

### Course Outcomes Mapping with Program Outcomes

S N o	Course Code	Course Title	LTP	Cre dits	CO NO	Description of the Course Outcome	Program Outcomes							
							1	2	3	4	5	6	7	
1	19PH510 1	Mathematical Physics	3-1-0	4	CO1	Classify the analytical functions, complex integration and evaluation of definite integrals	2	3						
					CO2	Analyze Beta and Gamma functions and some special functions	2	3						

					CO3	Describe and the Apply transform technique functions for	2	3						
					CO4	Apply the numerical technique to solve functions and system of equations	2	3						
2	19PH510 2	Classical Mechanics	3-1-0	4	CO1	Explain the applications of Newtonian mechanics and the formulation of Lagrange's equations of motion from D'Alembert principle.	2	3						
					CO2	Reduction of problem of two body problem to One body problem and Classification of orbits		2						
					CO3	Explain the applications of Hamilton's equations, Canonical transformations, Poisson brackets, Invariance of Poisson bracket under canonical transformations– Principle of least action		2						

					CO4	Illustrate the Hamilton Jacobi equations and characteristic functions, Action and angle variable, small oscillations, applications such as linear tri-atomic molecule, two carts connected with three springs, triple pendulum, and double pendulum.	3	3	3	3	3	3		
3	19PH510 3	Quantum Mechanics- I	3-1-0	4	CO1	Introduction to Quantum Mechanics and its principles		2						
					CO2	Derivation of Schrodinger's wave equation and its application to one dimensional problems	2	3						
					CO3	Introduce angular momentum and spin concept		2						
					CO4	Applying Schrodinger's wave equation to three dimensional problems and time independent perturbed problems	2	3						
4	19PH510 4	Electronics	3-0-2	4	CO1	Understand the working of Different Semiconductor devices (Construction, Working Principles and V-I	2	3						

					characteristics) and their applications.							
					CO2 Understand the working of Different Semiconductor devices as amplifiers and oscillators.		2					
					CO3 Understand the basic operational amplifier characteristics, OPAMP parameters ,applications as inverter, integrator, differentiator etc		2	3	3			
					CO4 Understand the basic applications of operational amplifier as inverter, integrator, differentiator etc		2	3	3	3		
					CO5 Analyze the semiconductor and operational circuits implementation.			3				
5	19PH510 5	Computational Physics	3-0-2	4	CO1 Analyze the C characters, operators, analytic expression, arrays, functions and simple programs	3	3					
					CO2 Describe and apply the basics of MATLAB to solve linear systems and interpolation	3	3					
					CO3 Apply MATLAB to solve linear equation, non-linear equation and	3	3					

					simultaneous equations							
					CO4 Describe and Apply C language and MATLAB to solve interpolations, numerical differentiation and integration	3	3					
6	19PH520 1	Statistical Mechanics	3-1-0	4	CO1 Explain the microstates and macro states of Ideal gas and microstate and macrostate in classical systems, and derivation of Maxwell's relations, and thermodynamic laws	2						
					CO2 Applications of these ensembles to classical ideal gas and explaining about types of oscillators.	2						
					CO3 Explanation of postulates of Quantum Statistical Mechanics and types of ensembles and energy distributions	2	2	2	2	2	2	
					CO4 Explaining of Thermodynamic behavior of Ideal, Bose, Fermi gases and applications of statistical mechanics	2	2	2	2	2	2	

7	19PH520 2	Quantum Mechanics - 2	3-1-0	4	CO1	Applying time dependent perturbation theory to solve different problems	2	3						
					CO2	Matrix representations of wave function, operator and the solution of harmonic oscillator using matrix mechanism	2	3						
					CO3	Scattering problems solutions using quantum rules	2	3						
					CO4	Solutions of central force problems like hydrogen atom using relativistic quantum mechanics	2	3						
8	19PH520 3	Electromag netic Theory	3-1-2	5	CO1	Explains the wave nature of light in different mediums using Maxwell's equations and Fresnel's equations	1	2	3					
					CO2	Explains the properties of Laser, production of Laser, different types of Laser sources and applications	1	2	3					
					CO3	Explains the second and third harmonic generations of light and basics of Holography, recording holograms and	1	2	3					

					applications							
					CO4	Explains modes of optical fibers, types of fibers, signal degradation in optical fibers and lot of information regarding optical fibers	1	2	3			
9	19PH520 4	Solid State Physics-1	3-0-2	4	CO1	Understands structure of crystalline solids, appreciates structure-property relationship in crystals, crystal diffraction and the concepts of reciprocal lattice	2	3				3
					CO2	Understand the motion of electron in gas and metal and heat capacity of metal	1	2				2
					CO3	Understand the Periodic Zone schemes, Fermi surfaces and different types of orbits and quantization of orbits in a magnetic field	1	2	2			2
					CO4	Understand the concept of energy bands and effect of the same on electrical properties.	1	2	2			2
					CO5	Understand and attaining knowledge in			3			

						different solid state related experiments								
10	19PH520 5	Digital Electronics	3-0-2	4	CO1	Describe the concepts of number systems with codes and logic gates usage in digital circuit design and identify the logical expressions in different forms and their minimization techniques for logical circuit optimization	2	3						
					CO2	Employ Combinational logic circuits with minimization techniques and logical verification through hardware description language	1	2	2					
					CO3	Substantiation of Sequential logic circuits and logical verification through hardware description language	1	2	2					
					CO4	Implementation of digital circuits using PAL, PLA, FPGA and CPLD	2	2	2	2	2			
					CO5	Describe the concepts of number systems with codes and logic gates usage in digital circuit design and identify the logical expressions in			3					



						different forms and their minimization techniques for logical circuit optimization								
11	19PH53E 1	Environment Physics	3-0-0	3	CO1	Understand the different types of pollution that occur in the Earth's environment		2						
					CO2	Apply the laws of radiation to Solar and Terrestrial Radiation			2	3				
					CO3	Describe the main reservoirs and exchanges in the global carbon cycle and explain the challenges involved in reducing CO2 emissions					2			
					CO4	Application in the Renewable sources of energy					2			
12	19PH53E 2	Radar Systems and Satellite communication	3-0-0	3	CO1	To be learn the Radar operations, types of radar and applications	1	2		2				
					CO2	To be learn the signal and data processing for radars, antenna characteristics	1	2		2				
					CO3	To be learn the satellite communications, orbital constitutions and Telemetry,	1	2	3					

					Tracking								
					CO4	To be learn the coding techniques for INMARSAT VSAT, GPS, RADARSAT, INTELST applications	2	3	2	3			
13	19PH53E 3	Fiber Optics and Nonlinear Optics	3-0-0	3	CO1	Explains the light properties like total internal reflection and interference	2						
					CO2	Fundamental properties of optical fibers, types of optical fibers and their related information	2	3					
					CO3	Different concepts of light and information related to interferometers and sensors	2	3					
					CO4	Explains the fiber optics in modulation sensors and different effects of light	2	3					
14	19PH530 1	Atomic and Molecular Physics	3-1-0	4	CO1	Detailed discussion about the electronic structure in atoms using different spectra	1	2					3
					CO2	Study of molecular energy levels using rotational and vibrational spectroscopy	1	2		3		3	3
					CO3	Study of Raman effect of rotational, vibrational and polyatomic	1	2		3		3	3

					molecules							
					CO4	Detailed discussion about the electronic spectra and resonance spectroscopy like NMR and ESR.	1	2	3	3	3	
15	19PH530 2	Nuclear Physics	3-1-0	4	CO1	Will apply the models describing the basic nucleon and nuclear properties and establish the basic fundamentals necessary for further course outcomes.	1	2				2
					CO2	Properties and decay principles of Beta and Gamma rays will be reviewed, their selection rules will be understood.		1	2	3		3
					CO3	History of different techniques to detect various kinds of radiation will be learned. Detection and importance of radiation detection using Hyper Pure Germanium Detectors to study various basic science principles and their applications in various fields will be reviewed.	1	2	3	4	4	2

					CO4	Basics of particle physics and their classification will be discussed. Their fundamental properties and functions along with basic particle physics models leading to GUT will be discussed.	2	3							3
16	19PH530 3	<i>Solid State Physics -2</i>	3-0-2	4	CO1	Understands structure of crystalline solids, kinds of crystal imperfections and appreciates structure-property relationship in crystals.	2	3							3
					CO2	understand the source of a materials magnetic behavior and be able to distinguish types of magnetism and their properties	1	2					3		
					CO3	understand semiconductor physics: direct and indirect band-gaps, the effects of doping a semiconductor and Drift and Diffusion – Einstein relation	1	2	2				3		
					CO4	understand the phenomenon of superconductivity: key experiments, some attempts to explain superconductivity, the BCS model	1	2	2				3		

					CO5	Expertise the student in physics experiments related to materials characterization									3
17	19PH530 4	Computer Architecture	3-0-2	4	CO1	Illustrate the functionality of the computer, functional units - control unit, memory unit, the arithmetic and logic unit, design of ALU and different programming languages.	2	3							
					CO2	Categorize the CPU operations, instruction execution unit, addressing modes and instruction set. Outline the concepts of micro-operations and RTL operations and the concepts of main, cache and virtual memory organizations	1	2	2						
					CO3	Distinguish different types of I/O subsystems and I/O transfer techniques.	1	2	2						
					CO4	Analyze the design issues of RISC and CISC CPUs and the design issues of pipeline architectures.	2	2	2	2	2	2			
18	19PH530 5	Term paper	0-0-4	2	CO1	Collecting literature from any interested topic related to	1	2							

						dissertation of IV semester								
19	19PH54E 1	Fluid Mechanics	3-0-0	3	CO1		1	2						
					CO2			2	3					
					CO3				3					
					CO4				3					
20	19PH54E 2	Antenna theory and Radio wave Propagation	3-0-0	3	CO1	To be learn the antenna characteristics, radiation and applications	1	2						
					CO2	To be learn antenna arrays, advantages; impedance measurements	1	2						
					CO3	To be learn types of antennas, excitation techniques for designing the antennas	1	2	2			2		
					CO4	To be learn ground wave space wave and sky wave propagation for wireless communications	1	3	3			3		
21	19PH54E 3	Physics of Nanomateri	3-0-0	3	CO1	Understand the basics of nanomaterials, parameters which get effected by scaling down the size of the material, Major	1	2						2

		als				approaches and synthesis procedure								
						CO2 Explain the basics of principles associated with characterization techniques and usage of the techniques	2	3						2
						CO3 Identifying the change in properties of the nanomaterial in case of metals, semiconductors, insulators, ceramics and polymers and make use of nanomaterials in those devices		2	2					2
						CO4 Understand synthesis of carbon nanotubes and explore their applications.	3	3	3	3	3	3		2
22	19PH54E 4	MicroProcessors and Controllers	2-0-2	3	CO1 Architecture and Programming of Microcontroller 8051	2	3							
					CO2 Interfacing of Peripherals to 8051 through programming		2	3	3					
					CO3 Understand the architectural features of PIC Microcontroller and 8086 Microprocessor.		2	3	3					
					CO4 Programming examples on 8086		2	3						
					CO5 Application programming with 8051 and 8086 on		2	3	4	4	4			

						hardware / software									
23	19PH54E 5	Thin Film Technology	3-0-0	3	CO1	Explain the concept of thin film technology and the preparation and techniques	2	3							2
					CO2	Explaining the growth and techniques and kinetics		2					2		
					CO3	Explaining about XRD,TEM and other techniques for Thin film characterization	1	2	2				2		
					CO4	Explaining the various properties of thin films.	3	3	3	3	3	3	2		
24	19PH54E 6	Science of Renewable Source of Energy	3-0-0	3	CO1	Understand the energy demand of world & distinguish between traditional and alternative form of energy.	1	2							
					CO2	Describe the concept of solar energy radiation and thermal applications.		2	3						
					CO3	Analyze making of solar cell and its types.			3	4					
					CO4	Identify hydrogen as energy source, its storage and transportation				4					



						methods.							
25	17PH540 1	Dissertation	0-0- 24	12	CO1	Gives overall information about the selected topic theoretically and experimentally							