

B.L.D.E.ASSOCIATION'S
S.B. Arts and K.C.P. Science College, Vijayapur
Re-Accredited at the 'B⁺⁺' Level
Masters of Science in Physics
Program Outcomes (2023-2024)

POs	DESCRIPTIONS
PO1	Scientific knowledge: Apply the knowledge of physics fundamentals with the help of mathematics to the solution of physical problems.
PO2	Problem analysis: Identify, formulate, research literature, and analyze physical problems using basic principles of physics.
PO3	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
PO4	Individual and team work: function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO5	Communication: Communicate effectively on complex activities with the scientific community and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO6	Modern tool usage: Apply appropriate techniques, resources, and modern scientific & engineering techniques to complex physical activities with an understanding of the limitations.
PO7	Research Proficiency: Apply various modern techniques for research specific activities/experiments and analysis purpose
PO8	Life-Long Learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSOs	DESCRIPTIONS
PSO1	Understand and apply basic principles of Physics, and basic interaction laws that govern our universe
PSO 2	Perform procedures/experiments as per laboratory standards
PSO 3	Understand the complex applications of physics in real world problems

Class	Paper	Course Outcomes	Descriptions
M.Sc I semester	20MScPH CT11 Mathematical Methods in Physics	CO1	Describe the vector algebra & vector calculus and solve related problems.
		CO2	Explain delta, beta and gamma functions and solve related problems.
		CO3	Describe Integral transforms and solve related problems.
		CO4	Describe Fourier series and its properties and solve related problems
		CO5	Describes tensors and solve related problems
	20MScPH CT12 Classical Mechanics	CO1	Describe the Mechanics of a system of particles, constraints of motion, generalized coordinates
		CO2	Explain D' Alembert's Principle, applications of Lagrangian formulation
		CO3	Describe Hamilton's principle, Legendre Transformation
		CO4	Describe Canonical Transformation and Hamilton-Jacobi Theory
		CO5	Explain orthogonal transformations, Euler's theorem and Describing inertia tensor, Small Oscillations
	20MScPH ST13 Nuclear and Particle Physics (General)	CO1	Understanding the concept of nucleus and its properties
		CO2	Gain an idea about different nuclear models and nucleus processes
		CO3	Studying the nuclear reactors using chain reaction
		CO4	Interactions of types of radiations and charge particular with matter
		CO5	Understanding the principal and working of G. M. Counter and scintillations counter.
	20MScPHs ST14 Condensed Matter Physics (General)	CO1	Develop an understanding of elastic properties in solids.
		CO2	Explain thermal properties, lattice vibrations, and normal modes.
		CO3	Enumerate and explain Electrons in a periodic potential, Bloch theorem, Semiconductor Crystals, superlattices.
		CO4	Define the transport theory, Boltzmann transport equation, Hall effect, Magnetoresistance.
		CO5	Develop an understanding of liquid crystals and physics of liquid crystal devices
20MScPH SP15 Practical-1 (Nuclear and Particle Physics)	CO1	To study the characteristics of G M counter and determination of operating voltage and plateau length.	
	CO2	To verify the inverse square law relationship between distance and intensity of radiation.	
	CO3	To determine the dead time of a GM tube using the double source method.	
	CO4	Study of characteristics of nuclear statistical counting for β -source using G M counter	
	CO5	Calculation of binding energy for different nuclei using semi-empirical mass formula	

M.Sc II Semester	20MScPH SP16 Practical-II (Condensed Matter Physics)	CO1	Analysis of X-ray diffraction Pattern (Powder XRD analysis, assignment).
		CO2	d-spacing calculations using Debye Scherer powder pattern (assignment)
		CO3	Thermistor characteristic and its energy gap determination
		CO4	Measurement of Hall coefficient in semiconductor and estimation of charge carrier concentration, carrier density mobility and type of semiconductor
		CO5	Determination of energy gap of a given semiconductor by determining its resistivity at various temperature by four probe method.
	20MScPH CT21 Quantum Mechanics -I	CO1	Develop an understanding of the mathematical tools and basic concepts of quantum mechanics.
		CO2	Develop an understanding of angular momentum and related problems.
		CO3	Understand stationary state approximation methods and their applications.
		CO4	Understand time dependent perturbation theory and its applications.
		CO5	Develop an understanding of various problems related to scattering theory
	20MScPH ST22 Atomic, Molecular and Optical Physics (General)	CO1	To understand the structure of atoms and its properties
		CO2	To understand the structure of molecules and its properties
		CO3	Students can understand applications and working properties of laser light
		CO4	To study the working and applications fiber optics
		CO5	To understand the experiment on divergence of laser beam using grating element
		CO6	Students can find the numerical aperture of optical fiber
	20MScPH ST23 Electronics (General)	CO1	Students can understand principles and working of semiconductor devices
		CO2	Students get ability to build oscillators using operational amplifier
		CO3	To study digital circuits and code conversion
		CO4	Students can understand arithmetic operation using logic gates
CO5		To understand how to convert digital to analog	
CO6		To study how to reduce the logic expression using k-map	
20MScPH SP24 Practical-1 (Atomic Molecular & Optical Physics)	CO1	Study of Zeeman Effect: Determination of e/m for an electron	
	CO2	To study the numerical aperture and bending loss of an optical fiber.	
	CO3	Determination of unknown wavelength of a laser source using grating and a laser source of known wavelength.	
	CO4	Measurement of wavelength of sodium D line/wavelength separation of sodium D doublet lines using Michelson Interferometer.	
	CO5	Determine the spectral terms of sp and pd configuration for 'LS' and 'JJ' coupling (assignment).	

M.Sc III Semester:	20MScPH SP25 Practical-II (Electronics)	CO1	Construction of Astable and Monostable Multivibrator using IC- 555 timer and calculation of frequency.	
		CO2	Construction of adder, subtractor, differentiator and integrator using Op-Amp 741.	
		CO3	SCR- characteristics and its applications as a switching device.	
		CO4	R-2R ladder network D/A converter and its characteristics.	
		CO5	Simplification of Boolean expression and implementation using 2-input NAND gate IC7400	
	O.E.C Strategies of Teaching (M. Ed)	CO1	Acquire competency in different teaching skills	
		CO2	Understand the context of application of different strategies of teaching and also implement them	
		CO3	Understand and appreciate the role of communication in effective teaching	
		CO4	Understand the impact of teacher communication on students personality development	
		CO5	Know and understand the correlates of teacher effectiveness	
	M.Sc III Semester:	20MScPH CT31 Statistical Mechanics	CO1	To Study the difference between the microscopic and macroscopic systems
			CO2	To build the knowledge about interaction between heat and systems and different types of interactions
			CO3	Students get ability, to distinguish the particles in different states
			CO4	Students can understand black-body radiation and its applications
			CO5	To get the knowledge about fluctuations.
20MScPH CT32 Classical Electrodynamics		CO1	How to find the force and field of a point charge	
		CO2	To build the knowledge about dielectric materials in electrostatics	
		CO3	How to find the force and field, energy of a moving charge	
		CO4	Students can understand the use of waveguide as a optical fiber	
		CO5	They can understand about plasma state and hydrodynamics	
O.E.C P.D.C.S (M.Ed)		CO1	To develop an awareness of the concept & dimensions of personality	
		CO2	To understand the relationship between education & Personality Development	
		CO3	To analyze the components of effective classroom communication	
		CO4	To understand the factors of Mental Health & Role of education in its developments	
20MScPH ST33 Condensed Matter Physics-I		CO1	Students can understand about crystal structures and their properties	
	CO2	To study the Fermi- level and Fermi-energy in metals and semiconductors		
	CO3	To get knowledge about X-rays, Phonons and photons and its properties		
	CO4	Students can understand transparent in semiconductors and metals		
	CO5	To study how to classify the magnetic materials and their temperature dependence		
	CO6	To study the hall effect in metals and semiconductors		
	CO7	Experiment to find heat capacity of metals using calorimeter		

	20MScPH SP34 Practical-1 (Condensed Matter Physics-I)	CO1	Magnetic Susceptibility determination by Quinke's method.	
		CO2	Gouy's method for the determination of magnetic susceptibility of various paramagnetic/diamagnetic samples	
		CO3	Determination of electron-phonon coupling constant by measuring resistivity of copper/silver wire	
		CO4	Tracing BH curves for ferromagnetic materials and calculation of magnetic susceptibility.	
		CO5	Diamagnetic susceptibility of water molecule. Gouy's experiment.	
	20MScPH SP35 Practical- II (Condensed Matter Physics-I)	CO1	Structure Factor calculations.	
		CO2	Indexing of Tetragonal system.	
		CO3	Calculation of relative integrated intensity.	
		CO4	Indexing of Hexagonal system.	
		CO5	Determination of structure of CdTe	
	20MScPH SP37 (Project Preliminary work for the 4 th semester project)	CO1	Literature survey	
		CO2	Problem identification	
		CO3	Finalizing the title of the project	
	M.Sc IV Semester:	20MScPH CT41 Quantum Mechanics -II	CO1	Students are also able to study operators in vector space
			CO2	To get knowledge about the dynamics of a system in operator form
CO3			To study about vector form of angular momentum	
CO4			To get knowledge about how to find correction to energy and wave function of a physical system	
CO5			To study about relativistic QM	
20MScPH CT42 Advanced Mathematical Methods in Physics		CO1	To study about linear algebra	
		CO2	How to solve differentiation and integration and equations using numerical methods	
		CO3	How to apply partial differential equations to physics	
		CO4	To solve numerical problems of physical systems	
		CO5	To get physical systems knowledge about probability theory.	
20MScPH ST43 Condensed Matter Physics -II		CO1	To study the dielectric materials and its properties	
		CO2	Study properties the phase transformation in ferroelectric materials.	
		CO3	Basics about semiconductor materials	
		CO4	To study how electrons transport in semiconductors	

		C05	To understand basic principle of magnetic resonance
		C06	To study magneto resistance of a semiconductor
		C07	To study working of solar cells
	20MScPH ST44 Condensed Matter Physics - III	C01	To understand working of semiconductor devices
		C02	To study the how dimensional semiconductors
		C03	Understand the properties of superconductors
		C04	Students can understand about the different effects an superconductors
		C05	They get knowledge about synthesis and characterization of nanomaterial's
	20MScPH SP45 Practical (Condense d Matter Physics- II&III)	C01	Determination of Hall coefficient and mobility of charge carriers in metals.
		C02	Effect of temperature on Hall coefficient and mobility in metals.
		C03	Study of Magnetoresistance effect in Bismuth.
		C04	Study of Magnetoresistance effect in semiconductors.
		C05	Magnetostriction study in Fe, Ni, Co and Cu using Michelson Interferometer.
	20MScPH SP46 Project (Condense d Matter Physics- II&III)	C01	The student will gain experience in research.
		C02	They will understand the research methodology and will help them in their future research career.

Dheeraj
Coordinator
Co-ordinator
Department of PG Studies in Physics
S.B. Arts and KCP Science College
VIJAYAPUR

[Signature]
IQAC, Coordinator
S.B. Arts & K.C.P. Science College,
Vijayapur.

[Signature]
Principal
Principal,
S.B. Arts and KCP Science College
VIJAYAPUR