HOLY CROSS COLLEGE (AUTONOMOUS)
Affiliated to Bharathidasan University
Nationally Accredited (3rd Cycle) with 'A' Grade by NAAC
College with Potential for Excellence.
Tiruchirapalli - 620002.

PG AND RESEARCH DEPARTMENT OF PHYSICS
Programme: B. Sc. PHYSICS/ PHYSICS WITH SPECIALIZATION IN ELECTRONICS

PO No	Programme Outcomes *Upon completion of the B.Sc. Degree Programme, the graduate will be able to*
PO-1	Promote Analytical Thinking and research skills in the minds of students
PO-2	Strive for consistent academic excellence and integrated personality development
PO-3	appreciate and apply Basic Physics principles in everyday life
PO-4	Acquire practical skills to gather information, assess, create and execute new ideas to develop entrepreneurial skills
PO-5	Mould the students to face the multi-faceted world of IT, with physics as the base and engulfing electronics
PO-6	Apply knowledge and skill in the design and development of Electronics circuits to cater to the needs of Electronic Industry

PSO No.	Programme Specific Outcomes *Upon completion of these courses the student would*
PSO-1	Acquire academic excellence with an aptitude for higher studies and research
PSO-2	Provide knowledge about material properties and its application for developing technology to ease the problems related to the society
PSO-3	Analyze the applications of mathematics to the problems in physics
PSO-4	Learn to design an experiment (or series of experiments) demonstrating their understanding of the scientific method and processes
PSO-5	Develop communication skills in communicating physics-related topics
PSO-6	Apply appropriate techniques and modern tools to complex scientific activities

Course Title	MAJOR CORE 1: GENERAL PHYSICS		
Code	**U15PH1MCT01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Recall and relate Elasticity, Viscosity and Surface tension	PSO 1	R, U
CO-2	Discuss Harmonic oscillator	PSO 5	U
CO-3	Analyze the Einstein‘s special theory of relativity	PSO 2	U, An
CO-4	Demonstrate Carnot‘s ideal heat, Internal combustion engine, Otto & Diesel Engines	PSO 3	U, Ap
CO-5	Describe Changes in Entropy in reversible and irreversible processes	PSO 2	U
CO-6	Compare Conduction, Convection and Radiation	PSO 5	U,E
CO-7	Gain Employability-Knowledge on basic principles of Physics	PSO 6	Ap

Course Title	ALLIED PHYSICS 1: BASIC PHYSICS – I		
Code	**U16PH1ACT01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Discuss the properties of matter types of stress and amount of strain, viscous nature and surface force.	PSO 1	U
CO-2	Explain the nature of S.H.M. and its applications in banking of curves and nature of gravitational field in mechanics	PSO 5	U, Ap
CO-3	List the features of musical notes and the importance of sound parameters	PSO 2	R
CO-4	Explain the thermal physics concepts in liquids and gases	PSO 5	R, U
CO-5	Discuss the basic principles of Optics.	PSO 2	R, U
CO-6	Gain Employability-Knowledge on basic principles of Physics	PSO 6	U, Ap

Course Title	MAJOR CORE 2: ELECTRICITY AND ELECTROMAGNETISM		
Code	**U15PH2MCT02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Recall and explain the concepts of electrical measurements and principle of capacitors	PSO-2	R, U
CO-2	Discuss the concepts of electromagnetism	PSO-1	U
CO-3	Deduce the expression for growth and decay of current and charge in LR, CR & LCR circuit	PSO-4	U, Ap
CO-4	Recognize and analyze the mechanism of electric generators and motors	PSO-4	R, An
CO-5	Explain the concepts of alternating currents	PSO-5	U
CO-6	Describe sharpness of resonance	PSO-3	U
CO-7	Gain Employability-Knowledge on basic principles of Physics	PSO 6	U,Ap

Code	ALLIED PHYSICS 3: BASIC PHYSICS - II		
Code	**U16PH2ACT03**		
CO No.	Course outcomes	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the basic principles in electricity and the working of capacitors	PSO-2	R, U
CO-2	Discuss the concept of electromagnetism.	PSO-1	U
CO-3	Explain the working of junction diode, Zener diode, working filters and rectifiers and to calculate its rectification efficiency in analog electronics.	PSO-4	U, Ap
CO-4	Construct the logic gates and write their truth tables.	PSO-4	R, An
CO-5	Explain the concepts of alternating currents	PSO-2	U
CO-6	List the application of X-rays in atomic physics, stability of nucleus, nuclear structure in nuclear physics	PSO-3	R, Ap
CO-7	Gain Employability- the knowledge on basics of Electricity, electromagnetism, analog and digital electronics, atomic and nuclear physics.	PSO 6	U

Course Title	MAJOR CORE 4: ELECTRONICS		
Code	**U15PH3MCT04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the working and characteristics of semiconductor diodes.	PSO 2	U
CO-2	Differentiate configuration of transistors (CE & CB) and analyze transistor as an amplifier.	PSO 2	U
CO-3	Compare the different types of Oscillators.	PSO 6	U, An
CO-4	Discuss the semiconductor devices such as JFET, MOSFET, UJT.	PSO 4	U, Ap
CO-5	Describe the functions of operational amplifier.	PSO 1	U
CO-6	Gain Employability-Knowledge on basic principles of Electronics.	PSO 6	U

Course Title	ALLIED PHYSICS OPTIONAL PAPER 1: PROPERTIES OF MATTER, HEAT AND MODERN PHYSICS		
Code	U15PH3AOT01		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO- 1	Explain the basic concepts of stress, strain, internal force and equilibrium in solids and characterize materials with elastic constitute relations in elasticity.	PSO 4	U
CO- 2	State Poiseuille‘s formula and determine viscosity of liquids by various method.	PSO 2	U, Ap
CO- 3	Distinguish between diffusion and osmosis. Determine osmotic pressure by Berkeley and Hartley method.	PSO 6	U, An
CO- 4	Demonstrate conduction, convection radiation applications in thermal physics.	PSO 5	U, Ap
CO- 5	Analyze photoelectric effect in different cells in atomic physics.	PSO 6	U, An
CO- 6	Describe radioactivity, nuclear fission and fusion process and calculate mean life for various elements in nuclear physics.	PSO 4	U,Ap
CO-7	Gain Employability- To understand the properties of matter and find application in various devices, the modes of transfer of heat and nuclear physics	PSO 6	U

Course Title	MAJOR CORE 6: OPTICS AND SPECTROSCOPY		
Code	U15PH4MCT06		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO- 1	Discuss the phenomenon of reflection and refraction, aberration, spherical and chromatic aberrations, Ramsden_s and Huygen‘s eyepieces	PSO 1	U
CO- 2	Explain the phenomenon of diffraction and to determine the thickness the wire and test the planes of a surface wavelength of sodium and monochromatic light	PSO 4	U, Ap
CO- 3	Describe diffraction, normal incidence, dispersive power of grating and able to compare the spectrum formed by grating and prism	PSO 4	U, Ap
CO- 4	Interpret the uses of Nicol prism as producer and analyser and determine the specific rotator power of sugar solution using Laurent‘s half shade polarimeter	PSO 4	U, Ap
CO- 5	Differentiate the types of spectroscopy and list the applications of spectroscopy and Raman effect in various field	PSO 4	U, Ap
CO-6	Gain Employability-Knowledge on basic laws of geometrical optics	PSO 6	U

Course Title	MAJOR ELECTIVE 1: DIGITAL ELECTRONICS		
Code	**U15PH4MET01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO- 1	Identify and apply the various number conversion techniques in number systems, codes and Boolean algebra	PSO 1	R,U
CO- 2	Explain the function of logic gates.	PSO 4	U
CO- 3	Simplify the Boolean equations by using min term technique	PSO 4	U, Ap
CO- 4	Design and analyze the various arithmetic, combinational and sequential circuits in digital electronics	PSO 4	U, Ap
CO- 5	Apply the sequential logic circuits to design the digital devices of shift registers and counter	PSO 4	U, Ap
CO- 6	Design the A/D and D/A converters and analyze the A/D and D/A conversions	PSO 4	U, Ap
CO-7	Gain Employability - Understand the basic principles of digital electronics.	PSO 6	U

Course Title	ALLIED PHYSICS OPTIONAL PAPER 2: OPTICS, ELECTRICITY AND ELECTRONICS		
Code	**U15PH4AOT02**		
CO No.	**Course Outcomes**	**PSO Addressed**	**Cognitive Level**
CO-1	Recall and relate the principles of Light	PSO 1	R, U
CO-2	Describe the working and operation of He-Ne Laser.	PSO 2	R, U
CO-3	Explain the principle of Capacitor.	PSO 1	R, U
CO-4	Describe the working of Anderson‘s method.	PSO 2	R, U
CO-5	Describe the Characteristics of a transistor in CE configuration.	PSO 4	R, U, Ap
CO-6	State and explain De Morgan‘s theorems.	PSO 4	R,Ap
CO-7	Gain Employability -understand the concepts of optics, Electricity, Electromagnetism, analog and digital electronics.	PSO 6	U, Ap

Course Title	MAJOR CORE 7: ATOMIC AND MOLECULAR PHYSICS		
Code	U15PH5MCT07		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	State Laws of photoelectric emission.	PSO 1	R
CO-2	Explain X rays and its properties.	PSO 1	U
CO-3	Recall and relateBohr atom model –Vector atom model.	PSO 2	R
CO-4	Distinguish Classical and Quantum theory of the normal Zeeman effect.	PSO 6	An
CO-5	Apply laser principle, discuss Holography.	PSO 4	Ap
CO-6	Describe vibration and rotation spectrum of a molecule.	PSO 5	U
CO-7	Gain Employability-Understand the concepts of atomic and nuclear model.	PSO 6	U

Course Title	MAJOR CORE 8: CLASSICAL AND QUANTUM MECHANICS		
Code	**U15PH5MCT08**		
CO No.	**Course Outcomes**	**PSO's Addressed**	**Cognitive Level**
CO-1	Summarize the fundamental concepts in Classical Mechanics and apply the conservation laws and constraints for a system of particles	PSO-1	U, Ap
CO-2	Explain and apply the Lagrangian Formulation for a mechanical system	PSO-1	U, Ap
CO-3	Explain and apply the Hamiltonian Formulation for a mechanical system	PSO-1	U, Ap
CO-4	Recall the importance of Quantum Mechanics over classical mechanics	PSO-1	R
CO-5	Differentiate Classical mechanics and Quantum mechanics.	PSO-1	An
CO-6	Summarize the postulates of wave mechanics, properties of wave function and operator formulation in Quantum Mechanics	PSO-1	U
CO-7	Apply the time dependent and time independent one dimensional Schrodinger equations to solve simple problems	PSO-1	Ap
CO-8	Gain Employability – Knowledge on fundamentals of classical and quantum mechanics and to appreciate the link between them.	PSO 6	U, Ap

Course Title	MAJOR CORE 9:ELECTROMAGNETICS AND MATHEMATICAL PHYSICS		
Code	**U15PH5MCT10**		
CO No.	**Course Outcomes**	**PSO's Addressed**	**Cognitive Level**
CO-1	Recall the concept of electrostatics and some applications with the boundary conditions in Electrostatics	PSO-1	R, Ap
CO-2	State and explain the laws of magnetostatics and apply them to some applications in Magnetostatics	PSO-2	R, U
CO-3	Explain about gradient, divergence, curl and their physical interpretation and different integrals in Vector Calculus.	PSO-3	R, U
CO-4	Distinguish beta and gamma function, their properties, Bessel's differential equation solution and its recurrence relations in Special Functions.	PSO-3	An
CO-5	Classify different types of matrices, Cayley Hamilton theorem and its application in Matrix Theory	PSO-4	An
CO-6	Gain Employability-understand the basic principles of Electrostatics, Magneto statics and to be familiarized with special functions, vector calculus and matrix theory.	PSO 6	U

Course Title	MAJOR ELECTIVE 2: MICROPROCESSOR INTEL 8085		
Code	**U15PH5MET02**		
CO No.	**Course Outcomes**	**PSO's Addressed**	**Cognitive Level**
CO-1	List out the various parts of microprocessor in Architecture of INTEL 8085	PSO-2	R, U
CO-2	Apply the five instruction set groups in Instruction set of INTEL 8085.	PSO-4	U, A
CO-3	Apply and write simple programs for basic arithmetic and logical operations using the instruction set of INTEL 8085in Programming of Microprocessor.	PSO-6	U, A
CO-4	Describe the interfacing techniques involved in INTEL 8085.	PSO-2	R,U
CO-5	Recognize the applications of INTEL 8085 such as digital display, traffic control, generation of square wave and water level indicator in Microprocessor Applications.	PSO-6	U,A
CO-6	Gain Entrepreneurship-Basic knowledge on Instruction set of INTEL 8085 and its applications by interfacing	PSO 6	U, Ap

Course Title	NON MAJOR ELECTIVE 1: BASICS OF COMPUTER ELECTRONICS		
Code	**U15PH5NMT01**		
CO No.	**Course Outcomes**	**PSO's Addressed**	**Cognitive Level**
CO-1	List out the various number systems	PSO-2	R, U
CO-2	Design the basic logic gates with their truth tables.	PSO-4	U
CO-3	Explain Demorgans theorem using Boolean algebra	PSO-4	U
CO-4	Compare the different types on memories	PSO-2	Ap
CO-5	Gain Employability-Understand the fundamentals of the basic circuits in computers	PSO 6	U

Course Title	SKILL BASED ELECTIVE: PHYSICS FOR LIFE SCIENCES		
Code	U17PH3SBP03 (SBE3-II Zoo) / U17PH5SBP04 (SBE4- III Bot)		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO- 1	Discuss the basic properties of liquids	PSO 1	U
CO- 2	Describe the concept of simple equipments such as lens and the working of microscope, centrifuge and decibel meter	PSO 5	U, Ap
CO- 3	Explain and analyze the principle and working of biomedical instruments such as CRO, Ultra Sonogram, ECG	PSO 2	R
CO- 4	Determine the various properties of liquid, loudness of sound and focal length and power of lens.	PSO 5	R, U
CO- 5	Explain the working of sonogram and mammogram and to detect various eye defects	PSO 2	R, U
CO-6	Skill development - Practical Exposure to Zoology and botany students	PSO 6	U,Ap

Course Title	MAJOR CORE 11: SOLID STATE PHYSICS		
Code	**U15PH6MCT13**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain theconcepts of crystallography in terms of atom positions and unit cells	PSO-1	U
CO-2	Discuss the fundamentals of nanomaterials and synthesis the process of new nanomaterials	PSO-2	C
CO-3	Describe Einstein‘s theory and Debye‘s theory of specific heat capacity of solids	PSO-1	An
CO-4	Compare the types of polarization and investigate the different experimental methods of dielectric materials	PSO-3	E
CO-5	Distinguish the types of magnetic materials and to apply the theories to estimate materials properties	PSO-6	An
CO-6	Explain about BCS theory and Cooper pair in superconductivity	PSO-5	U
CO-7	Gain Employability- Understand the basic of solids and its properties	PSO 6	U

Course Title	MAJOR CORE 12: NUCLEAR, PARTICLE AND ASTROPHYSICS		
Code	**U15PH6MCT14**		
CO No.	**Course Outcomes**	**PSO's Addressed**	**Cognitive Level**
CO-1	Recall the fundamentals involved in the structure of nucleus in introduction to the Nucleus.	PSO-2	R, U
CO-2	State and explain the laws related to Radioactivity in Radioactivity	PSO-2	R, U
CO-3	Illustrate nuclear fission and fusion reactions with examples.	PSO-4	R, U
CO-4	Outline the properties of elementary particles in Particle Physics.	PSO-2	R,U
CO-5	List and explain the objects in the Sky and the Solar system in Astrophysics.	PSO-2	R,U
CO-6	Gain Employability- understand on properties of nucleus, radioactivity, nuclear fission and fusion and basic introduction to elementary particles and astrophysics.	PSO 6	U

Course Title	MAJOR CORE 11: COMMUNICATION PHYSICS		
Code	**U15PH6MET04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Discuss the concepts of modulation, transmission and detection in radio communication systems	PSO-1	U
CO-2	Discuss in detail the working of television and RADAR	PSO-2	U
CO-3	Explain the concepts and principles of satellite communication systems	PSO-1	U
CO-4	Compare LASER diode and avalanche photo diode	PSO-2	Ap
CO-5	Explain the concept of digital communication system and to analyze digital modulation techniques and digital transmission media	PSO-3	An
CO-6	Gain Employability-Understand the fundamentals of communication systems	PSO 6	Ap

Course Title	NON MAJOR ELECTIVE 2: BASICS OF MODERN COMMUNICATION SYSTEMS		
Code	**U15PH6NMT02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the radio signal propagation and communication system performance in radio communication.	PSO 2	U
CO-2	Discuss the basic concept in the field of satellite communication	PSO 3	U, An
CO-3	Explain the basic elements of optical fiber transmission link	PSO 2	U
CO-4	Describe the basic concept of mobile communication.	PSO 5	U
CO-5	Discuss the basics of wireless communication and the usage of internet.	PSO 3	U,Ap
CO-6	Gain Employability-Understand the fundamentals of communication systems	PSO 6	Ap

Course Title	SKILL BASED ELECTIVE 5: TROUBLE SHOOTING AND MAINTENANCE OF ELECTRONIC EQUIPMENTS		
Code	**U18PH6SBT05**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Recall the causes and failures of trouble shooting process	PSO 1	R, U
CO-2	Describe the trouble shooting procedure	PSO 4	U
CO-3	Classify the types of active components.	PSO 3	U
CO-4	Identify various types of semiconductor devices	PSO 3	U,An
CO-5	Test and assess various active and passive components.	PSO 6	U,Ap
CO-6	Gain Entrepreneurship-Understanding the fundamentals of troubleshooting and maintenance of electronic equipments and practical knowledge to rectify the problem	PSO 6	U

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI
DEPARTMENT OF PHYSICS – CBCS -UG COURSE PATTERN

B.Sc. Physics with
Specialization in Electronics-
SHIFT II

Course Title	SKILL BASED ELECTIVE- 3: HOUSE WIRING		
Code	**U15PH3SBT03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain and apply the concepts of power generation.	PSO 2	R, U
CO-2	Explain the concepts of transformer and power distribution.	PSO 2	U
CO-3	Classify different tools and materials.	PSO 2	U
CO-4	Differentiate the types of wires and wiring system.	PSO 2	U
CO-5	Compare the types of switches and apply safety precautions.	PSO 2	U,Ap
CO-6	Gain Entrepreneurship-Understand the wiring and fitting techniques	PSO 6	U,Ap

Course Title	ALLIED PHYSICS OPTIONAL PAPER 4: BASICS OF ELECTRONICS		
Code	**U15PH4AOT04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the functions of PN junction in semiconductor electronics.	PSO 2	R, U
CO-2	Describe the working of operational amplifier.	PSO 2	U
CO-3	State and explain the basic Laws and principles of Boolean algebra and logic gates in combinational circuits.	PSO 3	U, An
CO-4	Differentiate the different types of flip flops and counters.	PSO 4	U,An
CO-5	Rewrite the programs using microprocessor.	PSO 4	U,An
CO-6	Gain Employability - Understand the characteristics and functions of electronic elements	PSO 6	U

Course Title	MAJOR CORE 8: CIRCUIT AND NETWORK ANALYSIS		
Code	**U15PH5MCT09**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	State and relate the concepts of Kirchoff‘s laws and methods of analyzing circuits	PSO-1	R
CO-2	State, explain and examine the theorems in circuit analysis	PSO-2	R, U
CO-3	Recognize and deduce the concepts of alternating currents and voltages	PSO-3	R,U
CO-4	Relate and reproduce the concepts of power and power factor	PSO-5	R, An
CO-5	Recall and discuss the concepts of transients	PSO-2	R, An
CO-6	Gain Entrepreneurship-Understand the basic ideas of circuit & network	PSO 6	U, Ap

Course Title	MAJOR CORE 9: MATHEMATICAL PHYSICS, CLASSICAL AND QUANTUM MECHANICS		
Code	**U15PH5MCT11**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Compute partial derivatives, derivatives of vector-valued functions, gradient functions and Evaluate integrals of functions or vector-related quantities over curves, surfaces, and domains in two- and three-dimensional space.	PSO 3	R, U
CO-2	Express and evaluate the fundamental concepts of conservation laws and constraints for a classical system of particles.	PSO 2	U
CO-3	Summarize the generalized coordinates and compose the Lagrangian Formulation for a mechanical system of conservative and non conservative forces.	PSO 3	U
CO-4	Outline and illustrate the basic concepts and importance of Quantum Mechanics over classical mechanics with the experiments and verifications.	PSO 4	U,An
CO-5	Restate the postulates of wave mechanics, wave function and operator concept in Quantum Mechanics.	PSO 3	U
CO-6	Demonstate the time dependent and time independent one dimensional Schrodinger equations to solve simple problems	PSO 3	U
CO-7	Gain Employability-Familiar with special functions and problem solving skills	PSO 6	U

Course Title	MAJOR ELECTIVE 2: MICROPROCESSOR AND ITS APPLICATIONS		
Code	U15PH5MET03		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Describe the architecture and instruction set of INTEL 8085.	PSO 1	R,U
CO-2	Compare and categorize the programming of microprocessor.	PSO 4	U
CO-3	Explain the various interfacing techniques.	PSO 2	U, An
CO-4	Classify and discuss the different microprocessor based data acquisition system, using A/D and D/A converter	PSO 3	U, An
CO-5	Apply and extrapolate microprocessor applications such as square wave generator and traffic control signals	PSO 4	U, Ap
CO-6	Gain Entrepreneurship-basic knowledge on Instruction set of INTEL 8085 and its applications by interfacing	PSO 6	U,Ap

Course Title	SKILL BASED ELECTIVE 4: PRINTED CIRCUIT TECHNIQUES		
Code	**U18PH5SBT04**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Identify the electronic symbols and draw schematic diagrams of printed circuit board.	PSO 1	R,U
CO-2	Dis Discuss the various types of printed circuit board and list layout design procedure and analyse various PCB design softwares.	PSO 4	U,An
CO-3	Classify various types of film processing for single sided PCB and apply film processing to printed circuit board holder.	PSO 2	U, Ap
CO-4	Categorize various methods for cutting, cleaning and etching process.	PSO 3	U, Ap
CO-5	Describe assembling and mounting techniques and create new PCB board for various applications.	PSO 4	U, Ap
CO-6	Gain Entrepreneurship-Understanding the fundamentals of printed board, layout design and fabrication and assembling	PSO 6	U, Ap

Course Title	MAJOR CORE 12: COMMUNICATION ELECTRONICS		
Code	**U15PH6MCT15**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain and evaluate the basic concepts of amplitude and frequency Modulation techniques.	PSO 3	U
CO-2	Distinguish fibre cables over copper wires	PSO 2	U
CO-3	Describe the principles and working of various Radar systems	PSO 3	U
CO-4	Estimate the radar range and calculate radar equation	PSO 3	U, An
CO-5	Discuss the principle and working design of mobile communication system.	PSO 4	U
CO-6	Design communication satellite and the broad band communication systems	PSO 4	C
CO-7	Gain Employability-Understand the basic ideas radio, TV, radar, satellite, fiber optic and fax	PSO 6	U

Course Title	MAJOR ELECTIVE 3: APPLIED ELECTRONICS		
Code	**U15PH6MET05**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Recall and relate the procedure of fabrication of IC and PCB.	PSO 2	U
CO-2	Describe the working and operation of IGBT.	PSO 2	R,U
CO-3	Explain the working and operation ofDIAC – TRIAC	PSO 3	R,U
CO-4	Discuss about photo multipier tube and photo detectors	PSO 3	U, An
CO-5	Explain about Tunnel Effect and Tunnel Diode ..	PSO 1	U
CO-6	Describe the working and operation of LVDT.	PSO 1	U
CO-7	Gain Entrepreneurship-Understand the basic ideas of fabrication of IC's, power electronic devices, optoelectronic devices, special diodes and MOSFET	PSO 6	U,Ap

Programme: M. Sc. PHYSICS

PO No.	Programme Outcomes *Upon completion of the M.Sc. Degree Programme, the graduate will be able to*
PO-1	Promote Analytical Thinking and research skills in the minds of students.
PO-2	Strive for consistent academic excellence and integrated personality development
PO-3	Appreciate and apply Basic Physics principles in everyday life
PO-4	Realize and develop an understanding of the impact of physics and science on society.
PO-5	Apply the knowledge of mathematics and fundamentals of physics to the solution of complex problems in physics
P**O-6**	Excel in the research field related to Physics and Materials Science

PSO No.	Programme Specific Outcomes *Upon completion of these courses the student would*
PSO-1	Learn to develop analytical and integrative problem-solving approaches
PSO-2	Disseminate subject matter from several disciplines and results to both specialists and a broader audience
PSO-3	Adequate background for pursuing pedagogic education
PSO-4	Familiar with contemporary research within various fields of physics
PSO-5	Research experience within a specific field of physics, through a supervised project (the Master Thesis) enable to enter new problem areas that require an analytic and innovative approach to ease the problems related to the society
PSO-6	Demonstrate knowledge and understanding of the physics principles and apply them to manage projects in multidisciplinary environment

Course Title	MAJOR CORE 1: MATHEMATICAL PHYSICS – I		
Code	**P15PH1MCT01**		
CO No.	**Course Outcomes**	**PSO's Addressed**	**Cognitive Level**
CO-1	evaluate problems using Fourier series and Fourier transforms	PSO-1	E
CO-2	evaluate problems using Laplace Transforms and Green functions	PSO-1	E
CO-3	describe the concept of partial differential equations to solve physical problems	PSO-1	R
CO-4	apply the concept of partial differential equations to solve physical problems	PSO-1	Ap
CO-5	evaluate mathematical problems by selecting appropriate methods from Numerical Methods – I	PSO-5	E
CO-6	evaluate mathematical problems by selecting appropriate methods from Numerical Methods – II	PSO-5	E
CO-7	Employability-Impart knowledge on special functions, vectors, tensors, matrix, complex variables and group theory to solve problems	PSO 5	U

Course Title	MAJOR CORE 2: CLASSICAL AND STATISTICAL MECHANICS		
Code	**P15PH1MCT02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	List the fundamental Principles of D'Alembert and Hamiltonian and apply it to Derive Langrange's equation from D'Alembert and Hamiltonian principle	PSO 3	U,R
CO-2	Describe Euler's equation of motion for rigid body and oscillations of a molecule	PSO 2	U
CO-3	Explain the concept of Hamiltonian Jacobi equations of motion	PSO 6	U
CO-4	Compare Maxwell Boltzman, Bose-Einstein and Fermi Dirac statistics in Quantum Statistics	PSO 6	U, An
CO-5	Discuss Non – Linear Dynamics	PSO 4	U, An
CO-6	Employability -Study the fundamental principles of Lagrangian, Hamitonian dynamics, quantum statistics and nonlinear dynamics	PSO 4	U

Course Title	MAJOR CORE 3: ELECTRONICS		
Code	P15PH1MCT03		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Recognize the working of different Semiconductor devices	PSO 6	R, U
CO-2	Describe the function of basic Operational amplifier circuits	PSO 6	U, Ap
CO-3	Apply the characteristics of operational amplifier for different circuits and to know the fundamentals of 555 timer in Applications of operational amplifier and 555 Timer	PSO 6	U, Ap
CO-4	Discuss basic principles of digital circuits	PSO 6	U, Ap
CO-5	Apply the fundamentals of digital principles to various applications in Registers, Counters and Memory Devices	PSO 6	U, Ap
CO-6	Employability-Knowledge on basic principles of electronics and digital electronics	PSO 1	U

Course Title	MAJOR CORE 4: CONDENSED MATTER PHYSICS		
Code	P15PH4MCT04		
CO No.	Course Outcomes	PSOs Addresse	Cognitive Level
CO-1	Define the crystal lattice, to differentiate the 2D and 3D crystal systems and determine the crystal structure by different methods.	PSO 1	R, U
CO-2	Explain the Lattice Vibrations in solids to measure the electrical and thermal conductivity of metals	PSO 2	U, Ap
CO-3	Distinguish the Dielectric and Magnetic Properties of the materials.	PSO 4	U, An
CO-4	Explain the occurrence of Super Conductivity, properties, types and applications of superconductors.	PSO 3	U, Ap
CO-5	Classify the types of Nanomaterials and explain the applications in the field of Nanotechnology.	PSO 4	U, Ap
CO-6	Employability-Understand the crystal structure, lattice vibration, dielectrics, magnetic properties, superconductivity and nanomaterials	PSO 1	U

Course Title	MAJOR CORE 6: MATHEMATICAL PHYSICS – II		
Code	CODE: P15PH2MCT06		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Express the gradient, divergence, curl and Laplacian equations in cylindrical and spherical coordinates	PSO-1	U, Ap
CO-2	Verify the Gauss theorem	PSO-1	U, Ap
CO-3	Apply the Stokes theorem to solve the problems in vectors	PSO-6	Ap
CO-4	Formulate Legendre differential equations	PSO-1	U,An
CO-5	Classify the tensors	PSO 4	U, Ap
CO-6	Calculate the eigen values and vectors	PSO-1	U
CO-7	Evaluate certain Improper real integrals	PSO-5	E
CO-8	Apply the orthogonality theorem to formulate the geometry of molecule	PSO-6	Ap
CO-9	Prepare the character table for C_{2v} & C_{3v} group	PSO-2	C

Course Title	MAJOR CORE 7: MICROPROCESSOR AND MICROCONTROLLER		
Code	P15PH2MCT07		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Recall the architecture and instruction set of INTEL 8085 in Microprocessor (INTEL 8085): Architecture and Instruction	PSO 1	R, U, Ap
CO-2	Create assembly language programs using instruction set of Microprocessor (INTEL 8085)	PSO 3	U, Ap
CO-3	Recall the concept of interfacing and interrupts in Peripheral Devices and Interfacing	PSO 4	U, Ap
CO-4	Relate the applications of INTEL 8085 in various daily life projects from Peripheral Devices and Interfacing	PSO 6	U, An
CO-5	Reproduce the fundamentals of microcontroller INTEL 8051 to design some assembly language programs	PSO 6	U, Ap
CO-6	Entrepreneurship-Understand the basic idea of organization of INTEL 8085 and its interfacing, microcontroller 8051	PSO 2	U

Course Title	MAJOR CORE - 8: ELECTROMAGNETIC THEORY		
Code	**P15PH2MCT08**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Solve electrostatic boundary value problems using green‘s function.	PSO 1	U, Ap
CO-2	Describe the boundary condition in Magnetostatics.	PSO 3	U
CO-3	Compare Electrostatics and Magnetostatics.	PSO 3	U, Ap
CO-4	Derive Maxwell‘s equation in differential and integral form.	PSO 3	U
CO-5	Discuss the propagation of electromagnetic waves in different medium.	PSO 2	U, Ap
CO-6	Explain the concept of interaction of electromagnetic waves with macroscopic matter.	PSO 2	U
CO-7	Employability-Understand the boundary value problems in Electrostatics, magneto statics and Electrodynamics	PSO 1	U

Course Title	NON - MAJOR ELECTIVE 1: BIOMEDICAL INSTRUMENTATION		
Code	**P15PH2NMT01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Write about pH meter and relate it´s function in biomedical applications.	PSO-1	U
CO-2	Describe the working principle of autoradiography and electron microscopes such SEM and TEM.	PSO-1	U
CO-3	Explain the working principles of bio-potential recorders such as ECG, EEG, EMG, ERG and EOG.	PSO-3	U, Ap
CO-4	Discuss the working principle of physiological assist devices used in biomedical applications.	PSO-6	U, Ap
CO-5	List out the advanced biomedical instruments and explain its working principles and applications.	PSO-6	U
CO-6	Write a note on the operation theatre medical equipments and explain about the safety of biomedical instrumentation.	PSO-1	U
CO-7	Entrepreneurship-Impart the knowledge about biophysical methods and physiological assist devices	PSO -1	U

Course Title	MAJOR CORE -10: QUANTUM MECHANICS		
Code	**P15PH3MCT10**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Discuss the quantum idea of wave function, uncertainty relations and commutation relations on the physical systems	PSO 1	U, Ap
CO-2	Express the Schrodinger equation to exactly solvable problems	PSO 5	U, Ap
CO-3	Explain Schrodinger equation for complex systems using approximation methods	PSO 2	R, U, Ap
CO-4	Justify scattering theory and angular momentum operators	PSO 5	R, U
CO-5	Compare the difference between relativistic and non relativistic quantum mechanics	PSO 2	R, U, An
CO-6	Describe Charge current densities and electromagnetic potentials	PSO 2	U, Ap
CO-7	Employability-Understand the quantum mechanical concepts and apply to solve problems	PSO-1	U

Course Title	MAJOR CORE -11: SPECTROSCOPY		
Code	P15PH3MCT11		
CO No.	**Course Outcomes**	**PSOs Addresse**	**Cognitive Level**
CO-1	Discuss the rotational spectra of molecules and identify the basic instrumentation ideas in microwave spectroscopy	PSO 6	U
CO-2	Describe the vibrational spectra of diatomic and polyatomic molecules and based on the information obtained from IR spectroscopy identifies corresponding functional groups	PSO 6	U, Ap
CO-3	Distinguish classical and quantum theory of Raman Effect	PSO 3	U, Ap
CO-4	Describe experimental techniques of Raman spectroscopy for various elements	PSO 6	R, U
CO-5	State various features of molecular Electronic spectra and apply Frank Condon principle to different molecules	PSO 6	R, Ap
CO-6	Explain the principle of NMR, ESR, EQR and Mossbauer in resonance spectroscopy. Analyze and apply the techniques to different molecules	PSO 6	U,Ap
CO-7	Employability- knowledge on basic idea of various branches of spectroscopy	PSO-1	U

Course Title	MAJOR ELECTIVE – 1: LASER AND APPLICATIONS		
Code	P15PH3MET01		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the concepts of Laser Principles and Types of laser.	PSO 2	R, U
CO-2	Describe the generation of high power pulses by the Control of the Laser Output and it benefits to society	PSO 3	U
CO-3	Describe the wave propagation in anisotropic material using harmonic generation phenomena.	PSO 3	U
CO-4	Explain the physical parameters using laser beam as a source and to study the Laser Applications (I) in industrial and fiber optic communication systems.	PSO 5	R
CO-5	Explain the Laser Applications (II) in biological field.	PSO 6	R
CO-6	Employability-Knowledge on fundamentals of lasers and applications	PSO -1	U

Course Title	NON-MAJOR ELECTIVE 2: THE INTERPLAY OF PHYSICS AND MUSIC		
Code	**P18PH3NMT02**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Explain the basics of music in nature, vibration of matter and sound waves.	PSO 1	U
CO-2	Discuss and analyze the concepts of simple vibrating systems and wave propagation.	PSO 5	U,An
CO-3	Identify and apply various sound effects and acoustics	PSO 2	R, Ap
CO-4	Explain the principle and working of various musical instruments	PSO 3	U
CO-5	Discuss the concept of recording sound and music	PSO 2	U
CO-6	Entrepreneurship-Understand the basics of interplay of physics and music	PSO 1	U

Course Title	SELF STUDY: ENERGY PHYSICS		
Code	**P17PH3SST01**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Learn the present energy scenario and the need for energy conservation	PSO 1	U
CO-2	Discriminate between 1) the solar resource, 2) solar energy conversion systems technologies like photovoltaic and 3) solar goods and services like electricity, hot water.	PSO 5	U,An
CO-3	Explain the concept of various forms of renewable energy.	PSO 3	U
CO-4	Outline division aspects and utilization of renewable energy sources for both domestics and industrial application	PSO 3	U, Ap
CO-5	Discuss the positive and negative aspects of geothermal energy in relation to natural and human aspects of the environment	PSO 2	U
CO-6	Employability-Understand the basics of energy storage device applications in physics	PSO 1	U

Course Title	MAJOR CORE – 13: NUCLEAR AND PARTICLE PHYSICS		
Code	P15PH4MCT13		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	Summarize the nuclear structure and the forces through various models	PSO 3	U
CO-2	Discuss the theories involved in α, β and γ radioactive decays.	PSO 3	U,An
CO-3	Explain the nuclear fission and fusion reactions and its application	PSO 3	R, Ap
CO-4	Discuss about the universe through astrophysics	PSO 3	U
CO-5	State the various types of nuclear reactions based on nuclear reaction cross sections in detail	PSO 3	U
CO-6	Explain elementary particles and discuss its classification based on theoretical models	PSO 3	U
CO-7	Employability-knowledge on nuclear structure, nuclear reaction, fission and fusion, elementary particles	PSO 2	R,U

Course Title	MAJOR ELECTIVE-2: INSTRUMENTATION SYSTEMS		
Code	P15PH4MET02		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Discuss Performance characteristics of instruments	PSO 1	U
CO-2	Classify different types of transducers	PSO 2	R, An
CO-3	Distinguish Active and Passive filters	PSO 2	R, An
CO-4	Demonstrate Digital display units	PSO 6	U
CO-5	Compare and Contrast Analog and Digital recorders	PSO 5	U, An
CO-6	Describe Modern digital data acquisition system	PSO 4	U
CO-7	Entrepreneurship-understand the basic concepts of measurements, various display devices, recorders and data acquisition system	PSO 2	R,U

Course Title	MAJOR ELECTIVE 3 B: THIN FILM PHYSICS		
Code	P16PH4MET04		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the principle and working of different types of vacuum production and pumps	PSO 1	R, U
CO-2	Discuss the physical thin film deposition techniques of coating and preparation	PSO 4	R, U
CO-3	Discuss the chemical thin film deposition techniques of coating and preparation	PSO 4	R, U
CO-4	Explain the composition and structure of thin films by different characterization techniques	PSO 2	R, U
CO-5	Analyze the techniques to characterize the thin film in terms of its optical properties	PSO 6	U, An
CO-6	Examine the techniques to characterize the thin film in terms of its electrical properties	PSO 6	U, An
CO-7	Employability-Understanding the preparation and characterization techniques of thin films and its application in different fields	PSO1	U,Ap

Programme: M. Phil. PHYSICS

PO No.	Programme Outcomes *Upon completion of the M.Phil. Degree Programme, the graduate will be able*
PO-1	Promote Analytical Thinking and research skills in the minds of students.
PO-2	Strive for consistent academic excellence and integrated personality development
PO-3	Appreciate and apply Physics principles in everyday life
PO-4	Realize and develop an understanding of the impact of physics and science on society.
PO-5	Apply the knowledge of advancement of physics to the solution of complex problems in physics
P**O-6**	Excel in the research field related to Physics and Materials Science

PSO No.	Programme Specific Outcomes *Upon completion of these courses the student would*
PSO-1	Learn to develop analytical and integrative approaches
PSO-2	Disseminate subject matter from several disciplines and results to both specialists and a broader audience
PSO-3	Adequate background for pursuing pedagogic education
PSO-4	Familiar with contemporary research within various fields of physics
PSO-5	Research experience within a specific field of physics, through a supervised project (the Master of Philosophy Thesis) enable to enter new problem areas that require an analytic and innovative approach to ease the problems related to the society
PSO-6	Demonstrate knowledge and understanding of the physics principles and apply them to manage projects in multidisciplinary environment

Course Title	REASEARCH METHODOLOGY		
Code	MPH16PH1C01		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	1. describe the procedure to identify the research problem by the scholar	PSO 1	R, U
CO-2	2. discuss the process of paper publication	PSO 4	R, U
CO-3	3. differentiate linear and nonlinear equations	PSO 4	R, U
CO-4	4. explain statistical description of data	PSO 2	R, U
CO-5	5. explain the working principles and applications of Ultrasonic interferometer.	PSO 6	U, An
CO-6	6. Employability-Knowledge on Various techniques for research,Scienctific writing, linear and nonlinear equations and data analysis	PSO 6	U, An

Course Title	PAPERII:ADVANCEDPHYSICS		
Code	MPH16PH1C02		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	1. discuss the concept of ray optics and wave optics	PSO 1	R, U
CO-2	2. explain the working of transducer in various instrumentation system	PSO 4	R, U
CO-3	3. list the steps involved in forming character table of a group and explain the nature of Homomorphism between SO (2) and SO (3)	PSO 4	R, U
CO-4	4. describe linear and nonlinear oscillators	PSO 2	R, U
CO-5	5. discuss the principle and working of automatic control system	PSO 6	U, An

CO-6	6. Employability-Equip knowledge in advanced physics	PSO 6	U, An

Course Title	**TEACHING AND LEARNING SKILLS**		
Code	**MPH18PH1C03**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	1. apply computer skills in the respective areas	PSO 1	R, U
CO-2	2. communicate their language with different skills	PSO 4	R, U
CO-3	3. apply the various methods of teaching.	PSO 4	R, U
CO-4	4. Outline learning process and integration of teaching and Academic resources	PSO 2	R, U
CO-5	5. Explain various teaching skills and assessment technology	PSO 6	U, An
CO-6	6. Employability-Understand the principles of physics and practice of teaching	PSO 6	U, An

Course Title	LIQUID STATE PHYSICS		
Code	MPH16PH1E04		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	1. explain Lattice theory, Eyring‘s structure theory and corresponding models.	PSO 1	R, U
CO-2	2. explain acoustical and thermodynamical parameters of liquids	PSO 4	R, U
CO-3	3. apply different theories for finding ultrasonic velocities of different liquids	PSO 4	R, U
CO-4	4. discuss different parameters of solutions, liquid mixtures using various techniques.	PSO 2	R, U
CO-5	5. apply spectroscopic studies for explaining different parameters of solutions, liquid mixtures.	PSO 6	U, An
CO-6	6. Employability-(Guide Paper)Understand the theory and properties of liquids	PSO 6	U, An

Course Title	NDT TECHNIQUES AND APPLICATIONS		
Code	MPH16PH1E05		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	1. Discuss the concept and types of acoustic emission inspection	PSO 1	R, U
CO-2	2. Explain the types, techniques and safety aspects of leak testing	PSO 4	R, U
CO-3	3. Discuss the instrumentation, methods and application of thermography	PSO 4	R, U
CO-4	4. Discuss the sailent features of industrial computed tomography	PSO 2	R, U
CO-5	5. Discuss the importance and application of NDE	PSO 6	U, An
CO-6	6. Entrepreneurship-(Guide Paper)-Understand the NDT techniqus and apply it to industrials.	PSO 6	U, An

Course Title	MATERIALS CHARACTERIZATION		
Code	MPH16PH1E06		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	1. Discuss the concept of phase diagram, and effects of alloying elements	PSO 1	R, U
CO-2	2. Explain the concept of metallography	PSO 4	R, U
CO-3	3. Discuss the importance and application of NDE	PSO 4	R, U
CO-4	4. Discuss the principle , working and application of various X ray techniques	PSO 2	R, U
CO-5	5. Discuss the principle ,construction, working and	PSO 6	U, An

	application of various microscopy techniques		
CO-6	6. Entrepreneurship-(Guide Paper)-Knowledge on materials characterization techniques	PSO 6	U, An

Course Title	**METALLURGY AND PROCESSES**		
Code	**MPH16PH1E07**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	1. Discuss the various types and mechanical properties of metal alloys	PSO 1	R, U
CO-2	2. Explain the characteristics of dislocations and the strengthening mechanism of metals	PSO 4	R, U
CO-3	3. Discuss the various failures in metals	PSO 4	R, U
CO-4	4. Discuss corrosion and degradation in metals and steps to prevent corrosion	PSO 2	R, U
CO-5	5. Explain the processing of engineering materials	PSO 6	U, An
CO-6	6. Entrepreneurship-(Guide Paper)-Knowledge on metallurgy and processes	PSO 6	U, An

Course Title	**NONLINEAR OPTICS**		
Code	**MPH16PH1E08**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	1. describe the polarization response of materials to light and various nonlinear optical phenomena	PSO 1	R, U
CO-2	2. explain the fiber modes and fiber losses and derive an expression for numerical aperture	PSO 4	R, U
CO-3	3. discuss two photon and three photon processes	PSO 4	R, U

CO-4	4. explain the basic principle and different types of laser.	PSO 2	R, U
CO-5	5. identify the basic requirements for nonlinear optical materials and discuss the instrumental analysis	PSO 6	U, An
CO-6	6. Employability-(Guide Paper)-Understand the and nonlinear optical processes and its applications	PSO 6	U, An

Course Title	**CRYSTAL GROWTH AND THIN FILM PHYSICS**		
Code	**MPH16PH1E09**		
CO No.	**Course Outcomes**	**PSOs Addressed**	**Cognitive Level**
CO-1	1. explain the concept of formation of critical nucleus and growth kinetics of thin films	PSO 1	R, U
CO-2	2. describe the various method to grow crystal from solution growth and gel growth techniques	PSO 4	R, U
CO-3	3. describe the various method to grow crystal from melt growth techniques	PSO 4	R, U
CO-4	4. discuss thin film deposition techniques	PSO 2	R, U
CO-5	5. explain the characterization techniques to analyze the structural properties	PSO 6	U, An
CO-6	6. Entrepreneurship-(Guide Paper)-knowledge on various crystal growth and thin film preparation and characterization techniques	PSO 6	U, An