The Department follows the syllabus and adheres to the curriculum structure as mandated by the affiliating Assam University.

During the three years of the B.Sc Physics Honours programme, spread over 6 semesters, 20 theory papers and 14 practical papers are taught. The Semester wise distribution of the Papers and their Course Outcomes are as follows:-

Semester I	
Name of the paper: MATHEMATICAL PHYSICS-I Paper Code: PHSHCC101T	On completion of this course the students will learn, have a fair understanding of and develop the concepts of: CO1: Matrices CO2: First and Second Order Differential Equations CO3: Scalar and Vector product of vectors, Scalar and Vector Triple Product CO4: Vector Differentiation CO5: Vector Integration CO6: Orthogonal Curvilinear Coordinates CO7: Introductory Numerical Techniques CO8: Probability and Theory of Errors
Name of the paper: MATHEMATICAL PHYSICS-I Practical Paper Code: PHSHCC101P	Once this course is completed, the students will be able to use C / C++ / FORTRAN / Scilab / Python / Matlab / Mathematica / others to solve the following problems: CO1: To Find the area of circle, area of square, volume of sphere CO2: To find sum & average of a list of numbers, find the largest of a given list of numbers and its location in the list, sort a list of numbers in ascending or descending order, find maximum, minimum and range of numbers, find values of sine, cosine and exponential function using their series expansion up to definite number of terms. CO3: To generate a list of random integers, find value of pi by random numbers, find factorial of a number and generate Fibonacci series. CO4: To solve algebraic equations i. by Bisection method ii. by Newton-Raphson method iii. by Secant method and to solve transcendental equations by suitable approximate numerical method. CO5: To evaluate trigonometric functions i. $sin\theta$ ii. $cos\theta$ iii. $tan\theta$ using Newton Gregory Forward and Backward difference formula
Name of the paper: MECHANICS	On completion of this course the students will learn, have a fair understanding of and develop the concepts of: CO1: Fundamentals of dynamics

Paper Code: PHSHCC102T	CO2: Work and Energy CO3: Collisions CO4: Rotational Dynamics CO5: Gravitational and Central Force Motion CO6: Oscillations CO7: Special Theory of Relativity
Name of the paper: MECHANICS PRACTICAL Paper Code: PHSHCC102P	At the end of this course the students will be able to: CO1: Measure the diameter of a thick wire using vernier caliper, screw gauge and travelling microscope and hence find its cross-section CO2: Determine the Moment of Inertia of unknown body by suitable method CO3: Determine Coefficient of Viscosity of water by suitable method CO4: Determine the Young's Modulus of a Wire by suitable method. CO5: Determine the Modulus of Rigidity of a Wire by suitable method. CO6: Determine the value of g using Bar Pendulum CO7: Determine the value of g using Kater's Pendulum. CO8: Study the Motion of Spring and calculate (a) Spring constant, (b) g
SEMESTER II	
Name of the paper: ELECTRICITY AND MAGNETISM Paper Code: PHSHCC201T	On completion of this course the students will be able to learn, understand and develop the concepts of: CO1: Electric field and electric potential CO2: Dielectric properties of matter CO3: Magnetic field CO4: Magnetic properties of matter CO5: Electromagnetic induction CO6: Electrical circuits CO7: Network Theorems CO8: Ballistic galvanometer
Name of the paper: ELECTRICITY AND MAGNETISM PRACTICAL Paper Code: PHSHCC201P	At the end of this course the students will be able to: CO1: Study the characteristics of a series RC Circuit connected to an ac/dc source. CO2: Determine an unknown Low Resistance using Potentiometer. CO3: Determine an unknown Low Resistance using Carey Foster's Bridge. CO4: Compare two capacitances using De'Sauty's bridge. CO5: Determine the strength of the magnetic field produced at the centre of the tangent galvanometer coil due to a current flowing in it and hence to determine horizontal component of earth's magnetic field. CO6: Verify the Thevenin's theorem.

	CO7: Verify the Norton's theorem. CO8: Verify the Maximum power transfer theorem. CO9: Determine self-inductance of a coil by Anderson's bridge/Maxwell's bridge. CO10: Study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor Q and (d) Band width. CO11: Determine the resistance of a given galvanometer by half deflection method. CO12: Determine the mutual inductance between two coils by suitable method.
Name of the paper: WAVES and OPTICS Paper Code: PHSHCC202T	Once this course is completed, the students will learn, have a fair understanding of and develop the concepts of: CO1: Superposition of collinear harmonic oscillations CO2: Superposition of two perpendicular harmonic oscillations CO3: Wave Motion CO4: Velocity of waves CO5: Superposition of two harmonic waves CO6: Electromagnetic nature of light Co7: Interference CO8: Diffraction CO9: Holography
Name of the paper: WAVES and OPTICS PRACTICAL Paper Code: PHSHCC202P	At the end of this course the students will be able to: CO1: Determine the frequency of an electric tuning fork by Melde's experiment and verify λ^2 –T law. CO2: Determine refractive index of the material of a prism using sodium source. CO3:Determine the dispersive power and Cauchy constants of the material of a prism using mercury source. CO4: Determine the wavelength of sodium source using Michelson's interferometer CO5: Determine wavelength of sodium light using Fresnel Biprism. CO6: Determine wavelength of sodium light using Newton's Rings. CO7: Draw the D- λ calibration curve and hence find the wavelength of unknown source. CO8: Determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating. CO9: Determine dispersive power and resolving power of a plane diffraction grating.
Semester III	
Name of the paper: MATHEMATICAL PHYSICS-II Paper Code:	At the end of this course the students will be able to learn, understand and develop the concepts of: CO1: Fourier Series CO2: Frobenius Method and its applications to find the solution of Legendre, Bessel, Hermite and Laguerre Differential Equations.

PHSHCC301T	CO3: : Properties of Legendre Polynomials: Rodrigues Formula, Generating Function, Orthogonality CO4: Beta and Gamma Functions and Relation between them CO5: Dirac Delta function and its properties CO6: Partial Differential Equations
Name of the paper: MATHEMATICAL PHYSICS-II Practical Paper Code: PHSHCC301P	Once this course is completed, the students will be able to use C / C++ / FORTRAN / Scilab / Python / Matlab / Mathematica / others to solve the following problems: CO1: To calculate velocity and acceleration from the given position with equidistant time data using forward difference formula. CO2: To evaluate integral of a function over an interval using Trapezoidal rule. CO3: To evaluate integral of a function over an interval using Simpson's 1/3 rule. CO4: To find the area of B-H Hysteresis loop using suitable numerical method. CO5: To add, multiply two matrices and find transpose of a given matrix. CO6: To find inverse, eigen values and eigen vectors of a given matrix CO7: To find the value of R from a given current(I) with voltage(V) data using least square fitting, assuming that the Ohm's law is obeyed. CO8: To measure spring constant using Hook's law (neglecting negative sign) from a given displacement(x) with applied force(F) data using least square fitting. CO9: To solve mesh equations of electric circuits (3 meshes) by Gauss elimination method. CO10: To solve coupled spring mass system(3 masses) by suitable method. CO11: Using Rodrigues' formula as a user-defined function, evaluate and plot the first six Legendre polynomials from x=-1 to +1. CO12: Using the appropriate Frobenius series as a user-defined

	function, evaluate and plot the first six Bessel functions of the first kind from x=-1 to +1.
Name of the paper: THERMAL PHYSICS Paper Code: PHSHCC302T	At the end of this course the students will be able to learn, understand and develop the concepts of: CO1: Zeroth and First Law of Thermodynamics CO2: Second Law of Thermodynamics CO3: Entropy CO4: Thermodynamic Potentials CO5: Maxwell's Thermodynamic Relations CO6: Phase Transition CO7: Distribution of Velocities CO8: Molecular Collisions CO9: Real Gases
Name of the paper: THERMAL PHYSICS PRACTICAL Paper Code: PHSHCC302P	At the end of this course the students will be able to: CO1: Determine Mechanical Equivalent of Heat, J, by Joule's / Callender and Barne's constant flow method. CO2: Determine the Coefficient of Thermal Conductivity of Cu by Searle's Apparatus or any suitable method. CO3: Determine the coefficient of linear expansion by optical lever method or any other suitable method. CO4: Determine the Coefficient of Thermal Conductivity of a bad conductor by Lee and Charlton's disc method or any suitable method. CO5: Determine the Temperature Coefficient of Resistance by Platinum Resistance Thermometer (PRT). CO6: Study the variation of resistance with temperature by Carry-Foster bridge and hence determine the temperature coefficient of the material using hotplate. CO7: Study the variation of Thermo-emf of a Thermocouple with Difference of Temperature of its Two Junctions CO8: Calibrate a thermocouple to measure temperature in a specified Range using Null Method, ii) Direct measurement using Op-Amp difference amplifier and to determine Neutral Temperature. CO9: Determine the specific heat of a liquid by the method of cooling.
Name of the paper: DIGITAL SYSTEMS AND APPLICATIONS Paper Code: PHSHCC303T	Once this course is completed, the students will learn, have a fair understanding of and develop the concepts of: CO1: Cathode Ray Oscilloscope CO2: Integrated Circuits CO3: Digital Circuits CO4: Boolean Algebra CO5: Data processing circuits CO6: Arithmetic Circuits CO7: Sequential Circuits CO8: Shift registers CO9: Counters (4 bits) CO10: Computer Organization CO11: Intel 8085 Microprocessor Architecture

	CO12: Introduction to Assembly Language CO13: Timers
Name of the paper: DIGITAL SYSTEMS AND APPLICATIONS PRACTICAL Paper Code: PHSHCC303P	At the end of this course the students will be able to: CO1: Verify the truth tables of AND, OR, NOT, NOR and NAND gates. CO2: Design a combinational logic system for a specified Truth Table. CO3: Convert a Boolean expression into logic circuit and design it using logic gate ICs CO4: Design and verify the De Morgan's theorem using breadboard. CO5: Design and verify Half Adder and Full Adder. CO6: Build Flip-Flop (RS, Clocked RS, D-type and JK) circuits using NAND gates. CO7: Build JK Master-slave flip-flop using Flip-Flop ICs CO8: Build a 4-bit Counter using D-type/JK Flip-Flop ICs and study timing diagram. CO9: Design an astable multivibrator of given specifications using 555 Timer. CO10: Design a monostable multivibrator of given specifications using 555 Timer. CO11: Measure (a) Voltage, (b) rise and fall times and (c) Time period of a periodic waveform using CRO. CO12: Write the following programs using 8085 Microprocessor **a.** Addition and subtraction of numbers using direct addressing mode **b.** Addition and subtraction of numbers using indirect addressing mode **c.** Multiplication by repeated addition. **d.** Use of CALL and RETURN Instruction.
Name of the paper: WORKSHOP SKILL Paper Code: PHSSEC301T	Once this course is complete, the students will be able to learn, understand and develop the concepts of: CO1: Introduction to Workshop Skill CO2: Mechanical Skill CO3: Machine processing CO4: Electrical and Electronic Skill CO5: Introduction to prime movers
Semester IV	
Name of the paper: MATHEMATICAL PHYSICS-III Paper Code: PHSHCC401T	On completion of this course, the students will learn, understand and develop the concepts of: CO1: Complex Analysis CO2: Taylor's and Laurent's series CO3: The Calculus of Residues CO4: Laplace Transform (LT) CO5: Inverse LT and Application of LT

Name of the paper: MATHEMATICAL PHYSICS-III PRACTICAL Paper Code: PHSHCC401P	Once this course is completed, the students will be able to use C / C++ / FORTRAN / Scilab / Python / Matlab / Mathematica / others to solve the following problems: CO1: Solve a given first order ordinary differential equation (ODE) like (a) Radioactive decay(b) Newton's law of cooling (c) Current in LR, RC circuit with DC source using Euler/RK 4Order method. CO2: Solve a given second order ordinary differential equation (ODE) like (a) free harmonic oscillator (b) Damped harmonic oscillator (c) forced harmonic oscillator using RK 4 order method. CO3: Solve (a) Wave equation (b) Heat equation (c) Poisson Equation (d) Laplace equation. CO4: Solve differential equations CO5: Dirac Delta Function: CO6: Fourier Series: CO7: Frobenius method and special functions: CO8: Calculation of error for each data point of observations recorded in experiments done in previous semesters (choose any two) CO9: Calculation of least square fitting manually without giving weightage to error. Confirmation of least square fitting of data through computer program. CO10: Evaluation of trigonometric functions e.g. $sin\theta$, CO11: Complex analysis CO12: Solve Kirchhoff's Current law for any node of an arbitrary circuit using Laplace's transform. CO13: Solve Kirchhoff's Voltage law for any loop of an arbitrary circuit using Laplace's transform. CO14: Perform circuit analysis of a general LCR circuit using Laplace's transform.
Name of the paper: ELEMENTS OF MODERN PHYSICS Paper Code: PHSHCC402T	At the end of this course, the students will learn, understand and develop the concepts of: CO1: Planck's quantum hypothesis CO2: Quantum Theory of Light CO3: Heisenberg's Uncertainty Principle CO4: Fundamental postulates of Quantum Mechanics CO5: Hamiltonian Operator, time dependent Schrodinger equation and Dynamical evolution of a quantum state CO6: Radioactivity CO7: Lasers
Name of the paper: ELEMENTS OF MODERN PHYSICS PRACTICAL	At the end of this course the students will be able to: CO1: Measure Planck's constant using black body radiation and photo-detector. CO2: Photo-electric effect: photo current versus intensity and wavelength of light; maximum energy of photo-electrons versus frequency of light.

Paper Code: PHSHCC402P	CO3: Determine work function of material of filament of directly heated vacuum diode. CO4: Determine the Planck's constant using LEDs of at least 4 different colours. CO5: Determine the wavelength of H-alpha emission line of Hydrogen atom. CO6: Determine the value of e/m by Magnetic focusing/ Bar magnet or by any suitable method. CO7:Set up the Millikan oil drop apparatus and determine the charge of an electron. CO8: Show the tunneling effect in tunnel diode using I-V characteristics. CO9: Determine the wavelength of laser source using diffraction of single slit. CO1: Determine the wavelength of laser source using diffraction of double slits.
Name of the paper: ANALOG SYSTEMS AND APPLICATIONS Paper Code: PHSHCC403T	On completion of this course the students will be able to learn, understand and develop the concepts of: CO1: Semiconductor Diodes CO2: Rectifier Diode CO3: Two-terminal Devices and their Applications CO4: Bipolar Junction transistors CO5: Amplifiers, Coupled Amplifier, Feedback in Amplifiers CO6: Sinusoidal Oscillators CO7: Operational Amplifiers (Black Box approach, Applications of Op-Amps
Name of the paper: ANALOG SYSTEMS AND APPLICATIONS PRACTICAL Paper Code: PHSHCC403P	At the end of this course the students will be able to: CO1: Study V-I characteristics of PN junction diode, and Light emitting diode. CO2: Study the V-I characteristics of a Zener diode and its use as voltage regulator. CO3: Study of V-I & power curves of solar cells, and find maximum power point & efficiency. CO4: Study the characteristics of a Bipolar Junction Transistor in CE configuration. CO5: Design a CE transistor amplifier of a given gain (mid-gain) using voltage divider bias. CO6: Study the frequency response of voltage gain of a single stage RC-coupled transistor amplifier. CO7: Design a phase shift oscillator of given specifications using BJT. CO8: Design a Wien bridge oscillator for given frequency using an op-amp. CO9: Study the analog to digital convertor (ADC) IC. CO10: Design an inverting amplifier using Op-amp (741,351) for dc input voltage and study its closed loop gain. CO11: Design inverting amplifier using Op-amp (741,351) and study its

	frequency response. CO12: Design non-inverting amplifier using Op-amp (741,351) & study its frequency response. CO13: Investigate the use of an op-amp (741,351) as an Integrator and Differentiator. CO14:Add two dc voltages using Op-amp (741,351) in inverting and non-inverting mode. CO15: Investigate the use of an op-amp (741,351) as adder and subtractor.
Name of the paper: ELECTRICAL CIRCUITS AND NETWORK Paper Code: PHSSEC401T	Once this course is complete, the students will be able to learn, understand and develop the concepts of: CO1: Basic Electricity Principles CO2: Understanding Electrical Circuits CO3: Electrical Drawing and Symbols CO4: Generators and Transformer CO5: Electric Motors CO6: Solid State Devices CO7: Electrical protection CO8: Electrical Wiring
Semester V	
Name of the paper: QUANTUM MECHANICS AND APPLICATIONS Paper Code: PHSHCC501T	Once this course is completed, the students will be able to learn, understand and develop the concepts of: CO1: General formalism of quantum mechanics CO2: Quantum mechanical Operators CO3: Applications of Schrodinger equation CO4: Quantum theory of hydrogen-like atoms CO5: Atoms in External Magnetic Field
Name of the paper: QUANTUM MECHANICS AND APPLICATIONS PRACTICAL Paper Code: PHSHCC501P	At the end of this course, the students will be able to CO1: Study Electron spin resonance- determine magnetic field as a function of the resonance frequency. CO2: Study Zeeman effect: with external magnetic field; Hyperfine splitting. CO3: Show the tunneling effect in tunnel diode using I-V characteristics. Quantum efficiency of CCDs. In addition to that, the students will be able to use C/C++/FORTRAN/ Scilab/ Python/Matlab/Mathematica/others to solve the following problems: CO1: Solve the s-wave Schrodinger equation for the ground state and

	the first excited state of the hydrogen atom CO2: Solve the s-wave radial Schrodinger equation for an atom CO3: Solve the s-wave radial Schrodinger equation for a particle CO4: Solve the s-wave radial Schrodinger equation for the vibrations of hydrogen molecule
Name of the paper: SOLID STATE PHYSICS Paper Code: PHSHCC502T	Once this course is completed, the students will be able to learn, understand and develop the concepts of: CO1: Crystal Structure CO2: Elementary Lattice Dynamics CO3: Magnetic Properties of Matter CO4: Dielectric Properties of Materials CO5: Ferroelectric Properties of Materials CO6: Elementary Band Theory CO7: Superconductivity
Name of the paper: SOLID STATE PHYSICS PRACTICAL Paper Code: PHSHCC502P	At the end of this course, the students will be able to CO1: Measure susceptibility of paramagnetic solution by (Quinck`s Tube Method)/suitable method. CO2: Measure the Magnetic susceptibility of Solids. CO3: Measure the Dielectric Constant of a dielectric Material by suitable method. CO4: Study the PE Hysteresis loop of a Ferroelectric Crystal. CO5: Draw the BH curve of Fe using Solenoid/transformer & determine energy loss from Hysteresis. CO6: Measure the resistivity of a semiconductor (Ge) with temperature by four-probe method (room temperature to 150 ^{o}C) and to determine its band gap. CO7: Determine the Hall coefficient of a semiconductor sample.
Name of the paper: CLASSICAL DYNAMICS	Once this course is completed, the students will be able to learn, understand and develop the concepts of:

Paper Code: PHSDSE501TA	CO1: Dynamics of a system of particles CO2: Lagrangian formalism CO3: Hamiltonian Formalism CO4: Small Amplitude Oscillations CO5: Fluid Dynamics
Name of the paper: NUCLEAR AND PARTICLE PHYSICS Paper Code: PHSDSE502TA	On completion of this course, the students will be able to learn, understand and develop the concepts of: CO1: General Properties of Nuclei CO2: Nuclear Models CO3: Radioactive decay CO4: Nuclear Reactions CO5: Interaction of Nuclear Radiation with matter CO6: Detector for Nuclear Radiations CO7: Particle Accelerators CO8: Particle physics
Semester VI	
Name of the paper: ELECTROMAGNETIC THEORY Paper Code: PHSHCC601T	On completion of this course, the students will be able to learn, understand and develop the concepts of: CO1: Maxwell Equations CO2: EM Wave Propagation in Unbounded Media CO3: EM Wave in Bounded Media CO4: Polarization of Electromagnetic Waves CO5: Wave Guides CO6: Optical Fibres
Name of the paper: ELECTROMAGNETIC THEORY PRACTICAL Paper Code: PHSHCC601P	At the end of this course, the students will be able to CO1: Verify the law of Malus for plane polarized light. CO2: Determine the specific rotation of sugar solution using Polarimeter. CO3: Analyze elliptically polarized Light by suitable method (using a

	Babinet's compensator). CO4: Study the polarization of light by reflection and determine the polarizing angle and hence determine the refractive index of the material. CO5: Verify the Stefan's law of radiation and to determine Stefan's constant. CO6: Determine the Boltzmann constant using V-I characteristics of PN junction Diode.
Name of the paper: STATISTICAL MECHANICS Paper Code: PHSHCC602T	Once this course is complete, the students will be able to learn, understand and develop the concepts of: CO1: Classical Statistics CO2: Classical Theory of Radiatio CO3: Quantum Theory of Radiation CO4: Bose-Einstein Statistics CO5: Fermi-Dirac Statistics
Name of the paper: STATISTICAL MECHANICS Paper Code: PHSHCC602T	When this course is over, the students will be able to use C / C++ / FORTRAN / Scilab / Python / Matlab / Mathematica / others to solve the following problems: CO1: Compute the partition function Z(β) for examples of systems with a finite number of single particle levels (e.g., 2 level, 3 level, etc.) and a finite number of non-interacting particles N under Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein statistics CO2: Plot Planck's law for Black Body radiation and compare it with Raleigh-Jeans Law at high temperature and low temperature. CO3: Plot Specific Heat of Solids (a) Dulong-Petit law, (b) Einstein distribution function, (c) Debye distribution function for high temperature and low temperature and compare them for these two cases. CO4: Plot the following functions with energy at different temperatures a. Maxwell-Boltzmann distribution b. Fermi-Dirac distribution c. Bose-Einstein distribution
	On completion of this course the students will learn, have a fair

	understanding of and develop the concepts of: CO1: Basic concepts of positional astronomy CO2: Astronomical techniques CO3: The sun, the solar family, stellar spectra and classification structure CO4: The milky way CO5: Large scale structure & expanding universe
Name of the paper: NANOMATERIALS AND APPLICATIONS Paper Code: PHSDSE601TB	On completion of this course the students will learn, have a fair understanding of and develop the concepts of: CO1: Nanoscale systems CO2: Synthesis of nanostructure materials CO3: Optical Microscopy. Scanning ElectronMicroscopy. Transmission Electron Microscopy. Atomic Force Microscopy. Scanning Tunneling Microscopy. CO4: Electron transport CO5: Optical properties CO6: Applications of nanoparticles
Name of the paper: DISSERTATION Paper Code: PHSDSE602TA	At the end of this course, the students will be able to carry out a project on topics in/related to any advanced theoretical/ experimental/ computational topics under the supervision of one of the course teachers

During the three years of the B.Sc with Physics programme, spread over 6 semesters, 10 theory papers and 4 practical papers are taught. The Semester wise distribution of the Papers and their Course Outcomes are as follows:-

Semester I	
Name of the paper: MECHANICS Paper Code: PHSDSC101T/PHSGEC101T	On completion of this course the students will learn, have a fair understanding of and develop the concepts of: CO1: Vectors CO2: Ordinary Differential Equations CO3: Momentum and Energy CO4: Rotational Motion CO5: Gravitation CO6: Elasticity

	CO7: Fluids CO8: Special Theory of Relativity
Name of the paper: MECHANICS PRACTICAL Paper Code: PHSDSC101P/PHSGEC101P	At the end of this course, the students will be able to CO1: Measure the diameter of a thick wire using Vernier Calliper, screw gauge and travelling microscope. CO2: Determine the Moment of Inertia of a regular body by torsional pendulum. CO3: Determine the Young's Modulus of a Wire by Searle's Method. CO4: Determine the Modulus of Rigidity of a Wire by Statistical method. CO5: Determine g by Bar Pendulum. CO6: Determine g by Kater's Pendulum. CO7: Determine ***g*** and velocity for a freely falling body using Digital Timing Technique. CO8: Study the Motion of a Spring and calculate (a) Spring Constant (b) Value of ***g***. CO9: Determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
Semester II	
Name of the paper: ELECTRICITY AND MAGNETISM Paper Code: PHSDSC201T/PHSGEC201T	On completion of this course the students will learn, have a fair understanding of and develop the concepts of: CO1: Vector analysis CO2: Electrostatics CO3: Magnetism CO4: Electromagnetic Induction CO5: Maxwell`s equations and Electromagnetic wave propagation
Name of the paper: ELECTYRICITY AND MAGNETISM PRACTICAL Paper Code: PHSDSC201P/PHSGEC201P	At the end of this course, the students will be able to CO1: Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d) checking electrical fuses. CO2: Determine the specific resistance by metre bridge. CO3: Determine the strength of the magnetic field produced at the centre of the tangent galvanometer coil due to a current flowing in it and hence to determine horizontal component of earth's magnetic field. CO4: Determine the self induction of a coil and its internal resistance in an L-R circuit CO5: Study a series LCR circuit and determine its (a) Resonant Frequency, (b) Quality Factor CO6: Determine the resistance of a galvanometer by half deflection method. CO7: Determine a resistance per unit length of metre bridge wire by Carey Foster's method. CO8: Verify the Thevenin's theorem. CO9: Verify the Norton's theorem. CO10:Verify series and parallel laws of resistance by Post office Box. CO11:Compare the emf of two cells by potentiometer.

Semester III	
Name of the paper: THERMAL PHYSICS AND STATISTICAL MECHANICS Paper Code: PHSDSC301T/PHSGEC301T	Once this course is complete, the students will be able to learn, understand and develop the concepts of: CO1: Thermodynamic Description of system CO2: Thermodynamic Potentials CO3: Kinetic Theory of Gases CO4: Theory of Radiation CO5: Statistical Mechanics
Name of the paper: THERMAL PHYSICS AND STATISTICAL MECHANICS PRACTICAL Paper Code: PHSDSC301P/PHSGEC301P	At the end of this course, the students will be able to CO1: Determine Mechanical Equivalent of Heat, J, by Joule's method. CO2: Determine the specific heat of a liquid by the method of cooling. CO3: Verify Stefan's law by electrical method. CO4: Determine the coefficient of thermal conductivity of copper by Searle's Apparatus. CO5: Determine the coefficient of linear expansion by suitable method. CO6: Determine the temperature co-efficient of resistance by Platinum resistance thermometer. CO7: Study the variation of thermo emf across two junctions of a thermocouple with temperature.
Name of the paper: WORKSHOP SKILL Paper Code: PHSSEC301T	Once this course is complete, the students will be able to learn, understand and develop the concepts of: CO1: Introduction to Workshop Skill CO2: Mechanical Skill CO3: Machine processing CO4: Electrical and Electronic Skill CO5: Introduction to prime movers
Semester IV	
Name of the paper: WAVES AND OPTICS Paper Code: PHSDSC401T/PHSGEC401T	On completing the course, the students will be able to learn, understand and develop the concepts of: CO1: Superposition of Two Collinear Harmonic oscillations CO2: Superposition of Two Perpendicular Harmonic Oscillations CO3: Waves Motion- General CO4: Sound CO5: Wave Optics CO6: Interference CO7: Interferometers

	CO8: Diffraction CO9: Polarization
Name of the paper: WAVES AND OPTICS PRACTICAL Paper Code: PHSDSC401P/PHSGEC401P	At the end of this course, the students will be able to CO1: Determine the frequency of tuning fork by Sonometer. CO2: Determine the refractive index of a given liquid by travelling microscope. CO3: Determine the R. I. of the material of a given lens by suitable method. CO4: Determine the focal length of convex mirror with the help of a convex lens by optical bench. CO5: Familiarization with Schuster`s focussing; determination of angle of prism. CO6: Determine the Refractive Index of the Material of a given Prism using Sodium Light. CO7: Determine Dispersive Power of the Material of a given Prism using Mercury Light CO8: Determine wavelength of sodium light using Newton's Rings.
Name of the paper: ELECTRICAL CIRCUITS AND NETWORK Paper Code: PHSSEC401T	Once this course is complete, the students will be able to learn, understand and develop the concepts of: CO1: Basic Electricity Principles CO2: Understanding Electrical Circuits CO3: Electrical Drawing and Symbols CO4: Generators and Transformer CO5: Electric Motors CO6: Solid State Devices CO7: Electrical protection CO8: Electrical Wiring
Semester V	
Name of the paper: BASIC INSTRUMENTATION Paper Code: PHSSEC501T	On completion of the course, the students will be able to learn, understand and develop the concepts of: CO1: Basic of Measurement CO2: Multimeter CO3: Electronic Voltmeter CO4: AC millivoltmeter CO5: Cathode Ray Oscilloscope CO6: Signal Generators and Analysis Instruments CO7: Impedance Bridges & Q-Meters CO8: Digital Instruments CO9: Digital Multimeter They will also have hands-on training on CO10: Use of an oscilloscope. CO11: CRO as a versatile measuring device.

	CO12: Circuit tracing of Laboratory electronic equipment. CO13: Use of Digital multimeter/VTVM for measuring voltages. CO14: Winding a coil / transformer. CO15: Study the layout of receiver circuit. CO16: Balancing of LCR bridges.
Name of the paper: CLASSICAL DYNAMICS Paper Code: PHSDSE501TA	Once this course is completed, the students will be able to learn, understand and develop the concepts of: CO1: Dynamics of a system of particles CO2: Lagrangian formalism CO3: Hamiltonian Formalism CO4: Small Amplitude Oscillations CO5: Fluid Dynamics
Semester VI	
Name of the paper: RENEWABLE ENERGY AND ENERGY HARVESTING Paper Code: PHSSEC601T	Once this course is completed, the students will be able to learn, understand and develop the concepts of: CO1: Fossil fuels and Alternate Sources of energy CO2: Solar energy CO3: Wind Energy harvesting CO4: Ocean Energy CO5: Geothermal Energy CO6: Hydro Energy CO7: Piezoelectric Energy harvesting CO8: Electromagnetic Energy Harvesting
Name of the paper: ASTRONOMY AND ASTROPHYSICS Paper Code: PHSDSE601TA	On completion of this course the students will learn, have a fair understanding of and develop the concepts of: CO1: Basic concepts of positional astronomy CO2: Astronomical techniques CO3: The sun, the solar family, stellar spectra and classification structure CO4: The milky way

	CO5: Large scale structure & expanding universe
Name of the paper: NANOMATERIALS AND APPLICATIONS Paper Code: PHSDSE601TB	On completion of this course the students will learn, have a fair understanding of and develop the concepts of: CO1: Nanoscale systems CO2: Synthesis of nanostructure materials CO3: Optical Microscopy. Scanning ElectronMicroscopy. Transmission Electron Microscopy. Atomic Force Microscopy. Scanning Tunneling Microscopy. CO4: Electron transport CO5: Optical properties CO6: Applications of nanoparticles