C 08 STATISTICAL MECHANICS	i	Understand the concept of Postulates of equilibrium thermodynamics
		ii	Explain the Statistical Basis of Thermodynamics and Microcanonical Ensemble
		iii	Understand Liouville's theorem and its significance
		Iv	Understand Canonical ensemble-Equilibrium between system and reservoir
		v	Define simple uniaxial ferromagnets
9	PHY2C 09 SPECTROSCOPY	i	Understand the Hydrogen atom and the three quantum numbers-spectra
		ii	Understand the normal Zeeman effect
		iii	Understand Regions of the spectrum-classification of molecules
		Iv	Understand The vibrating diatomic molecule
10	PHY3C10 QUANTUM MECHANICS –II	i	Understand Time-dependent perturbation theory
		ii	State Scattering cross-section, scattering amplitude of spinless particles
		iii	Explain identical particles, Construction of symmetric and antisymmetric wave functions-
		Iv	Understand the Klein-Gordon equation
		v	Discuss Equation of continuity
		Vi	Describe Delayed choice experiment, Einstein-Bohr controversy
11	PHY3C11 SOLID STATE PHYSICS	i	Understand the Bragg law - Scattered wave amplitude - Brillouin Zones
		ii	Vibrations of crystals with monatomic and diatomic basis
		iii	Analyse Energy levels in 1D
		Iv	Understand the Intrinsic carrier concentration
		v	Understand Superconductivity
		Vi	Explain ferromagnetic domains
12	PHY3C12 NUCLEAR AND PARTICLE PHYSICS	i	Nuclear size, shape, mass and binding energy, semi-empirical mass formula
		ii	Define The shell model, shell model potential
		iii	Familiarize Beta decay, Energy release in beta decay
		Iv	Understand Types of reactions and conservation laws

		v	Understand Basic forces and classification of particles:
		Vi	the TCP theorem, conservation of parity
		vii	quantum chromodynamics and gluons Enough exercises
13	PHY4C14 OPTICS	i	Understand the basic concepts of Spatial and temporal coherence
		ii	Explain coherent states and their properties
		iii	Understand different Lasers
		Iv	Understand the basic concepts of Nonlinear polarization of the medium
14	PHY4C15 NUMERICAL TECHNIQUES & PROBABILITY	i	Probability definition
		ii	Understand the Binomial distribution
		iii	Understand the Bisection method, ordinary iteration method,
15	PHY3P03/PHY4P03- (Practical –III) - ADVANCED PHYSICS AND ELECTRONICS	i	Develop skill in setting up apparatus for accurate measurement of physical quantities.
		ii	Understand multiple experimental techniques for determining physical quantities.
		iii	Develop skill in a systematic way of measurements by minimising possible errors.
		Iv	Develop skill in the construction of rectifiers, voltage regulators, amplifiers and oscillators.
16	PHY3E01- PLASMA PHYSICS	i	Understand the Existence of plasma
		ii	Understand the Debye shielding 1D and 3D
		iii	The set of fluid equations
		Iv	Understand The problem of controlled fusion-magnetic confinements such as toruses – mirrors
17	PHY3E02-RADIATION PHYSICS	i	Types of radiations, ionizing, non-ionizing, electromagnetic
		ii	Explain bremsstrahlung, range energy relation
		iii	Understand Particle flux and fluence
		Iv	Explain Basic concepts of cell biology, Effects of ionizing radiations at molecular, submolecular and cellular levels,
18	PHY3E03 -MICROPROCESSOR AND APPLICATIONS	i	Define Assembly language programming—subroutine—delay routine— Assembly language programming in 8085 .

		ii	Understand Memory mapping and I/O mapping
		iii	Need for interrupts—types of interrupts—software interrupts of 8085
19	PHY3E04- CHAOS & NONLINEAR PHYSICS	i	Familiarise Linearity and non-linearity
		ii	Understand the Qualitative features of non-linear systems
		iii	Explain the Chaos in nonlinear electronic circuits
		Iv	Understand the basic concepts of Lyapunov exponents
20	PHY3E05- ATMOSPHERIC PHYSICS	i	Familiarise aSub earth and the atmosphere.
		ii	Familiarise latitudinal and seasonal variations.
		iii	Understand the Stability criteria – parcel method
		Iv	Explain Atmospheric pollution
21	PHY 4E06-OPTOELECTRONICS	i	Understand the p-n junction principles - open circuit-
		ii	Explain the double heterostructure
		iii	Understand the generation of high power pulses, Q-factor
		iv	Wave propagation in an anisotropic crystal - polarization response of to light
22	PHY4E07-ASTROPHYSICS	i	Understand the basic concepts of Absolute magnitude and distance modulus,
		ii	Explain the Structure and evolution of stars
		iii	Understand the basic concepts of The space-time dynamics of the Universe
23	PHY4E08- ELECTRONIC INSTRUMENTATION	i	Understand the Basic characteristics of measuring devices instruments
		ii	Explain principles of transducers
		iii	Understand the basic principles of Cathode ray oscilloscopes
24	PHY4E09- COMMUNICATION ELECTRONICS	i	Antenna parameters – Effects of ground on antenna
		ii	Understand the basic concepts of Amplitude modulation and demodulation circuits
		iii	Understand the basic concepts of Pulse amplitude modulation
		Iv	Understand the basic concepts of optical heterodyne

			receivers-analogue system design
25	PHY4E10- CONDENSED MATTER PHYSICS	i	Understand the basic concepts of Hartree Fock approximation; Plasmons and electron plasmon interactions
		ii	Understand the basic Physics of alloy formation
		iii	Understand the basic concepts of Diffusion in solids, Vacancies, dislocations and mechanical strengths
		Iv	Understand the basic concepts of Nanomaterials and Quantum mechanics
26	PHY4E11-NANOSCIENCE AND TECHNOLOGY	i	Familiarise Optical microscopies- Mass and Ion beam spectroscopy- X-ray diffraction
		ii	Develop skill in setting up apparatus for accurate measurement of physical quantities.
		iii	Understand Carbon nanostructures
		Iv	Giant and colossal magnetoresistance
27	PHY4E12 -EXPERIMENTAL TECHNIQUES	i	Understand the basic concepts of Units and basic definitions, Roughing pumps - Oil sealed rotary vacuum pump and Sorption pump
		ii	Understand Thermoelectric power, Interference filters
		iii	Analyse Liquefaction of gases – Internal and external work methods
		Iv	Describe Henning and Hydrogen vapour cryostat,