COURSE OUTCOMES

DEPARTMENT OF PHYSICS

SEMESTER 1:

Subject Name: MECHANICS AND RELATIVITY

Subject Code: U2PHC1

In this course the students will

CO1:	Learn different types of impact and projectile motion
CO2:	Understand the concepts of Centre of Gravity of different shapes of solids and centre of Pressure of laminas immersed in liquid
CO3:	Get knowledge about angular momentum, torque and Rocket Motion
CO4:	Be imparted the knowledge about moment of inertia and its calculation
CO5:	Understand frames of reference, Galilean transformation and relativity concepts through Michelson –Morley experiment.

Subject Name: ALGEBRA & TRIGNOMETRY

Subject Code: U2MAA1X1

In this course the students will

CO1:	Gain knowledge on various series like binomial series, logarithmic series, trigonometric series.
CO2:	Develop the ability to solve equations and understand the nature of roots of higher order equations.
CO3:	Acquire knowledge on hyperbolic functions.

Subject Name: PROPERTIES OF MATTER

Subject Code: U2PHS11

In this course the students will

CO1:	This course aims to Produce basic knowledge about the properties of matter such as solid and liquid. Also it extend
CO2:	Understand the principles of Elasticity and bending of beam
CO3:	Get knowledge about streamline and turbulent flow of liquids
CO4:	Learn the importance of surface tension of liquids
CO5:	Understand the concepts of viscosity, energy of the liquid in motion and its applications.

Subject Name: THERMAL PHYSICS – 1

Subject Code: U2PHS12

In this course the students will

CO1:	Understand the concept of specific heat capacity and experimental determination of $C_v$andC_p
CO2:	Learn the fundamentals of thermodynamics, Otto and Diesel engine
CO3:	Understand reversible and irreversible process, entropy and change in entropy.
CO4:	Know Joule- Thomson effect, liquefaction of gases
CO5:	Understand the working of refrigerator and Air- conditioner.

SEMESTER 2

Subject Name: ELECTROSTATICS AND CURRENT ELECTRICITY

Subject Code: U2PHC2

In this course the students will

CO1:	Understand the fundamentals of electrostatic parameters, Electric Field, Gauss's law and its application, Electric Dipole
CO2:	Obtain the knowledge about Electric Potential, Capacitances, different types Capacitor and Energy Stored in Capacitor
CO3:	Learn about Ohm's law, Kirchhoff's Laws and its applications
CO4:	Be Imparted the knowledge about Thermoelectricity, Chemical Effect of Current and different types of Cells
CO5:	Learn the Theory of Dielectric, Applications of Laplace's equation and experimental method to find dielectric constants.

Subject Name: CALCULUS & MATRICES

Subject Code: U2MAA2X2

In this course the students will

CO1:	Apply the reduction formula to solve problems in integral calculus.
CO2:	Utilize the concept of vector differentiation to identify the curl, divergence of a given vector.
CO3:	Construct the evolute of any curve using differential calculus.
CO4:	Develop the skills of solving simultaneous equations by marking use of the rank of

	matrices.
CO5:	Find the eigeon values, eigeon vectors of a given matrix.

Subject Name: SOUND

Subject Code: U2PHS21

In this course the students will

CO1:	Learn about the types of wave motions and its equation
CO2:	Acquire the knowledge of interference of sound waves and its applications
CO3:	Understand the vibration of sound waves in strings and air columns
CO4:	Get the knowledge of the Doppler effect in sound and practical applications of acoustics.

Subject Name: THERMAL PHYSICS II

Subject Code:U2PHS22

In this course the students will

CO1:	Understand the concept of specific heat radiation and experimental determination
CO2:	Acquire the knowledge of the fundamental laws of black body radiation
CO3:	Be imparted knowledge about Stefan's law, pyrometry and solar constant
CO4:	Understand convection, stability of atmosphere, different latent heat equations
CO5:	Derive ideal gas equation, transport phenomena of gases.

SEMESTER 3

Subject Name: ELECTROMAGENTISM

Subject Code: U2PHC3

In this course the students will

CO1:	Knowabout laws of induction and methods to find self and mutual inductance of coils
CO2:	Be aware of the nature of transient currents in LR and CR circuits
CO3:	Learn about the current variation in series and parallel resonance circuits
CO4:	Obtain the knowledge the properties of magnetic materials
CO5:	Be imparted the knowledge about importance of Maxwell's equations in electromagnetism

Subject Name: Differential Equations and Laplace Transform

Subject Code: U2MAA3X3

In this course the students will

CO1:	Understand the concepts of differential equations, partial differential equations, Laplace transforms and Analytical geometry.
CO2:	Analysevarious methods solving partial differential equations.
CO3:	Acquire skill to solve many problems in Laplace transform and in Analytical geometry.
CO4:	Understand that Laplace domain allows algebraic manipulation of differential equations.
CO5:	Understand the linear equations occur in subareas of mathematics and especially in applied mathematics.

Subject Name: **General Chemistry-I for Physical Science**

Subject Code: **U2CHA3X1**

In this course the students will

CO1:	Knowing the basics ideas about organic chemistry.
CO2:	Knowing the details about periodic table and its periodic properties.
CO3:	Learning chemical equilibrium and its importance in industrial processes.
CO4:	Acquiring knowledge about petroleum and petrochemical products.

SEMESTER 4

Subject Name: ANALOG ELECTRONICS

Subject Code: U2PHC4

In this course the students will

CO1:	Know about the characteristics of two port network parameters and semiconductor devices
CO2:	Get knowledge about Transistor biasing and methods
CO3:	Learn about performance of transistor amplifiers and op-amps
CO4:	Learn about performance of oscillators and its types
CO5:	Be imparted knowledge of the techniques used in communication such as modulation and demodulation.

Subject Name: LAB: General Physics II
Subject Code: U2PHC4P
In this Course, the students will

CO1:	Student can get basic practical knowledge about General Physics
CO2:	Understand the practical and theory knowledge of optics
CO3:	Do the experiments on interference and diffraction
CO4:	Do experiments based on galvanometer, potentiometer and bridges

Subject Name: STATISTICS, GROUPS AND FOURIER SERIES

Subject Code: U2MAA4X4

In this course the students will

CO1:	Learn the various statistical tools to analyse the data collected.
CO2:	Know the basic concepts of group theory.
CO3:	Have an introduction about the Fourier transformations and solving techniques.
CO4:	Gain knowledge in varieties of index numbers.

Subject Name: GENERAL CHEMISTRY-II

Subject Code: U2CHA4X2

In this course the students will

CO1:	Learning the basics gaseous state.
CO2:	Getting idea about the polymer and its applications.
CO3:	Studying adequate knowledge about nuclear chemistry.

Subject Name: **Volumetric Analysis**

Subject Code: **U2CHA2PX1**

In this course the students will

CO1:	Studying the applications of volumetric analysis.

SEMESTER 5

Subject Name: CLASSICAL AND STATISTICAL MECHANICS

Subject Code: U1PHC51

In this course the students will

CO1:	Understand the classical concepts of the mechanics.
CO2:	Get knowledge about Lagrangian, Hamiltonian Mechanics.
CO3:	Understand the Fundamentals and distribution laws of statistical mechanics such as Maxwell Boltzmann, Fermi-Dirac and Bose Einstein distribution laws.
CO4:	Understand the black body radiation and Fermi energy.

Subject Name: DIGITAL ELECTRONICS

Subject Code: U1PHC52

In this course the students will

CO1:	Understand different number systems and Boolean algebra.
CO2:	Get knowledge about different logic gates.
CO3:	Learn about the different arithmetic circuits.
CO4:	Understand the functioning of Clocks, timer Circuits and Registers

Subject Name: PHYSICAL OPTICS AND SPECTROSCOPY

Subject Code: U1PHC53

In this course the students will

CO1:	Understand Nature of light.
CO2:	Get knowledge about properties of light.
CO3:	Be imparted the knowledge about electromagnetic spectrum
CO4:	Understand the different kind of spectroscopy corresponding to the different molecules.

Subject Name: GENERAL CHEMISTRY

Subject Code: U1CHA5X3

In this course the students will

CO1:	Learning the basic requirements of chemical calculations.
CO2:	Understanding the fundamental of bonding.

CO3:	Knowing the fundamental concept about adsorption, catalysis and co-ordination compounds.
CO4:	Studying the principles of water analysis.

Subject Name: NME – BASIC PHYSICS

Subject Code: U1PHN51

In this course the students will

CO1:	Get basic knowledge about three states of matter.
CO2:	Learn about the different types of motion.
CO3:	Understand Newton's law of motion
CO4:	Obtain the knowledge of Law of liquid pressure

SEMESTER 6

Subject Name: ATOMIC AND NUCLEAR PHYSICS

Subject Code: U1PHC61

In this course the students will

CO1:	Understand atom models.
CO2:	Learn about the quantum mechanical explanation for the atom model.
CO3:	The nuclear composition and its properties
CO4:	Understand the nuclear structure.
CO5:	Understand the concepts of nuclear fission and fusion.

Subject Name: MATERIAL SCIENCE

Subject Code: U1PHC62

In this course the students will

CO1:	Know about bonding in solids and crystal structure.
CO2:	Understand the electronic theory of solids.
CO3:	Get knowledge about Magnetic properties of solids.
CO4:	Understand the behaviour of Dielectric materials

Subject Name: PROGAMMING IN C

Subject Code: U3PHC63

In this course the students will

CO1:	Get basic knowledge about programming language
CO2:	Get idea about Constants and Variables used in C Program
CO3:	Understand various Operators, Input and Output statements used in C Program
CO4:	Imparted the knowledge about different Logical Statements and Arrays
CO5:	Utilize programming language to solve problems in physics

Subject Name: PROJECT & AREA STUDY

Subject Code: U2PH6PR

In this course the students will

CO1:	Get idea about practical knowledge about basic Physics
CO2:	Do Projects based on basic or applied physics
CO3:	Impart the knowledge of scientific importance of visiting institute or Lab
CO4:	Know the art of project report writing

Subject Name: GENERAL CHEMISTRY

Subject Code: U1CHA6PX2

In this course the students will

CO1:	Studying the basics of chemical equilibrium.
CO2:	Acquiring basic idea about drugs.
CO3:	Studying the chromatographic techniques.
CO4:	Understanding the role of bio-organic materials.

Subject Name: **Organic Qualitative Analysis**

Subject Code:U2CHA6PX

In this course the students will

CO1:	Gaining the fundamental knowledge about organic analysis.

Subject Name: BIO- MEDICAL INSTRUMENTATION

Subject Code: U2PHS61

In this course the students will

CO1:	Student get idea about medical instruments
CO2:	Understand the working of ECG, EEG
CO3:	Understand the application of laser and computers in medical field

Subject Name: NME- BASIC PHYSICS-II

Subject Code: U1PHN61

In this course the students will

CO1:	Get basic knowledge about Heat and Temperature.
CO2:	Acquire knowledge about the propagation of light, sound.
CO3:	Learn about X-rays and radioactivity.

COURSE OUTCOME – M.Sc. (Physics)

SEMESTER 1

Subject Name: MATHEMATICAL PHYSICS -1

Subject Code: P2PHC11

In this course the students will

CO1:	Acquire the knowledge of the Gauss divergence theorem, Stoke's theorems and application of vectors in hydrodynamics and heat flow in solids.
CO2:	Understand the algebra of matrices and eigenvalue problems
CO3:	Learn the Fourier series and transforms and its applications to physical problems.
CO4:	Be imparted the knowledge of power series technique to solve Bessel's and Legendre's differential equations and their orthogonal properties.

Subject Name: ELECTRONICS

Subject Code: P2PHC12

In this course the students will

CO1:	Be familiar with the basic amplifier, power amplifier circuits and its performance.
CO2:	Understand the effect of feed back in amplifiers, oscillators and their applications.
CO3:	Be aware of the importance of modulation and demodulation in communication systems.
CO4:	Learn about the advantages of op-amp over transistor amplifiers and its applications.
CO5:	Apply different variable map knowledge to the Boolean function and study of flip-flops.

Subject Name: CLASSICAL MECHANICS

Subject Code: P2PHC13

In this course the students will

CO1:	Solve the Lagrangian equations and Hamilton's equation from the Variational Principle.
CO2:	Understand the problem of two bodies moving under the influence of a mutual central force as an application of the Lagrangian formulation.
CO3:	Be familiar the canonical transformations, Poisson's brackets and Hamilton-Jacobi equations.
CO4:	Apply the theory of oscillations of small amplitudes related to fundamental frequencies.

Subject Name: NUMERICAL METHODS & PROGRAMMING IN C ++MAJOR ELECTIVE

Subject Code: P2PHE1

In this course the students will

CO1:	Apply numerical techniques to solve Algebraic and Simultaneous equations
CO2:	Solve Differential equations, differentiate and Integrate equations numerically
CO3:	Get introduced to C++programming
CO4:	Obtain the knowledge of control and Branch statements in C++

Subject Name: GENERAL PHYSICS CORE LAB - I

Subject Code: P1PHC1P

In this Course, the students will

CO1:	Get the theoretical and practical knowledge of General Physics experiments
CO2:	Study the refractive index of the liquid,
CO3:	Do experiments using the concepts of CF bridge, Anderson's bridge and Wien's bridge

SEMESTER 2

Subject Name: MATHEMATICAL PHYSICS –II

Subject Code: P2PHC21

In this course the students will

CO1:	Acquire the knowledge of the properties of complex number, complex differentiation and integrals and evaluation of definite integrals.
CO2:	Understand the algebra of tensors and applications to electrodynamics.
CO3:	Learn about the formation of group, class, character table and application of group theory to molecules.
CO4:	Be imparted the knowledge about different statistical distribution and their applications.

Subject Name: ELECTROMAGNETIC THEORY

Subject Code: P2PHC22

In this course the students will

CO1:	Understand the electrostatic field in vacuum and dielectric media.
CO2:	Understand the method to apply mathematical methods to electrostatic problems.
CO3:	Learn about the magnetic induction and derivation of Maxwell's equations.
CO4:	Know about the propagation of an electromagnetic wave through non conductors and conductors and coaxial line.

Subject Name: THERMODYNAMICS AND STATISTICAL MECHANICS

Subject Code: P2PHC23

In this course the students will

CO1:	Understand the state of the system at equilibrium under temperature, free energy, entropy, internal energy, pressure etc.
CO2:	Acquire knowledge of the physical properties of matter in bulk on the basis of the dynamical behaviour of its microscopic constituents.
CO3:	Understand the systems of particles and the statistical equation of state of a substance and its energy equation.
CO4:	Know about the statistical thermodynamic parameters for ideal gas and solids

Subject Name: NME- NON CONVENTIONAL ENERGY SOURCES

Subject Code: P2PHN2

In this course the students will

CO1:	Be familiarthe salient features of non-conventional energy sources
CO2:	Obtain knowledge of the solar energy, its measurement and solar collectors
CO3:	Know about Wind energy, Bio-mass and Ocean energy

Subject Name: COMPUTIONAL PHYSICS

Subject Code: P2PHE2P

In this Course, the students will

CO1:	Learn about the Programming in C++
CO2:	Get knowledge about C++ programming for algebraic and simultaneous equations
CO3:	Get knowledge of programming

Subject Name: ELECTRONICS CORE LAB 2

Subject Code: P2PHC2P

In this Course, the students will

CO1:	Get the theoretical and practical knowledge of basic electronics
CO2:	Know making of electronic circuits using soldering
CO3:	Study the performance of amplifier and oscillator circuits

SEMESTER 3

Subject Name: SOLID STATE PHYSICS-I

Subject Code: P1PHC31

In this course the students will

CO1:	Understand the structure of crystals.
CO2:	Get knowledge about the Imperfections of crystals.
CO3:	Understand the concept of lattice vibrations.
CO4:	Be imparted knowledge about energy band theories and band gap in semiconductors

Subject Name: QUANTUM MECHANICS –I

Subject Code: P1PHC32

In this course the students will

CO1:	Understand the necessity of new field Quantum Mechanics.
CO2:	Get knowledge about the wave equation of particle and significance of wave function.
CO3:	Gain knowledge about the fundamental postulates of Quantum Mechanics and its applications.
CO4:	Be imparted the knowledge about angular momentum operator, ladder operators.
CO5:	Be exposed to time independent perturbation theory and apply this theory to specific problems.

Subject Name: NUCLEAR AND PARTICLE PHYSICS

Subject Code: P2PHC33

In this course the students will

CO1:	Understand the theoriesbehind Nuclear forces.
CO2:	Learn the different types of Nuclear models.
CO3:	Learn the process of Nuclear Reactions.
CO4:	Be imparted the knowledge of Nuclear fission and fusion.
CO5:	Gain knowledge about the elementary particles

Subject Name: FIBER OPTICS COMMUNICATIONS

Subject Code: P1PHE31

In this course the students will

CO1:	Get fundamental idea about Optical Fiber Communication.
CO2:	Understand the structure and types of Optical Fiber.
CO3:	Learn about the types of solid state optical sources.
CO4:	Know the different techniques of power Launching & Coupling in optical fiber.
CO5:	Get knowledge about Photo detectors.

Subject Name: APPLIED OPTICS

Subject Code: P1PHE32

In this course the students will

CO1:	Get the knowledge of the matrix methods in Gaussian optics.
CO2:	Understand the Fresnel and Fraunhoffer diffraction pattern and Fourier Transforming properties of lenses.
CO3:	Acquire the knowledge of the Frequency analysis of imaging system.
CO4:	Learn about Non-linear optics.
CO5:	Know about laser and its properties

Subject Name: DIGITAL ELECTRONICS AND GENERAL PHYSICS

Subject Code: P2PHC3P

In this Course, the students will

CO1:	Get the theoretical and practical knowledge of digital electronics
CO2:	Know about assembling digital electronic circuits
CO4:	Learn about the working principles of IC
CO4:	Study the filters and adder &subtractor circuits

SEMESTER 4

Subject Name: SOLID STATE PHYSICS-II

Subject Code: P1PHC41

In this course the students will

CO1:	Understand the nature of Fermi surfaces in metals.
CO2:	Learn about the Plasma oscillations.
CO3:	Be imparted the knowledge about super conductivity.
CO4:	Understand the electric and magnetic properties of solids.

Subject Name: MOLECULAR SPECTROSCOPY

Subject Code: P1PHC42

In this course the students will

CO1:	Get knowledge about rotational spectrum of molecules.
CO2:	Understand the nature of vibration of molecules.
CO3:	Be exposed to the knowledge about Raman spectra of molecules.
CO4:	Gain knowledge about electronic spectra and spin resonance spectra of molecules.

Subject Name: QUANTUM MECHANICS-II

Subject Code: P1PHC43

In this course the students will

CO1:	Understand the scattering mechanism in microscopic interactions such as nuclear reactions.
CO2:	Get knowledge about the fundamentals of Quantum Mechanics using Dirac vector notations and Hilbert space.
CO3:	Learn about the operators of total angular momentum, addition of angular momenta and the procedure to evaluate CG-coefficients.
CO4:	Impart the knowledge about time dependent perturbation theory and its applications to Physics problems.
CO5:	Understand the Relativistic Quantum Mechanics using KG equation and Dirac equation.

Subject Name: NANO PHYSICS

Subject Code: P2PHE41

In this course the students will

CO1:	Know the concept of various types of microscopy
CO2:	Get the knowledge about lithography techniques.
CO3:	Understand the methods of fabrication of nanostructures.
CO4:	Know the properties of nanoparticles.
CO5:	Gain knowledge about the preparation of nanostrctures and its applications.

Subject Name: BIO PHYSICS

Subject Code: P1PHE42

In this course the students will

CO1:	Acquire the knowledge of the Principle and working of different Microscopes used in Biology.
CO2:	Understand the Mechanism of human Ear.
CO3:	Get knowledge about different types of Spectroscopy.
CO4:	Understand the applications of Bioenergetics

Subject Name: PROJECT

Subject Code: P1PH4PV

In this Course, the students will

CO1:	Apply the knowledge of Physics by doing basic physics projects
CO2:	Do documentation and analysis of readings observed during project work
CO3:	Learn about project report writing

COURSE OUTCOME – MPhil (Physics)

SEMESTER I

RESEARCH METHODOLOGY AND CHARACTERIZATION TECHNIQUES (M2PHC11)

CO1:	Understand the objectives & methods of Research and way of selecting a research problem.
CO2:	Know the art of research report writing.
CO3:	Understand the X -ray diffraction principle and applications.
CO4:	Learn SEM and SPM microscopic principles and related techniques.

ADVANCED TOPICS IN CONDENSED MATTER PHYSICS (M2PHC12)

CO1:	Understand the Nanostructures.
CO2:	Get knowledge about the semiconductors.
CO3:	Understand the potentials of silicon technology.
CO4:	Know about Nano electronics and Quantum electronic devices including Single electron transistors.

OPTOELECTRONICS (M1PHE13)

CO1:	Be familiar with the various methods of preparation of thin films.
CO2:	Understand thin film characterization techniques.
CO3:	Acquire knowledge about electrical and optical properties of thin films.
CO4:	Have an in-depth knowledge about photoconductivity.

Subject Name: THIN FILMS

Subject Code: M1PHE11

In this Course, the students will

CO1:	Study the various methods of preparation of thin films.
CO2:	Understand thin film characterization techniques.
CO3:	Impart knowledge about electrical and optical properties of thin films.
CO4:	Study about photoconductivity in detail.

Subject Name: BIOPHYSICS

Subject Code: M1PHE12

In this Course, the students will

CO1:	Study the basics of Biophysics and general properties & functions of proteins.
CO2:	Understand Infrared and Raman spectroscopy techniques applied to biomolecules.
CO3:	Study the various force field methods involved in computational methods.
CO4:	Understand the simulation methods.

Subject Name: PROJECT

Subject Code: M1PH2PV

In this Course, the students will

CO1:	Student get idea about the research work
CO2:	Understand the sample preparation and characterization analysis
CO3:	Know the art of project report writing

Allied Papers

Semester 1

Subject Name: MECHANICS, PROPERTIES OF MATTER AND SOUND

Subject Code: U1PHA1X1/U1PHA3X1

In this Course, the students will

CO1:	Understand the concept of force, friction and energy.
CO2:	Get the knowledge about the angular momentum, torque and moment of inertia .
CO3:	Understand principle of gravity.
CO4:	Learn about the principles of Elasticity and bending of beams.
CO5:	The types of wave motions and their equations.

Semester 2

Subject Name: THERMAL PHYSICS

Subject Code: U1PHA2X2/U1PHA4X2

In this Course, the students will

CO1:	Impart knowledge about the concept of specific heat capacity and experimental determination of specific heat capacities.
CO2:	Understand the concepts convection, stability of atmosphere, different latent heat equations.
CO3:	Impart knowledge about Stefan's law, pyrometry and solar constant.
CO4:	Understand the kinetic theory and transport phenomena of gases.
CO5:	Study the Carnot's engine, Joule- Thomson effect and liquefaction of gases.

Semester 1

Subject Name: ELECTRICITY & ELECTRONICS

Subject Code: U1PHA3X3/U1PHA5X3

In this Course, the students will

CO1:	Understand the fundamentals electrostatic parameters, Gauss's law and its application, Electric Potential, Capacitance and different types Capacitors.
CO2:	Learn about Kirchhoff's Laws and its applications, principle of potentiometer.
CO3:	Study about the principle & working of galvanometer and LCR circuits.

CO4:	Know about performance of transistor amplifiers and op-amps.
CO5:	Study the principle of digital electronics and related concepts.

Semester 2

Subject Name: OPTICS, SPECTROSCOPY & MODERN PHYSICS

Subject Code: U1PHA4X4/U1PHA6X4

In this Course, the students will

CO1:	Understand the basics of geometrical and physical optics.
CO2:	Study the different technique in spectroscopy and photoelectricity.
CO3:	Get basic knowledge about quantum physics
CO4:	Understand the concept of relativity

Allied Practical

Semester 2

Subject Name: ALLIED PHYSICS PRACTICAL –I

Subject Code: U1PHA2PX / U1PHA4PX

In this Course, the students will

CO1:	Get basic practical knowledge about General Physics
CO2:	Understand theory behind the properties of Matter by doing experiments
CO3:	Do experiments based on galvanometer, potentiometer and bridges
CO4:	Understand basic principles of Sound

Semester 4

Subject Name: ALLIED PHYSICS PRACTICAL –II

Subject Code: U1PHA4PX / U1PHA6PX

In this Course, the students will

CO1:	Get basic practical knowledge about General Physics and Electronics
CO2:	Understand the theory of interference and diffraction through Optics experiments
CO3:	Understand the theory of Boolean algebra by constructing Logic gates
CO4:	Do experiments based on rectifier, transistor and oscillator circuits

Self Learning Course

Subject Name: RENEWABLE ENERGY SOURCES

Subject Code: U1PHSL1

In this course the students will

CO1:	Be familiar the salient features of non-conventional energy sources
CO2:	Obtain knowledge of the solar energy, its measurement and solar collectors
CO3:	Understand the principles of solar thermal and photovoltaic devices
CO4:	Know about fundamentals of Wind energy, Bio-mass energy and Geothermal energy