

## SREE VIDYADHIRAJA N.S.S. COLLEGE

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Affiliated to Mahatma Gandhi University, Kottayam - NAAC Accredited with B Grade

Name of the Programme : B Sc Physics				
2009-16 Admissions				
Course Code	Course Title	Course Outcomes		
		Cor	e Courses	
		SEN	IESTER 1	
		CO1	Outline the methodology and historical perspectives of science in general and Physics in particular.	
PH1B01 U	Methodology in Physics	CO2	Understand the fundamental principles of analytical instruments used in Physics experiments.	
		CO3	Analyze the nature of experimental errors and methods to reduce errors in measurements	
		CO1	Estimate mass, volume, thickness etc of materials using vernier calipers, screw gauge, spherometer	
PH1B01 U	Practical	CO2	Gain practical skill in testing electronic components used in Physics experiments	
		CO3	Analyze experimental data and estimate errors in acquire data	
		SEN	IESTER 2	
	Mechanics and properties of matter	CO1	Understand the fundamental concepts of mechanics and properties of matter.	
PH2B01 U		CO2	Identify different types of wave motion and its properties	
		CO3	Gain knowledge on applications of elastic properties of materials	
	Practical	CO1	Demonstrate bending experiments to determine modulus of elasticity	
II2D01		CO2	Realize SHM and validate the theory of oscillations	
U		CO3	Determine surface tension and viscosity of different liquids	
		SEM	IESTER 3	
DU2DO		CO1	Understand the physical principles and applications of Electronics	
1U	Electronics	CO2	Describe the characteristic features of diodes, filter circuits, transistors and its applications	
		CO3	Explain fundamental circuits based on op-Amps	
PH3B0	Practical	CO1	Identify the characteristics and uses of different electric components	
1U		CO2	Construct circuits in electronic devices used in daily life	

SEMESTER 4			
		CO1	Interpret electrical circuits containing resistors, inductors and capacitors
PH4B0	Electricity and Electrodynamics	CO2	Gain Knowledge on the basic concepts of electric and magnetic fields.
	, , , , , , , , , , , , , , , , , , ,	CO3	Familiarize with EM waves, propagation and its properties.
PH4B0	Practical	CO1	Compare methods to determine modulus of elasticity
10		CO2	Construct circuits in electronic devices used in daily life
		SEN	1ESTER 5
		CO1	Compare Newtonian, Lagrangian and Hamiltonian formalisms in Classical Mechanics.
PH5B0	Classical and quantum	CO2	Appreciate the historical development of quantum mechanics
10	incentances	CO3	Apply Schrodinger equation for systems such as particle in a box, potential barrier, Harmonic oscillator etc.
PH5B0	Practical	CO1	Analyze different methods to determine the elastic constants of material
10		CO2	Verification of physical laws and physical constants
DUCDO	Physical optics and Photonics	CO1	Relate various optical phenomena like reflection, refraction, interference, diffraction, polarization etc with day-to-day observations
2U		CO2	Explain the working principles of various optical instruments and devices
		CO3	Describe working principle and applications of Lasers, Holography and optical fiber
DH2BU		CO1	Validation of optical phenomena using spectrometer
2U	Practical	CO2	Calibration of electric devices like ammeter and voltmeter
	Thermal and Statistical Physics	CO1	Define thermodynamic properties of matter like internal energy, entropy etc
PH5B0 3U		CO2	Discuss the principle and working of various automobile engines
		CO3	Apply the principles of probability in distribution of particles in various systems
		CO1	Construct and analyze basic electronic circuits
PH5B0 3U	Practical	CO2	Demonstrate the oscillator circuits and certain mathematical operations like integration and differentiation
		CO1	Examine various number systems and its application in digital systems
PH5B0 4U	Digital Electronics	CO2	Simplify Boolean expressions using Karnaugh maps
40		CO3	Acquire the basic ideas of sequential logic, combinational logic, D/A and A/D converters.

PH5B0	Practical	CO1	Analyze the magnetic properties of magnet and determine the horizontal intensity of magnetic field	
40		CO2	Determination of wavelength of source, dispersive power of grating using spectrometer	
PH5B05U	Project	CO1	Build a scientific approach towards research	
		SEM	IESTER 6	
		CO1	Gain background knowledge and architecture of microprocessor 8085.	
PH6B0 1U	Computational Physics	CO2	Solve algebraic equations, integral and differential equations using numerical methods	
		CO3	Explain the simplified syntax of C++ programming language.	
PH6B0	Practical	CO1	Differentiate methods to determine magnetic moment of magnets	
10		CO2	Apply C++ program in physical problems	
		CO1	Explain the concepts and potential applications nuclear and particle Physics.	
PH6B0 2U	Nuclear and Particle Physics	CO2	Appreciate the application of general principles of quantum physics to atomic and nuclear systems.	
		CO3	Interpret the theoretical predictions on nuclear models and nuclear reactions.	
PH6B0	Dreatical	CO1	Realization of digital circuits	
2U	Practical	CO2	Apply C++ program in physical problems	
PH6B0	Condensed Matter Physics	CO1	Classify condensed or solid state materials on the basis of arrangement of atoms, ions, electron motion, spin etc.	
3U		CO2	Extend the ideas on electric, magnetic and superconducting properties of materials	
		CO3	Outline the current trends in material science particularly nanoscience	
PH6B0	Drastical	CO1	Construct and verify digital circuits	
3U	riactical	CO2	Model mathematical operations using op amp	
	Relativity and	CO1	Develop an idea of Galilean and Lorentz transformations and theory of relativity	
PH6B0		CO2	Describe theories based on the structure of atoms and the origin of the observed spectra.	
4U	spectroscopy	CO3	Summarize the change in behavior of atoms in external applied electric and magnetic field.	
		CO4	Explain rotational, vibrational, electronic and Raman spectra of molecules and their application.	
		CO1	Construct and verify digital circuits	
PH6B0 4U	Practical	CO2	Model mathematical operations using op amp and microprocessor	
		CO3	Apply C++ program in physical problems	
	Compleme	entary C	Courses for Mathematics	
			Comprehend the fundamental concepts of mechanics	
MT1C01	Properties of Matter,	CO1	and properties of matter	

	Mechanics and Fourier	CO2	Identify different types of oscillations and waves
U	Analysis	$CO_{2}$	Understand Fourier analysis in the application of
		005	physics
		CO1	Determine surface tension, coefficients of viscosity
		COI	and refractive index of different liquids
MT1C01	Practical	$CO^{2}$	Recognize the characteristics and uses of different
U	riactical	002	electric components
		CO3	Realize SHM and measure physical constants and
		005	quantities
		SEN	IESTER 2
			Describe induced polarisation and magnetisation in
	Electric and Magnetic	CO1	materials, Maxwell's equations and electromagnetic
MT2C01	phenomena thermodyna		radiation.
U	mics and special theory of	CO2	Understand thermal properties of matter and
U	relativity	002	the various temperature scales.
	č	CO3	Describe the relativistic effect on various physical
		0.00	phenomena.
		CO1	Estimate surface tension, coefficients of viscosity and
			Identify the characteristics and uses of different
MI2C01	Practical	CO2	electric components
U			Poolize SHM and manufus physical constants and
		CO3	quantities
		SEN	
			Appreciate the emergence and development of
		CO1	quantum concepts in Physics.
	Quantum Mechanics,	CO2	Explain nuclei structure and interaction of nucleons
MT3C01	spectroscopy, Nuclear Physics, basic electronics and Digital Electronics	002	Understand basic principles and applications of most
U		CO3	common spectroscopic methods
		004	Gain basic ideas on various electronic components and
		CO4	digital circuits.
		CO1	Demonstrate bending experiments to determine
MT2C01		COI	modulus of elasticity
	Practical	CO2	Validate optical phenomena using spectrometer
U		CO3	Identify components in electronic devices used in daily
		005	life
		SEN	IESTER 4
		CO1	Explain the propagation of light in various media on
		COI	the basis of wave mechanics.
MT4C01	Physical optics, Laser	CO2	
U	physics and Astrophysics	002	Outline principle, working and application of lasers.
		~ ~ ~	Understand the laws and physical processes that
		CO3	govern the universe its constituents their origins and
		005	
		001	evolution
MT4C01		C01	evolution Validate optical phenomena using spectrometer
MT4C01	Practical	CO1 CO2	evolution Validate optical phenomena using spectrometer Demonstrate bending experiments to determine modulus of elasticity
MT4C01 U	Practical	CO1 CO2	evolution Validate optical phenomena using spectrometer Demonstrate bending experiments to determine modulus of elasticity

Complementary Courses for Chemistry						
	SEMESTER 1					
<b>GYV1</b> G 0.4	Properties of Matter.	CO1	Comprehend the fundamental concepts of mechanics and properties of matter			
CH1C01	Mechanics and Particle	CO2	Identify different types of oscillations and waves			
U	Physics	CO3	Familiarize elementary particles, their classifications and interactions.			
		CO1	Determine surface tension, coefficients of viscosity and refractive index of different liquids			
CH1C01 U	Practical	CO2	Recognize the characteristics and uses of different electric components			
		CO3	Realize SHM and measure physical constants and quantities			
		SEM	IESTER 2			
	Electric and Magnetic	C01	Describe induced polarisation and magnetisation in materials, Maxwell's equations and electromagnetic radiation.			
CH2C01 U	phenomena, thermodyna mics and Elementary solid-	CO2	Develop knowledge of the thermal properties of matter and the various temperature scales.			
	state Physics	CO3	Study the conduction mechanism in solids			
		CO4	Correlate the structure and property of solid state materials.			
	Practical	CO1	Estimate surface tension, coefficients of viscosity and refractive index of different liquids			
CH2C01 U		CO2	Identify the characteristics and uses of different electric components			
		CO3	Realize SHM and measure physical constants and quantities			
		SEM	IESTER 3			
	Quantum Mechanics, spectroscop y, Nuclear Physics and Electronics	CO1	Appreciate the emergence and development of quantum concepts in Physics.			
CHO CO1		CO2	Explain nuclei structure and interaction of nucleons			
U		CO3	Understand basic principles and applications of most common spectroscopic methods			
		CO4	Achieve basic ideas on various electronic components and circuits.			
CU2C01		CO1	Demonstrate bending experiments to determine modulus of elasticity			
CH3C01	Practical	CO2	Validate optical phenomena using spectrometer			
U		CO3	Identify components in electronic devices used in daily life			
		SEM	IESTER 4			
		CO1	Explain the propagation of light in various media on the basis of wave mechanics.			
CH4C01 U	Physical optics, laser physics and Supercondu ctivity	CO2	Outline principle, working and application of lasers.			
	ctivity	CO3	Understand the basic properties of superconductors and their applications			

CH4C01 U		CO1	Validate optical phenomena using spectrometer		
		002	Demonstrate bending experiments to determine		
	Practical	CO2	modulus of elasticity		
		CO3	Verify logic circuits and truth table		
		Ope	en Course		
		SEM	IESTER 5		
		CO1	Study the different types of energy sources		
PH5D01	Energy and Environm ental	CO2	Explain the basic principles of ecosystem and		
2U	studies	002	Develop basic ideas about Environment impact		
		CO3	assessment and waste minimization techniques.		
		<b>Choice</b> I	Based Course		
		SEM	IESTER 6		
			Appreciate the ideas of photonics and electronics and		
		CO1	its scope as optoelectronics.		
PH6B05.		<b>G 0</b>	Understand the various optical process in optical		
5U –	Optoelectronics	CO2	devices		
		<b>GO 2</b>	Explain the principle of optoelectronic devices used		
		CO3	for communication purposes.		
	20	17 Adm	ission Onwards		
Core Courses					
		SEM	IESTER 1		
		001	Outline the History of Physics, giving emphasis on the		
		COI	contributions of great scientists.		
DUICD	Mathadalagy and		Introduce the mathematical tools for physicists, which		
T01	nerspectives of Physics	CO2	includes differentiation, integral and vector calculus,		
101	perspectives of r flystes		curvilinear coordinates		
		CO3	Understand the principles of various measuring		
		005	instruments, errors and its propagation.		
		SEM	IESTER 2		
		CO1	Equip the student with basics of engineering skills		
			useful in their everyday life.		
PH2CR	Mechanics and properties	CO2			
102	of matter		Identify different types of oscillators and their features		
		CO3	Gain knowledge on surface tension, viscosity and		
			elastic properties of materials		
		CO1	Estimate mass, volume, thickness etc of materials		
DUCCDD	Core Practical I:		Coin practical skill in testing algebranic components		
01	Mechanics and Properties	CO2	used in Physics experiments		
	of Matter		Analyze experimental data and estimate errors in		
		CO3	acquire data		
		SEM	IESTER 3		
			Relate various optical phenomena like reflection		
		CO1	refraction, interference, diffraction. polarization etc		
DITA			with day-to-day observations		
PH3CR	Optics, laser and fiber optics	000	Explain the working principles of various optical		
Т03		002	instruments and devices.		

		CO3	Describe working principle and applications of Lasers,
		005	Holography and optical fiber
		SEN	IESTER 4
		CO1	Understand the physical principles and applications of Electronics
DUACDT		CO2	Describe the characteristic features of diodes, filter
$\Gamma \Pi 4 C K I$	Semiconductor Physics	CO3	Explain fundamental circuits based on on-Amps
04		0.05	Gain basic ideas on construction and working of
		CO4	electronic devices and circuits and communication
		001	systems.
		CO1	Validation of optical phenomena using spectrometer
PH4CRP	Core Practical II: Optics	CO2	Construct and analyze basic electronic circuits
02	and Semiconductor	002	Identify components in electronic devices used in daily
	rnysics	003	life
		SEN	IESTER 5
		CO1	Understand laws governing the charge distribution in
		COI	electrostatics.
		$CO^2$	Familiarize Maxwell's equations, displacement current
PH5CR	Electricity and Electro-	002	and wave propagation
T05	dynamics	CO3	Develop in depth knowledge about the transient
			current response
		004	Solve problems involving linear electrical networks
		CO4	using the symmetry concepts and various network
			Compare Newtonian, Lagrangian and Hamiltonian
		CO1	formalisms in Classical Mechanics
			Appreciate the historical development of quantum
PH5CR	Classical and quantum	CO2	mechanics
106	mechanics		Apply Schrodinger equation for systems such as
		CO3	particle in a box, potential barrier, Harmonic oscillator
			etc.
		CO1	Examine the fundamentals of codes and number
			system, binary arithmetic, logics and boolean
			functions.
		CO2	Explain the design and working of various
PH5CR	Digital electronics and		combinational and sequential logic circuits.
T07	programming	CO3	language design and implementation
			Practice the fundamental concepts of object oriented
		CO4	programming languages and provide exposure to
			problem solving through programming in C++
			Enhance critical and creative thinking and hence
		CO1	involve in environmental issues that challenge the inter-
DU5CD	Environmental Physics and human rights		relationship between man and environment
PH5CR T08		$CO^{2}$	Develop character building, positive attitude and
		002	values in life

		CO3	Understand human rights, its protection and activities against it in a global perspective.
		SEN	IESTER 6
		CO1	Describe the central concepts and basic formalisms of specific heat, entropy, quantum theory of radiation etc.
T09	Physics	CO2	Discuss the principle and working of various automobile engines
		CO3	Understand the statistical distribution of particles, ensembles, classical and quantum statistics etc.
		CO1	Develop an idea of Galilean and Lorentz transformations and theory of relativity
PH6CR	Relativity and	CO2	Analyze theories based on interaction between matter and radiation.
T10	spectroscopy	CO3	Summarize the change in behavior of atoms in external applied electric and magnetic field.
		CO4	Study the principle and instrumentation of various spectrometers including NMR and ESR systems.
	Nuclear, particle Physics and astrophysics	CO1	Explain the concepts and potential applications nuclear and particle Physics.
PH6CR		CO2	Appreciate the application of general principles of quantum physics to atomic and nuclear systems.
T11		CO3	Interpret the theoretical predictions on nuclear models and nuclear reactions.
		CO4	Understand the evolution of stars and other heavenly bodies.
	Solid state Physics	CO1	Classify condensed or solid state materials on the basis of arrangement of atoms, ions, electron motion, spin etc.
T12		CO2	Understand the basic correlation between chemical bonding, crystal structure and their effects.
		CO3	Discuss the conduction mechanism in solids including superconductors.
DUCODD	Core Practical III: Electricity, Magnetism and Laser	CO1	Calibration of electric devices like ammeter, voltmeter using potentiometer
03		CO2	Compare different methods to determine magnetic moments of magnet
		CO3	Validation of Network theorems
PH6CRP	Core Practical IV: Digital	CO1	Analyze logic processes and implement logical operations using combinational and sequential logic circuits
04	Electronics	CO2	Construct logic circuits using universal gates as well as using transistors and diodes
		CO1	Apply C++ program in physical problems
рнастр	Core Practical V: Thermal	CO2	Carry out experiments using Spectrometer
РН6СКР 05	Physics, Spectroscopy and C++ programming	CO3	Determine physical constants such as thermal conductivity, specific heat capacity using heat experiments

	Core Practical VI:	CO1	Understand the voltage -current characteristics in semiconductor devices
PH6CRP 06	Acoustics, Photonics and Advanced Semiconductor	CO2	
	Physics	002	Model mathematical operations using digital circuits
		<u>CO3</u>	Construct Regulated power supply and amplifiers
		COI	Build a scientific approach towards research
PH6PRO	<b>N 1 1 1 1 1 1 1</b>	~ ~ •	Create an awareness how national and state level
01	Project and Industrial visit	CO2	research institutions/industries play a key role in the
			development of nation
		CO3	Develop problem solving skills
	Compleme	entary C	Courses for Mathematics
		SEM	IESTER 1
		CO1	Explore the elastic properties of solids
PH1CM	Properties of matter &	CO2	Understand the surface tension and viscous property of fluids
101	error analysis	~ ~ •	Analyze the nature of experimental errors and methods
		CO3	to reduce errors in measurements
		SEM	ESTER 2
		CO1	Comprehend the laws involved in mechanics.
		CO2	Identify different types of oscillations and waves
PH2CM	Mechanics and Astro-	002	Appreciate the laws and physical processes that govern
T01	physics	CO3	the universe its constituents their origins and
		003	evolution
			Determine surface tension coefficients of viscosity
	Comulan anton a Dhavior	CO1	and refractive index of different liquids
		CO2	Recognize the characteristics and uses of different
01	Practical 1		electric components
01			Realize SHM and measure physical constants and
		CO3	quantities
		SEM	
		SEN	LA Anno siste the emergence and development of
	Modern Physics and	CO1	Appreciate the emergence and development of
			quantum concepts in Physics
PH3CM		CO2	Develop knowledge related to the concepts of
101	Electronics		spectroscopy.
		CO3	Gain basic ideas of construction, working of electronic
			devices such as diodes and transistors.
		SEM	IESTER 4
		CO1	Discuss the fundamental concepts and applications of interference, diffraction and polarization.
PH4CM T01	Optics and electricity	CO2	Outline principle, working and application of lasers.
		CO3	Understand behavior of transient currents in various circuits
		CO1	Demonstrate bending experiments to determine modulus of elasticity
PH4CMP 01	Complementary Physics Practical 2	CO2	Determine refractive index, dispersive power etc using optical experiments

		CO3	Identify components in electronic devices used in daily life		
<b>Complementary Courses for Chemistry</b>					
		SEN	IESTER 1		
		CO1	Explore the elastic properties of solids		
PH1CM	Properties of matter and	CO2	Understand the surface tension and viscous property of fluids		
102	inermouyna mes	CO3	Acquire knowledge on heat transfer, entropy and quantum theory of radiation.		
		SEN	IESTER 2		
		CO1	Comprehend the laws involved in mechanics.		
PH2CM	Mechanics and supercondu	CO2	Identify different types of oscillations and waves		
T02	ctivity	CO3	Understanding the basic principles of superconducting transitions.		
		CO1	Determine surface tension, coefficients of viscosity and refractive index of different liquids		
PH2CMP 02	Complementary Physics Practical 1	CO2	Recognize the characteristics and uses of different electric components		
		CO3	Realize SHM and measure physical constants and quantities		
		SEN	IESTER 3		
	Modern physics and magnetism	CO1	Appreciate the emergence and development of quantum concepts in Physics		
PH3CM T02		CO2	Develop knowledge related to the concepts of spectroscopy.		
		CO3	Explain the concepts of magnetic field , magnetic flux and Earth's magnetic field		
SEMESTER 4					
	Optics and solid state physics	CO1	Discuss the fundamental concepts and applications of interference, diffraction and polarization.		
PH4CM T02		CO2	Outline principle, working and application of lasers.		
		CO3	Understand the basic characteristics of solids and various technological applications.		
		CO1	Demonstrate bending experiments to determine modulus of elasticity		
PH4CMP 02	Complementary Physics Practical 2	CO2	Determine refractive index, dispersive power etc using optical experiments		
		CO3	Identify components in electronic devices used in daily life		
	Open Course				
		SEN	IESTER 5		
		CO1	Develop scientific aptitude and attitude in every aspect of life		
PH5OP T01	Our Universe	CO2	Understand the evolution of stars and other heavenly bodies.		
		CO3	Create basic idea about optical telescopes		

Choice Based Course SEMESTER 6				
		CO1	Introduce basic concepts of distance and co-ordinate systems used in space physics	
РН6СВ Т05	Astronomy and Astrophysics	CO2	Create basic idea about optical telescopes	
		CO3	Appreciate the evolution of stars and other heavenly bodies.	
		CO3	Impart scientific research aptitude in space physics	