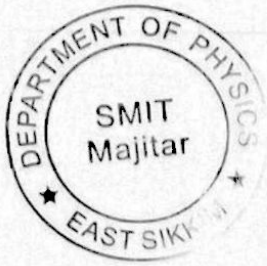
SMIT SIKKIM MANIPAL UNIVERSITY
SIKKIM MANIPAL INSTITUTE OF TECHNOLOGY

DEPARTMENT OF PHYSICS
SIKKIM MANIPAL INSTITUTE OF TECHNOLOGY
MAJITAR, EAST SIKKIM
COURSE OUTCOMES

Sl. No.	Semester	Subject Code	Subject Name	Course Outcomes	
1.	B. Tech. 1st & 2nd SEMESTER	Code: PH10101A	ENGINEERING PHYSICS	CO1	Implement the knowledge of oscillations and waves to solve related problems.
				CO2	Understand the concept of interference, diffraction, polarization and total internal reflection of light and their applications.
				CO3	Apply Quantum Mechanics to explain atomic phenomena.
				CO4	Understand the concept of free electron theory and band theory of solids and classify solids as conductor, semiconductor and insulator.
				CO5	Implement the knowledge of the properties of semiconductors and semiconductor devices.

DEPARTMENT OF PHYSICS
SMIT
Majitar
EAST SIKKIM

2	**1st & 2nd SEMESTER**	Code: PH10401A	ENGINEERING PHYSICS LAB	CO1	Understand the phenomena of oscillations and waves through experimentation.
				CO2	Apply the phenomena of thin-film interference, diffraction and polarisation.
				CO3	Demonstrate the properties of semiconductors and semiconductor devices.
				CO4	Analyse statistical errors in an experimental data.
				CO5	Apply the principle of photo-electric effect to find Planck's constant.
3	**SEMESTER : I** M. Sc. (Physics)	PH20101A	MATHEMATICAL PHYSICS	CO1	Solve tedious integrals using complex analytical method.
				CO2	Understand delta function, Fourier and Laplace transformation and their applications.
				CO3	Apply tensors to solve complex problems.
				CO4	Solve nonhomogeneous differential equations using Green's function.
				CO5	Explain the basic idea of group theory to understand the advance label of physics.
4	**SEMESTER : I** M. Sc. (Physics)	PH20102A	FUNDAMENTALS OF ELECTRONICS	CO1	Solve and analysis different electronic circuit networks such as filters.
				CO2	Understand and analysis the I-V characteristics of active electronic components.
				CO3	Understand, analyze and design electronic circuits used for the modulation and demodulation for different waves.



				CO4	Design electronic digital circuits using different GATES.
				CO5	Design different electronic circuits using OP-AMP such as differentiator, integrator etc.
5	**SEMESTER : I** M. Sc. (Physics)	PH20103A	CLASSICAL MECHANICS	CO1	Solve the mechanical problems by using Lagrangian & Hamiltonian methods.
				CO2	Apply the concept of canonical transformations and Poisson's brackets in solving problems of physics.
				CO3	Solve the dynamical systems by applying the Hamilton-Jacobi techniques.
				CO4	Solve Lagrange's equation of motion for small oscillations.
				CO5	Understand classical approach to deal with dynamic of rigid bodies.
				CO6	Understand the basics of nonlinear dynamics.
6	**SEMESTER : I** M. Sc. (Physics)	PH20104A	QUNATUM MECHANICS-I	CO1	Understand the mathematical preliminaries needed to study quantum mechanics.
				CO2	Understand the Concepts like matter waves, uncertainty principle, operator algebra, wave function.
				CO3	Solve the time independent Schrodinger equations for simple quantum systems

					like free particle motion, bound states, tunneling problem, hydrogen atom, linear harmonic oscillator.
				CO4	Understand the concepts of quantum harmonic oscillator.
				CO5	Apply the concepts of symmetry in quantum mechanics.
				CO6	Understand the concepts of rotational and spin angular momentum.
7	**SEMESTER : I** M. Sc. (Physics)	**PH20401A**	PHYSICS LAB – I (GENERAL PHYSICS LAB)	CO1	Apply wave properties for characterization of materials.
				CO2	Determine the thermal, electrical and magnetic properties of matters.
				CO3	Understand crystal structure and different distributions of radioactive decay.
				CO4	Analyze semiconducting and conducting materials for various applications.
				CO5	Understand electron associated various experiments for atomic and spectral analysis.
8	**SEMESTER : I**	**PH20402A**	PHYSICS LAB – II (PHOTONICS & SPECTROSCOPY)	CO1	Implement the working principle of optoelectronic devices.

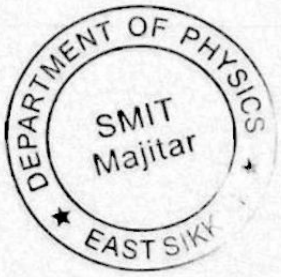
	M. Sc. (Physics)			CO2	Understand the phenomena of photoelectric effect and find Planck's constant.
				CO3	Analyse the properties of lasers, optical fiber and some select materials.
				CO4	Understand the principle of interference, diffraction and polarization through experimentation.
				CO5	Analyse the spectrum of some atomic systems.
9	**SEMESTER : II** M. Sc. (Physics)	**PH20105A**	CLASSICAL & RELATIVISTIC ELECTRODYNAMICS	CO1	Enhance the knowledge of electric and magnetic fields.
				CO2	Understand the motion of charged particle in presence of various combination of non-uniform electric and magnetic fields.
				CO3	Understand propagation of electromagnetic waves through bound systems like wave guide and transmission line.
				CO4	Understand the theory of radiation by point charge/dipoles.
				CO5	Understand the relativistic formulation of electrodynamics.
				CO6	Understand the theory of scattering process of electromagnetic waves by free or bound charge.

DEPARTMENT OF PHYSICS
SMIT
Majitar
EAST SIK

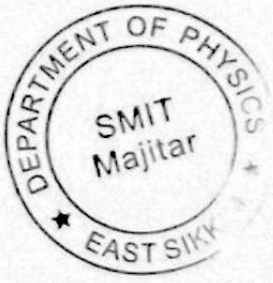
10	**SEMESTER : II** M. Sc. (Physics)	**PH20106A**	CONDENSED MATTER PHYSICS	CO1	Understand the conduction process in metals and energy the band gap.
				CO2	Understand, analyze, and calculate the lattice structure, different factor eg. miller indices, diffraction angle etc. of different solids.
				CO3	Understand the theory of vibration of lattice in a solid.
				CO4	Understand the thermal and dielectric properties for different solids.
				CO5	Understand the theory for different magnetic materials and calculate different parameters related to magnetic properties of solids.
				CO6	Understand the theory for superconductivity and nanostructures.
11	**SEMESTER : II** M. Sc. (Physics)	**PH20107A**	COMPUTATIONAL PHYSICS-I	CO1	Develop the skill to write basic programs using C language.
				CO2	Understand the various conditional statements and loops, Arrays, Pointers, structures and Errors.
				CO3	Solve problems using loops and arrays in C.
				CO4	Solve nonlinear equation using C.
				CO5	Explain the nterpolation and extrapolation techniques.
				CO6	Understand various curve fitting techniques.

DEPARTMENT OF PHYSICS SMIT Majitar EAST SIKK

12	**SEMESTER : II** M. Sc. (Physics)	**PH20108A**	QUNATUM MECHANICS-II	CO1	Understand the different approximation methods like time independent perturbation method, time dependent perturbation method, WKB method and variational method.
				CO2	Apply different approximation methods to solve mathematical calculation on complex quantum systems.
				CO3	Understand Stark effect, Zeeman effect and different quantum mechanical phenomena.
				CO4	Develop the basic knowledge on scattering theory and relativistic quantum mechanics.
				CO5	Implement the relativistic and non-relativistic equations to solve atomic structural problems.
13	**SEMESTER : II** M. Sc. (Physics)	**PH20403A**	PHYSICS LAB III (ELECTRONICS)	CO1	Design circuits using diodes such as rectifiers and filters, clippers and clampers.
				CO2	Design circuits using BJTs, JFETs and analyze the output characteristics curves.
				CO3	Design of the analog circuits using OPAMP for various electronic applications analyze the output characteristics curves.
				CO4	Design multivibrator circuits and analyze the output characteristics curves.
				CO5	Able to identify and analyses basic digital

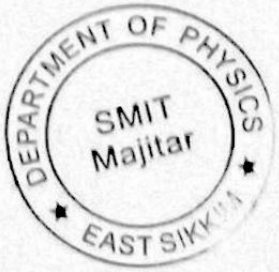


					electronics Circuits and its applications
14	**SEMESTER : II** M. Sc. (Physics)	**PH20404A**	PHYSICS LAB – IV (COMPUTATIONAL PHYSICS LAB-I)	CO1	Understand the basic C programming techniques
				CO2	Explain the usage of functions, arrays, pointers and stuctures.
				CO3	Understand the different numerical root finding techniques.
				CO4	Explain the procedure of interpolation and extrapolation in C.
				CO5	Understand the numerical curve fitting techniques.
15	**SEMESTER : III** M. Sc. (Physics)	**PH20109A**	STATISTICAL MECHANICS	CO1	Develop understanding of correlation between the macroscopic thermodynamics of a system with the microscopic dynamics of constituents.
				CO2	Understand the different kinds of statistical systems.
				CO3	Understand the basics of quantum statistics.
				CO4	Explains the basics of ideal Bose and Fermi gas.
				CO5	Explain the classical and modern theories of phase transitions.
16	**SEMESTER : III** M. Sc. (Physics)	**PH20110A**	NUCLEAR AND PARTICLE PHYSICS	CO1	Understand the ground state properties of the nucleus.
				CO2	Explain about nuclear forces and their dependence on various parameters.
				CO3	Establish the need for various nuclear models and deduce properties of the nucleus from the models.
				CO4	Explain the nuclear interaction and mechanism of nuclear reactions.



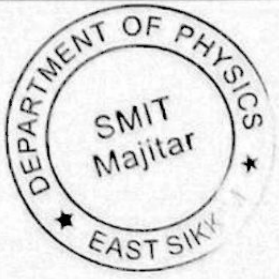
				CO5	Implement the basic knowledge of particle physics.
17	**SEMESTER : III** M. Sc. (Physics)	**PH20111A**	COMPUTATIONAL PHYSICS-II	CO1	Develop the skill of numerically solving Simultaneous linear equations.
				CO2	Able to solve numerically differentiation and integration.
				CO3	Able to solve numerical problems related to ODE.
				CO4	Able to solve numerical problems related to PDE.
				CO5	Develop the skill to formulate algorithms to generate random numbers by different techniques.
				CO6	Understand the numerical process using Monte Carlo method and the basic concept of parallel computing.
18	**SEMESTER : III** M. Sc. (Physics)	**PH20301A**	PARTICLE PHYSICS I (ELECTIVES-I)	CO1	Explain fundamental constituents of matter.
				CO2	Explain fundamental interactions among the elementary particles.
				CO3	Apply the advanced quantum mechanics to explain the various processes in particle physics.
				CO4	Understand the field theory and its application to various physical processes.
				CO5	Apply concept of symmetry to explain different aspect of various physical processes.
19	**SEMESTER : III**	**PH20303A**	PLASMA PHYSICS-I (ELECTIVE I)	CO1	Understand the basic concept of phases of matter.

	M. Sc. (Physics)			CO2	Understand the mode study in any medium.
				CO3	Understand the stability and instability of a system.
				CO4	Apply the Fourier method to solve problems in Plasma Physics.
20	**SEMESTER : III** M. Sc. (Physics)	**PH20305A**	ELECTRONICS-I (ELECTIVE-II)	CO1	Understand the basic knowledge about the VLSI based devices fabrication processes.
				CO2	Understand the various operations like stick and layout diagrams of VLSI.
				CO3	Apply the Designing process of the analog circuits using OPAMP for various real life applications.
				CO4	Understand the basic architecture and various data transfer schemes of 8085 and 8086 microprocessor.
				CO5	Implement the acquired knowledge skill in simple program writing for INTEL 8085.
21	**SEMESTER : III** M. Sc. (Physics)	**PH20307A**	ELECTRONICS LAB-I (ELECTIVE-II)	CO1	Analyze the IC 741 operational amplifier and its characteristics.
				CO2	Design the solution for linear & non-linear applications using IC741.
				CO3	Analyze the working principle of various data converters.
				CO4	Implement basic programs on 8085 microprocessors.
				CO5	Understand the concepts related to I/O and memory interfacing.
22	SEMESTER : IV	**PH20112A**	EXPERIMENTAL TECHNIQUES AND DATA ANALYSIS	CO1	Understand the concept of interaction of the radiation, and calculate dose and exposure etc.

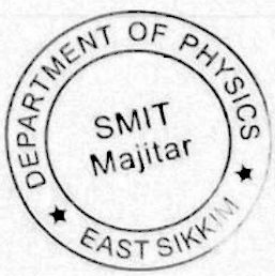


	M. Sc. (Physics)			CO2	Analyze the experimental data and calculate the error in measurement.
				CO3	Develop the concept of working principle of different detectors.
				CO4	Develop the basic working principle of microprocessors able to write related programming.
				CO5	Develop the idea of signal conditioning and measurement.
23	**SEMESTER : IV** M. Sc. (Physics)	**PH20113A**	ATOMIC AND MOLECULAR PHYSICS	CO1	Determine the origin and nature of the fine structure of the spectrum of hydrogen –like atoms.
				CO2	Explain the build-up of multielectron atoms and the concept of L-S coupling, j-j coupling to derive the atomic terms.
				CO3	Determine the molecular structure, symmetry and energies of diatomic molecules.
				CO4	Apply molecular spectroscopy and resonance spectroscopic techniques to elucidate the molecular structure.
				CO5	Understand the phenomena of non-linear optics and application of laser optics.
24	**SEMESTER : IV** M. Sc. (Physics)	**PH20405A**	COMPUTATIONAL PHYSICS LAB –II	CO1	Applying the knowledge gained by studying the Numerical Technique (Theory) to solve physics problems numerically using computer.
				CO2	Understands the significance of errors and its propagation in numerical calculations and how to minimize the errors,

					hence improving the accuracy.
				CO3	Develop skill to solve problems with numerical technics for differentiation, integration, from different areas of science and technology
				CO4	Develop skill to study the evolution of phenomena with numerical technics for solving ODE and PDE from different areas of science and technology.
				CO5	Develop the logical and reasoning aptitude to analyze the variation of parameters on different physical problems.
				CO6	Develop the skill to analyze data generated from experiments and understand the physics behind it.
25	**SEMESTER : IV** M. Sc. (Physics)	**PH20302A**	PARTICLE PHYSICS II (ELECTIVES-I)	CO1	Understand the theory of the weak interaction. Write tle Lagrangian of weak interactions
				CO2	Perform gauge transformation. Correlate the gauge transformation and conservation laws associated.
				CO3	Understand the concept of spontaneous symmetry breaking and Higgs mechanism to different situations.
				CO4	Able to construct standard model- a local gauge invariant theory.
				CO5	Apply the concept of spontaneous symmetry breaking and Higgs mechanism to standard model.



26	**SEMESTER : IV** M. Sc. (Physics)	**PH20304A**	PLASMA PHYSICS-II (ELECTIVE I)	CO1	Understand the 4th state of matter i.e. plasma in nature and evaluate parameters.
				CO2	Develop the ability of analysis of charge particle motion in different filed conditions.
				CO3	Understand the plasma behavior by fluid theories and diffusion of plasma in different magnetic field conditions.
				CO4	Analyze modes propagation in plasma in different physical conditions.
				CO5	Understand the advantages of kinetic theory over fluid theory and implement the theory to solve the plasma problems.
				CO6	Develop basic understanding of stability and instability of a fluid/plasma system and analyze the plasma instability problems.
27	**SEMESTER : IV** M. Sc. (Physics)	**PH20306A**	ELECTRONICS-II (ELECTIVE-II)	CO1	Acquaint with AM and FM basic functionalities and
				CO2	Understand the influence of noise on the performance of analog communication systems.
				CO3	Acquaint the theory of modern digital communications and systems.
				CO4	Understand the modern digital data transmission concepts and optimization of receivers.
				CO5	Apply the data transmission concepts



					related as radar and mobile communications.
28	**SEMESTER : IV** M. Sc. (Physics)	**PH20308A**	ELECTRONICS LAB-II (ELECTIVE-II)	CO1	Design the solution for different 1st order active filters using IC741.
				CO2	Design the solution for different 2nd order active filters using IC741.
				CO3	Understand the basic knowledge associated with digital and analog communication systems.
				CO4	Apply the practical working knowledge of Electrical and Electronics Simulation and Analysis using PSPICE.
				CO5	Analyze the basic Electrical and Electronics Circuits and Applications by PSPICE.

DEPARTMENT OF PHYSICS
SMIT
Majitar
EAST SIKKIM

2/7/22

Prof. (Dr.) G. C. Mishra
Head, Department of Physics
SMIT, Majhitar, Rangpo Sikkim