

PROGRAMME: M.Sc. PHYSICS

Programme Outcomes

- PO1:** Acquired the ability for critical thinking and problem solving
- PO2:** Attained life skills and communication skills
- PO3:** Inculcated moral and ethical values
- PO4:** Become a promoter of unpolluted environs and proactive society
- PO5:** Developed a culture of research and lifelong learning
- PO6:** Become an empowered woman aware of global perspectives and national realities

PROGRAMME SPECIFIC OUTCOME

	Program Specific Outcomes
PSO1	Demonstrate substantial knowledge in various subfields of physics such as classical mechanics, mathematical physics, quantum mechanics, electrodynamics, solid state physics, statistical mechanics, lasers and optical fibers etc.
PSO2	Acquire considerable knowledge in mathematical methods, and practical knowledge in supported fields like computer science.
PSO3	Gain research experience within a specific field of physics through a supervised project and become familiar with contemporary research within various subfields of physics.
PSO4	Complete an original, creative project that demonstrably advances human knowledge within their subfield
PSO5	Communicate effectively the results of the research project to professionals within their subfield and within the broader physics community, through both oral presentation and written work.
PSO6	Demonstrate fluency in comprehension of the research literature in subfields of their interest.
PSO7	Acquire scientific, technical and engineering skills to become employable in a variety of industries

***R-remember, U-understand, A- apply, Z- analyze, E- evaluate, C- create**

***F-factual, C-conceptual, P-practical/procedural**

Course Outcomes

CORE COURSES:

Course Code: SJPHY1C01

Name of the Course: CLASSICAL MECHANICS

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions(appr.)
CO1	Understand Lagrangian formulations and its applications in various classical systems.	PSO1	R, U A, Z	C	10
CO2	Understand Hamiltonian formulations and its applications in various classical systems.	PSO1	R, U A, Z	C	7
CO3	Understand Hamilton – Jacobi formulation and the classical background of quantum mechanics.	PSO1	U, A	C	19
CO4	Understand the Kinematics and Dynamics of rigid bodies.	PSO1	U, A	C	14
CO5	Understand the theory of small oscillations and its applications.	PSO1	U, A	C	9
CO6	Understand nonlinear equations and chaos.	PSO1	U, A	C	13

Course Code: SJPHY1C02

Name of the Course: MATHEMATICAL PHYSICS I

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions(appr.)
CO1	Understand orthogonal curvilinear coordinates and its application in different coordinate system	PSO2	U Ap,E	C	11
CO2	Understand matrices and tensors in various field of physics	PSO2	U Ap,E	C	11
CO3	Understand second order differential equation and its application in various field of physics	PSO2	U Ap,E	C	14
CO4	Understand Special functions and its application in various field of physics	PSO2	U Ap,E	C	24
CO5	Understand Fourier series and its application in various field of physics	PSO2	U Ap,E	C	12

Course Code: SJPHY1C03

Name of the Course: ELECTRODYNAMICS AND PLASMA PHYSICS

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions(appr.)
CO1	Understanding the basics concepts of Maxwell's equation in time varying fields.	PSO1	U	C	14
CO2	Analyzing the behavior of plane waves in unbounded media.	PSO1	Z	P	13
CO3	Understanding the behavior of plane waves in guided structure like transmission line, wave guides and cavity resonators	PSO1	An	P	14
CO4	Applying relativity in the field of electrodynamics and presenting it in tensor notations.	PSO1	Ap	P	15
CO5	Understanding the basic ideas of plasma and its applications	PSO1	U	C	16

Course Code: SJPHY1C04

Name of the Course: ELECTRONICS

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions(appr.)
CO1	Understand the concept of Field Effect Transistors.	PSO1	U	C	10
CO2	Understand the working principle of different types of microwave and photonic devices.	PSO1	U, Z	F	14
CO3	Understand the basic concept and characteristics of OP-AMP.	PSO1	U	C	12
CO4	Application of OP-AMP in Various electronic circuits	PSO1	Ap	F	14
CO5	Understand the concepts of flip flops, digital counters and architecture of Intel 8085 microprocessor.	PSO1	U	C	22

Course Code: SJPHY2C05

Name of the Course: QUANTUM MECHANICS I

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions(appr.)
CO1	Understand basic principles, mathematical methods for formulating Quantum mechanics.	PSO1	R, U	C	20
CO2	Understand different methods used in Quantum dynamics and develop skill to solve problems.	PSO1	R, U	C	20
CO3	Understand the theory of angular momentum and its applications.	PSO1	R, U A	C	15
CO4	Understand the theory of central potentials and its applications.	PSO1	U	C	8
CO5	Understand different invariance principles and the corresponding conservation laws.	PSO1	U, Z	C	9

Course Code: SJPHY2C06

Name of the Course: MATHEMATICAL PHYSICS II

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions(appr.)
CO1	Understand Complex variable theory and its applications in various fields of physics	PSO2	U,Z E	C	15
CO2	Understand group theory and its applications in various fields of physics	PSO2	U,Ap E	C	20
CO3	Understand the method of calculus of variation and its application in physics	PSO2	U,Ap	C	14
CO4	Understand the transformation of differential equation to integral form and different method to solve integral equations	PSO2	U,E	C	12
CO5	Understand the basic concept of Green's function	PSO2	U	C	11

Course Code: SJPHY2C07

Name of the Course: STATISTICAL MECHANICS

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions(appr.)
CO1	Understanding the basic ideas of statistical mechanics and its link with thermodynamics	PSO1	U	C F	13
CO2	Understanding different ensembles and the formulation of various thermodynamic variables	PSO1	U Ap	C P	21
CO3	Understanding the formulation of quantum statistics	PSO1	U	C	15
CO4	Understanding the thermodynamic behavior of Boson gas and its application taking photons and phonons as examples	PSO1	U Ap	F	10
CO5	Understanding the behavior of Fermi gas and its applications	PSO1	U Ap	F	13

Course Code: SJPHY2C08

Name of the Course: COMPUTATIONAL PHYSICS

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions (appr.)
CO1	Understand basic and advanced concepts in python programming.	PSO2	R, U	C	13
CO2	Understand the different tools for maths and visualization in python using numpy and pylab modules.	PSO2	U, Z	C	13
CO3	Develop skill to correlate python with various numerical techniques.	PSO2	C, A	C	30
CO4	Understand the concept of computer simulations used for problems in python.	PSO2	C, A	C	16

Course Code: SJPHY3C09

Name of the Course: QUANTUM MECHANICS II

	Course Outcome	POs/ PSO's	CL	KC	Class Sessions (appr.)
CO1	Understand and apply concepts of time independent perturbation theory.	PSO1	U, A	C	20
CO2	Understand and apply variational and WKB methods.	PSO1	U, A	C	12
CO3	Understand and apply concepts of time dependent perturbation theory.	PSO1	U, A	C	12
CO4	Understand different concepts of scattering.	PSO1	U	C	12
CO5	Understand and apply concepts of relativistic quantum mechanics.	PSO1	U, Z	C	16

Course Code: SJPHY3C10

Name of the Course: NUCLEAR AND PARTICLE PHYSICS

	Course Outcome	POs/ PSO's	CL	KC	Class Sessions (appr.)
CO1	Understand the properties of nucleus and the theory of nucleon- nucleon scattering.	PSO1	R, U	C	12
CO2	Understand the concept and theory of alpha, beta and gamma decay.	PSO1	U	C	12
CO3	Understand the theory of nuclear models and concept of nuclear fission and fusion	PSO1	U,Z	C	19
CO4	Understand the working principle of different types of nuclear detectors.	PSO1	U	F	12
CO5	Understand different nuclear reactions and conservation laws in particle physics	PSO1	R, U	C	9
CO6	Understand different models to classify of elementary particles	PSO1	U	C	8

Course Code: SJPHY3C11

Name of the Course: SOLID STATE PHYSICS

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions(appr.)
CO1	Understand various crystal structures, introduction to reciprocal lattice and crystal bondings.	PSO1	U Z	C	12
CO2	Understand lattice vibration and Einstein and Debye model of specific heat capacities	PSO1	U Z	F P	9
CO3	Introduction to free electron theory and semiconductor theory.	PSO1	U Ap	F	17
CO4	Understanding dielectric electric and magnetic properties of crystals	PSO1	U Z	F	22
CO5	Understanding basic principles of superconductivity	PSO1	U	F	12

Course Code: SJPHY4C12

Name of the Course: ATOMIC AND MOLECULAR SPECTROSCOPY

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions (appr.)
CO1	Understand the basic principle of vector atom model, Zeeman effect, Paschen Back effect and Stark effect	PSO1	U	F	12
CO2	Understand the principle of microwave and infrared spectroscopy	PSO1	U	F	17
CO3	Understand the principle of Raman spectroscopy	PSO3	U Ap	F	14
CO4	Understand the principle of vibrational analysis and rotational fine structure of electronic spectroscopy	PSO3	U Ap	F	12
CO5	Understand the principle of NMR,ESR and Mossabauer spectroscopy	PSO1	U	F	17

PRACTICALS FOR SEMESTER I AND II**Course Code: SJPHY1L01 & SJPHY2L03****Name of the course: GENERAL PHYSICS**

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions
CO1	Apply and illustrate the concepts of properties of matter through experiments	PSO7	A	P	72 per semester
CO2	Illustrate elementary experiments using laser	PSO7	A	P	
CO3	Apply and illustrate the experiments using spectrometer	PSO7	A	P	
CO4	Apply and illustrate experiments to find various constants(Plank's constant, susceptibility)	PSO7	A	P	

Course Code: SJPHY1L02 & SJPHY2L03**Name of the course: ELECTRONICS**

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions
CO1	Apply and illustrate the principles of transistor through experiments	PSO7	A	P	72 per semester
CO2	Apply and illustrate the principles of opamp IC 741 through experiments	PSO7	A	P	
CO3	Apply and illustrate the principles of opamp IC 555 through experiments	PSO7	A	P	
CO4	Apply and illustrate the principles of digital electronics through experiments	PSO7	A	P	

PRACTICALS FOR SEMSTER III & IV

Course Code: SJPHY3L05 & SJPHY4L06

Name of the course: MODERN PHYSICS

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions
CO1	Apply and illustrate experiments using various experimental techniques.	PSO7	Ap	P	72 per semester
CO2	Apply and illustrate experiments using semiconductor devices,	PSO7	Ap	P	
CO3	Apply and illustrate experiments using lasers and optical fibres.	PSO7	Ap	P	
CO4	Develop and analyze programs using Intel 8085 microprocessor.	PSO7	Ap	P	
CO5	Apply and illustrate experiments in optics	PSO7	Ap	P	

Course Code: SJPHY4L07

Name of the course: COMPUTATIONAL PHYSICS PRACTICAL

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions
CO1	Develop python program for various numerical methods.	PSO7	C	P	72 per semester
CO2	Develop python program for Monte Carlo method	PSO7	C	P	
CO3	Develop python program to simulate various physical systems.	PSO7	C	P	

ELECTIVE COURSES:**Course Code: SJPHY3E05****Name of the Course: EXPERIMENTAL TECHNIQUE**

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions (appr.)
CO1	Understand the concept of vacuum , different types of vacuum pumps, vacuum accessories and vacuum gauges.	PSO1	U	C	19
CO2	Understand the concept of thin film technology- thin film fabrication, thickness measurement and its application in physics and industry.	PSO1	U,Ap	F	14
CO3	Understand different types of accelerators.	PSO1	U,Z	F	8
CO4	Understand the different ion sources, ion implantation technique and its application	PSO1	U	C	6
CO4	Understand different nuclear technique for material analysis.	PSO1	U,Ap	F	15
CO5	Understand the basic concept of XRD	PSO1	U	C	10

Course Code: SJPHY4E13**Name of the Course: LASER SYSTEMS,OPTICAL FIBRES AND APPLICATIONS**

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions (appr.)
CO1	Understand the basic theory of lasers.	PSO1	U,E	C	18
CO2	Understand the working principle and energy level diagrams of various laser systems.	PSO1	U,Z	C	12
CO3	Understand the basic concepts of non linear optics.	PSO1	U	F	14
CO4	Understand the industrial and medical applications of lasers.	PSO1	Ap	F	13
CO5	Understand the basic structure ,theory and different types of optical fibres.	PSO1	U, Ap	F	15

Course Code: SJPHY4E20**Name of the Course: Microprocessors and Applications**

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions (appr.)
CO1	Understand Intel 8085 microprocessor and develop skill to write assembly language programme.	PSO1	U,C	C	12
CO2	Understand different methods for data transfer schemes and Intel 8085 timing.	PSO1	U	C	10
CO3	Understand different types of peripheral devices and how to interface with Intel 8085	PSO1	U	C	10

CO4	Understand the applications of microprocessors	PSO1	Ap	C	6
CO5	Understand the architecture of Intel 8051 microcontrollers and basics of AVR architecture.	PSO1	U,C	C	16
CO6	Understand concepts of AVR Programming language.	PSO1	C	C	18

AUDIT COURSES:

Course Code: SJPHY1A01

Name of the Course: ABILITY ENHANCEMENT COURSE(AEC)

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions(appr.)
CO1	Understand the recent trends in physics	PSO6	U	P	Nil
CO2	Develop the presentation skill.	PSO6	C	P	Nil

Course Code: SJPHY2A02

Name of the Course: PROFESSIONAL COMPETENCY COURSE(PCC)

	Course Outcome	POs/ PSOs	CL	KC	Class Sessions(appr.)
CO1	Understand the scientific document preparation system-LATEX	PSO6	U	P	Nil
CO2	Develop the creative skill.	PSO6	C	P	Nil