

**PROGRAMME SPECIFIC OUTCOMES, PROGRAMME OUTCOMES AND COURSE OUTCOMES****DEPARTMENT OF PHYSICS****B.Sc., (PHYSICS), EXTRA-CREDIT COURSES & VALUE-ADDED COURSES****PSO, PO & CO STATEMENTS / 2019 - 2022**

<b>PSOs</b>	<b>PROGRAMME SPECIFIC OUTCOMES</b>
PSO1	Students will demonstrate an understanding of concepts of Physics
PSO2	Students will understand the interplay between theory and experiment
PSO3	Students will exhibit curiosity and enthusiasm for learning science
PSO4	Students will demonstrate an ability to analyze problems
PSO5	Student will successfully carry out experiments to arrive at scientific results
PSO6	Students will successfully apply computing tools to problems
PSO7	Students will communicate well orally and in writing in scientific context
PSO8	Students will be able to use laboratory devices and electronics in scientific applications.
<b>B.Sc., PHYSICS</b>	
<b>B.Sc., PHYSICS / PROGRAMMES OUTCOMES</b>	
<b>POs</b>	<b>Description of POs</b>
PO1	Students will demonstrate an understanding of core knowledge in physics.
PO2	Students will show that they have learned laboratory skills, enabling them to take measurements in a Physics laboratory and analyze the measurements to draw valid conclusions.
PO3	Students will demonstrate written and oral communication skills in communicating Physics-related topics.
PO4	Students will pursue their higher studies and undertake research
PO5	Students will take up future academic carrier and establish themselves in global scenario.

<b>B.Sc., PHYSICS / COURSE OUTCOMES</b>		
	<b>Description of COs</b>	<b>Bloom's Taxonomy / Cognitive Domain</b>
<b>MUPC1 Mechanics and Properties of Matter</b>		
CO1.	Get the knowledge about forces in daily life and under the Principle of rocket propulsion	Applying (Level K3)
CO2.	Provide the information the about rolling concepts	Understanding (Level K2)
CO3.	Learn the basic concepts of gravitation laws.	Remembering (Level K1)
CO4.	Identify the type of forces, type of supports and the reactions	Analyzing (Level K4)
CO5.	Understand the principles, basic equations and their applications.	Understanding (Level K2)
<b>MUPC2 Electricity and Electromagnetism</b>		
CO1.	Use the concepts of electricity and magnetism to express physical processes and related technical improvements.	Remembering (Level K1)
CO2.	Apply Maxwell's equations for electromagnetic wavepropagation.	Applying (Level K3)
CO3.	Calculate inductances	Understanding (Level K2)
CO4.	Apply Gauss, Ampere's and Faraday's laws in the context of advanced electrical devices.	Analyzing (Level K4)
CO5.	Design, setup and carry out experiments and compare with theoretical predictions.	Evaluating (Level K5)
<b>MUPA1/MUPA3 Mechanics, Properties of Matter and Thermal Physics</b>		
CO1.	Gain deeper understanding of electrostatics	Understanding (Level K2)
CO2.	Acquire knowledge on elementary ideas of electricity and logic gates	Understanding (Level K2)
CO3.	Understand the working of Junction diode, Zener diode and transistor	Applying (Level K3)
CO4.	Use the electronic devices for doing experiments in the laboratory	Analyzing (Level K4)
CO5.	Demonstrate fundamental knowledge and insight into geometrical optics in the areas of lenses, aberrations and physical optics	Applying (Level K3)
<b>MUPWO1 SBC I - Waves and Oscillations</b>		
CO1.	Understand the significance of longitudinal and transverse waves	Understanding (Level K2)
CO2.	Distinguish between the phase velocity of a travelling wave and the group velocity of a wave group	Applying (Level K3)
CO3.	Derive and solve the equations of motions for physical systems that undergo SHM.	Applying (Level K3)
CO4.	Demonstrate the laws of transverse vibration of a stretched string using sonometer	Analyzing (Level K4)
CO5.	Know the production and applications of ultrasonic waves, factors affecting acoustics of buildings	Applying (Level K3)

<b>MUPC3 Thermal Physics</b>		
CO1.	Understand the equation, theorem and degrees of freedom of a thermo dynamical system	Understanding (Level K2)
CO2.	Apply the concepts of low temperature physics in liquefaction of gases	Applying (Level K3)
CO3.	Apply the concepts and laws of thermo dynamics to solve problems in thermo dynamics systems such as gases, heat engines etc.,	Applying (Level K3)
CO4.	Use the principles of black body radiation to analyze radiation process in thermo dynamical systems.	Analyzing (Level K4)
CO5.	Familiarize with the properties of systems close to absolute zero	Evaluating (Level K5)
<b>MUPP1 Core Practical Paper-I</b>		
CO1.	Apply knowledge of mathematics, physics and instrumentation	Remembering , Applying (Level K1 & K3)
CO2.	Apply the basic laws and theories to determine various properties of the materials given.	Applying (Level K3)
CO3.	Gain knowledge in the scientific methods and learn the process of measuring different Physical variables	Applying (Level K3)
CO4.	Understand the application side of the experiments	Understanding (Level K2)
CO5.	Use standard methods to calibrate the given measuring instruments	Applying (Level K3)
<b>Ancillary MUPA2/MUPA4 Electricity, Electronics and Optics</b>		
CO1.	Gain deeper understanding of electrostatics	Understanding (Level K2)
CO2.	Acquire knowledge on elementary ideas of electricity and logic gates	Understanding (Level K2)
CO3.	Understand the working of Junction diode ,Zener diode and transistor	Applying (Level K3)
CO4.	Use the electronic devices for doing experiments in the laboratory	Analyzing (Level K4)
CO5.	Demonstrate fundamental knowledge and insight into geometrical optics in the areas of lenses, aberrations and physical optics	Applying (Level K3)
<b>MUPAP Ancillary Physics Practical</b>		
CO1.	Gain knowledge in the scientific methods and learn the process of measuring different Physical variables	Understanding (Level K2)
CO2.	Understand the given concepts and its physical significance	Understanding (Level K2)
CO3.	Have a deep knowledge of fundamentals of optics and electric circuits	Applying (Level K3)
CO4.	Use standard methods to calibrate the given low range voltmeter and ammeter and to measure resistance of the given coil and various physical quantities	Analyzing (Level K4)
CO5.	Apply the theory to design the basic electrical circuits	Applying (Level K3)
<b>MUPCM2 SBC II - Computer Fundamentals and MS Office</b>		
CO1.	Describe the usage of computers and why computers are essential components in business and society	Understanding (Level K2)
CO2.	Work with the basic features of Word, create high quality document designs and layouts.	Applying (Level K3)
CO3.	Be able to modify worksheet data and structure and format data in a Worksheet	Analyzing (Level K4)

CO4.	Be able to sort data, manipulate data using formulas and functions and add and modify charts in a worksheet	Analyzing (Level K4)
CO5.	Solve common business problems using appropriate Information Technology applications and systems.	Evaluating (Level K5)
<b>MUPC4 Optics</b>		
CO1.	Know about lenses and different defects arising while using lenses.	Remembering (Level K1)
CO2.	Know to use lenses in constructing eyepieces and the formation of rainbows.	Applying (Level K3)
CO3.	Understand the function of interferometers.	Understanding (Level K2)
CO4.	Understand the concept of diffraction and the theory of diffraction grating.	Understanding (Level K2)
CO5.	Understand the phenomenon of polarization and apply the concept of optical activity in polarimeters.	Applying (Level K3)
<b>MUPMS3 SBC III - Material Science</b>		
CO1.	Understand the conducting properties of metals, insulators and semiconductors based on band theory	Understanding (Level K2)
CO2.	Acquire knowledge about the behavior of different types of dielectric materials	Understanding (Level K2)
CO3.	Know the function of optical devices like LED, LCD, Photoconductor etc,	Applying (Level K3)
CO4.	Understand the physical properties of nanomaterials and advanced ceramic materials	Applying (Level K3)
CO5.	Apply the behavior of various modern engineering materials like Polymers, Biomaterials, and Non-linear materials in recent development	Evaluating (Level K5)
<b>MUPN1 NME I - Astrophysics</b>		
CO1.	Learn fundamental concepts in astrophysics that will equip them to better understand new scientific discoveries made in the coming years	Understanding (Level K2)
CO2.	Apply basic physical principles from a broad range of topics in physics to astronomical situations	Applying (Level K3)
CO3.	Come to view science as a constantly evolving process instead of a static set of rules and equations	Applying (Level K3)
CO4.	Clearly understand about stars and our galaxy	Understanding (Level K2)
CO5.	Understand astrophysics as a way to describe our real physical world	Understanding (Level K2)
<b>MUPC5 Basic Electronics</b>		
CO1.	Acquire the knowledge of basic semiconductors Physics	Understanding (Level K2)
CO2.	Analyze the characteristics of various electronic devices like diode, transistor etc,	Analyzing (Level K4)
CO3.	Classify and analyze the various circuit configurations of transistors	Understanding & Analyzing (Level K2 & K4)
CO4.	Analyze simple circuits like rectifiers, amplifiers and oscillators	Analyzing (Level K4)
CO5.	have awareness of the latest technological changes in electronic devices.	Evaluating (Level K5)
<b>MUPC6 Relativity &amp; Atomic Physics</b>		

CO1.	Understand the concepts of relative motion of different bodies in different frame of references	Understanding (Level K2)
CO2.	Understand the critical potential and its experimental determination	Understanding, Applying (Level K2&K3)
CO3.	Know the structure of atoms	Understanding (Level K2)
CO4.	Learn the photoelectric effect and photoelectric cells	Remembering (Level K1)
CO5.	Analyze the diffraction of X-rays and Compton effect	Analyzing (Level K4)
<b>MUPP2 Core Practical Paper – II</b>		
CO1.	Apply knowledge of mathematics and physics fundamentals and an instrumentation to arrive solution for various problems	Remembering, Applying (Level K1 & K3)
CO2.	Understand the usage of basic laws and theories to determine various properties of the materials given.	Applying (Level K3)
CO3.	Gain knowledge in the scientific methods and learn the process of measuring different Physical variables	Applying (Level K3)
CO4.	Understand the application side of the experiments by using spectrometers, Microscopes and learned to construct electrical bridges	Understanding (Level K2)
CO5.	Acquire practical knowledge about many theories related to lenses, aberrations, refractive indices, wavelengths, capacitances and resistances	Applying (Level K3)
<b>MUPNN4 SBC IV - Nanoscience &amp; Nanotechnology</b>		
CO1.	Learn about the background on Nanoscience	Remembering (Level K1)
CO2.	Understand the synthesis of nanomaterials and their application and the impact of nanomaterials on environment	Understanding (Level K2)
CO3.	Apply their learned knowledge to develop Nanomaterials	Applying (Level K3)
CO4.	Impart the basics of Carbon nanotubes and its synthesis techniques	Analyzing (Level K4)
CO5.	Apply the applications of Nanotechnology in various fields	Evaluating (Level K5)
<b>MUPC7 Advanced Mechanics</b>		
CO1.	Define and demonstrate the different formalism in classical dynamics of a system.	Understanding (Level K2)
CO2.	Apply the formalism to obtain equations of motion for simple systems.	Applying (Level K3)
CO3.	Distinguish between different types of particles and statistics	Analyzing (Level K4)
CO4.	Understand the matter waves and the uncertainty relation	Understanding (Level K2)
CO5.	Understand the idea of wave function and to solve schrodinger equation for simple potential	Understanding , Evaluating (Level K2& K5)
<b>MUPC8 Digital Electronics</b>		
CO1.	Understand the basic concepts of number system.	Understanding (Level K2)
CO2.	Get the knowledge of logic gates and the applications of logic gates in different digital circuits.	Applying (Level K3)

CO3.	Gain the know-how of multivibrators	Analyzing (Level K4)
CO4.	Construct counters and registers using flipflops.	Evaluating (Level K5)
CO5.	Know basic concepts of operational amplifier and their applications.	Remembering Applying (Level K1, K3)
<b>MUPE1 Computer Programming in 'C'</b>		
CO1.	Get a basic knowledge of fundamental concepts of 'C' programming language	Remembering (Level K1)
CO2.	Write algorithm and are able to draw flowcharts.	Understanding (Level K2)
CO3.	Know how to write simple programmes in 'C'	Applying (Level K3)
CO4.	Gain thorough knowledge of various control statements, if, if-else, do-while, while switch case	Understanding (Level K2)
CO5.	Write programs with structure, union and pointers	Evaluating (Level K5)
<b>Fundamentals of Microprocessor- 8085</b>		
CO1.	Get a basic knowledge of fundamental of microcomputer and microprocessor 8085	Remembering (Level K1)
CO2.	Understand the instruction set of microprocessor 8085	Understanding (Level K2)
CO3.	Know the various addressing modes	Applying (Level K3)
CO4.	Write simple assembly language programs	Analyzing (Level K4)
CO5.	Write programs for given case studies	Evaluating (Level K5)
<b>MUPE2 Energy Physics</b>		
CO1.	Acquire knowledge on energy sources available	Understanding (Level K2)
CO2.	Understand solar energy collection and storage processes	Understanding (Level K2)
CO3.	Apply solar energy in various house hold appliances	Applying (Level K3)
CO4.	Know the recent development in biomass conversion technologies	Analyzing (Level K4)
CO5.	Study the methods of ocean thermal electric power generation in various applications.	Evaluating (Level K5)
<b>Mathematical Physics</b>		
CO1.	Solve ordinary and partial differential equations in physical sciences.	Applying (Level K3)
CO2.	Use special functions	Understanding (Level K2)
CO3.	Analyze the basic theory of vectors	Analyzing (Level K4)
CO4.	Understand the concepts of matrices	Understanding (Level K2)
CO5.	Acquire the knowledge of solving differential equations	Evaluating (Level K5)
<b>MUPCP5 SBC V - Computer Programming in 'C' -Practicals</b>		
CO1.	Write simple programme in 'C'	Applying (Level K3)
CO2.	Use control statements and simple if else statements in writing programmes	Applying (Level K3)
CO3.	Write programs using switch case	Applying (Level K3)

CO4.	Write programme using for loop	Analyzing (Level K4)
CO5.	Write programme using functions	Evaluating (Level K5)
<b>MUPC9 Solid State Physics</b>		
CO1.	Have a detailed idea of crystallography	Remembering (Level K1)
CO2.	Study various defects in solids	Understanding (Level K2)
CO3.	Gain knowledge of lattice vibrations in crystals.	Understanding (Level K2)
CO4.	Explore various properties of different magnetic materials.	Applying (Level K3)
CO5.	Acquire knowledge of superconductors and their applications.	Analyzing (Level K4)
<b>MUPC10 Nuclear and Particle Physics</b>		
CO1.	Gain a clear picture of nuclear composition and various nuclear models	Understanding (Level K2)
CO2.	Have a deep knowledge about Radio activity, nuclear Fission, Nuclear Fusion and nuclear transformation.	Applying (Level K3)
CO3.	Understand the working of nuclear detectors and counters and the importance of Cosmic rays	Understanding (Level K2)
CO4.	Become familiar with nuclear particles and different particle accelerators	Applying (Level K3)
CO5.	classify different kinds of reactions between elementary particles	Analyzing (Level K4)
<b>MUPE3 Laser, Fibre Optics &amp; Spectroscopy</b>		
CO1.	Explore the Laser fundamentals	Understanding (Level K2)
CO2.	Get adequate knowledge about Industrial and medical applications of laser for day-to-day applications	Applying (Level K3)
CO3.	Recognize and classify the structure of Optical fibre	Analyzing (Level K4)
CO4.	Understand the Optical sensors and their applications	Understanding ,Applying (Level K2& K3)
CO5.	Recognize different types of spectroscopy and their applications	Applying, Analyzing (Level K3& K4)
<b>Communication Electronics</b>		
CO1.	Acquire knowledge on recent developments in the scientific and technological fields based on electronic principles	Understanding (Level K2)
CO2.	Apply different modulation and demodulation techniques in advanced electronic communications	Applying (Level K3)
CO3.	Analyze generation and detection of AM and FM signals and comparison between them	Analyzing (Level K4)
CO4.	Identify different radio receiver circuits and role of AGC.	Analyzing (Level K4)
CO5.	Apply the recent developments in the field of information technology and internet	Evaluating (Level K5)
<b>MUPP3 CORE PRACTICAL - PAPER III</b>		
CO1.	Impart the broad knowledge of experimental methods and measurements	Remembering (Level K1)
CO2.	Gain knowledge and understanding the components and handling equipments	Understanding (Level K2)

CO3.	Familiarize with the experimental techniques	Understanding (Level K2)
CO4.	Get the idea about experimental setup and arrangement of devices	Applying (Level K3)
CO5.	Verify the experimental results with theoretical values	Applying (Level K3)
<b>MUPP4 CORE PRACTICAL - PAPER IV</b>		
CO1.	Remember the applications of semiconductor devices	Remembering (Level K1)
CO2.	Gain the idea and principles of electronics practically	Understanding (Level K2)
CO3.	Access the action of electronic devices such as diode, transistor etc.,	Understanding (Level K2)
CO4.	Impart the broad knowledge of experimental methods and measurements	Applying (Level K3)
CO5.	Gain knowledge and understanding the components and handling equipments	Applying (Level K3)
<b>MUPN2 NME II - Types of Energy &amp; their Utilization</b>		
CO1.	Learn fundamental concepts of energy	Understanding (Level K2)
CO2.	Impart the usage of non-renewable energy Sources	Applying (Level K3)
CO3.	Apply basic characteristics of renewablesources of energy and technologies for theirutilization	Applying (Level K3)
CO4.	Give review on utilization trends of renewablesources of energy	Analyzing (Level K4)
CO5.	Interpret the advantages and disadvantages of different renewable and non-renewable sourcesof energy	Evaluating (Level K5)



**EXTRA CREDIT COURSES****Astronomy**

CO1.	Understand the basics of celestial bodies	Understanding (Level K2)
CO2.	Apply the knowledge to find how diffraction limits the resolution of any system having a lens or mirror. Distinguish between reflecting and refracting telescopes and their usage.	Applying (Level K3)
CO3.	Understand the basics of eclipse and its types	Understanding (Level K2)
CO4.	Have a deep knowledge of fundamentals of stellar evolution	Remembering (Level K1)
CO5.	Remember and illustrate the structure of our Milky way galaxy and types of galaxies.	Applying (Level K3)

**Electrical Appliances**

CO1.	Learn fundamental concepts of working of Electric oven and Washing machine	Remembering (Level K1)
CO2.	Understand the working principle of Refrigerator and Air conditioner	Understanding (Level K2)
CO3.	Know the function of Electric function of bell and Room heater	Understanding (Level K2)
CO4.	Get an idea about the working of Induction stove Lightning conductor	Understanding (Level K2)
CO5.	Familiarize with Wiring Materials and types of wiring basic principles of earthing ad its types	Applying (Level K3)

**Biomedical Instrumentation**

CO1.	Learn the fundamentals of bioelectric potentials and electrodes	Remembering (Level K1)
CO2.	Understand the basics of transducers and its types	Understanding (Level K2)
CO3.	Learn about the function of ECE and EEG,	Remembering (Level K1)
CO4.	Know the working of EMG, ERG and EOG. Pacemakers and its types	Applying (Level K3)
CO5.	Understand applications of Computer Tomotography(CT)	Understanding (Level K2)

**VALUE-ADDED COURSES****Technical Training For Lab Equipments**

CO1.	Know about the basic concepts for measurement of physical quantities.	Remembering (Level K1)
CO2.	Acquire knowledge to design and analyze electrical and electronic instruments	Understanding (Level K2)
CO3.	Apply the principles of power supplies in various circuits.	Applying (Level K3)
CO4.	Remember the basic principles of transformers	Understanding (Level K2)
CO5.	Analyze frequency responses in various circuits using oscillators.	Applying (Level K3)

**Designing & Fabrication of PCB**

CO1.	Learn about the basics of PCB	Remembering (Level K1)
CO2.	Understand the types of PCB	Understanding (Level K2)
CO3.	Apply their learned knowledge to develop Layout	Applying (Level K3)
CO4.	To discuss the concept of laminates and printing	Understanding (Level K2)
CO5.	Apply their learned knowledge to develop Etching and Soldering	Applying (Level K3)

**Optoelectronics Devices**

CO1.	To understand LEDs their working, advantages and its applications	Remembering (Level K1)
CO2.	To know about LCD, their working and uses	Applying (Level K3)
CO3.	Understand the function of different semiconductor opto devices	Understanding (Level K2)
CO4.	To discuss the concept of different photo detecting devices	Understanding (Level K2)
CO5.	To learn about the working of CRO	Applying (Level K3)