



DEPARTMENT OF PHYSICS

PROGRAMME OUTCOMES OF UG COURSES (2021 ONWARDS)

Name of the Programme: B.Sc Physics	
PO1	Acquire academic excellence with an aptitude for higher studies and research.
PO2	Apply appropriate scientific methods and modern technology to solve complex problems related to society.
PO3	To derive several conclusions for the science problems related to public health, safety and environmental issues using the knowledge of physics.
PO4	To understand the basic concepts and analyze for prediction of physical systems.
PO5	To apply critical reasoning skills with ethical principles to solve physics related problems with precision and accuracy.
PO6	To equip the students to communicate effectively on interdisciplinary concepts and describe the natural phenomena individually and in teams.
PO7	To prepare the students to create and apply appropriate techniques and modern tools.
PO8	Producing graduates who are well acquainted with the fundamentals of Physics and requisite skills, in order to use their knowledge in Physics in a wide range of Practical applications.
PO9	Developing creative thinking and the power of imagination to enable graduates work in research in academia and industry for broader applications.
PO10	Relating the training of Physics graduates to the employment opportunities within the country.
PO11	To promote societal values through Physics related activities.



PROGRAMME SPECIFIC OUTCOMES OF UG COURSES (2021 ONWARDS)

Name of the Programme: B.Sc Physics	
PSO1	Demonstrate an understanding of basic scientific principles, theories, and laws in Physics as well as an awareness of the changing nature of science.
PSO2	Analyze, interpret, and evaluate scientific hypotheses and theories using rigorous methods use appropriate mathematical techniques and concepts to obtain quantitative solutions to problems in physics.
PSO3	Demonstrate basic experimental skills by the practice of setting up and conducting experiments with minimizing measurement errors.
PSO4	Demonstrate a qualitative understanding of the core physics ideas and the relationship of this physics to the humanities through both written and oral communication.
PSO5	Demonstrate an ability to recognize the need for life-long learning for sustaining professional career.
PSO6	Understanding of best practices and standards to develop user interactive and abstract application.
PSO7	An ability to assist and manage the execution of an effective project plan.



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COURSE OUTCOMES OF UG COURSES (2021 ONWARDS)

Name of the Programme: B.Sc Physics		
Course Code & Course Title	Course Outcome	
SEMESTER - I		
21UPH01 PROPERTIES OF MATTER AND ACOUSTICS	CO1	Students understand the behaviour and properties of solids and fluids.
	CO2	Students will able to acquire knowledge about viscosity and lubrication.
	CO3	Students will have a strong knowledge of surface tension.
	CO4	Students will get an overview of the fundamental principles of waves and oscillations.
	CO5	To study and apply the knowledge of Acoustics aspects of halls and auditorium and understand Ultrasonic and its application in various field.
SEMESTER - II		
21UPH02 MECHANICS	CO1	Learn to solve the problems in projectile motion.
	CO2	Understand the concepts of rigid body dynamics in terms of the moment of inertia.
	CO3	Understand and apply the pre-defined functions and user defined functions and then apply in simple problems.
	CO4	Understand and define the laws involved in mechanics.
	CO5	Gain deeper understanding of mechanics and its fundamental concepts.



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21UPHP01 PRACTICAL – MAJOR PRACTICAL - I	CO1	Analyze the concepts of Viscosity; Surface Tension and Young's Modulus of different substances Explore the knowledge of Spectrometer and other Optical instruments.
	CO2	Realize principles and applications of Potentiometer, Sonometer, Magnetometer and PN junction diode.
	CO3	Understand and apply the principle of physics by doing related experiments in properties of Matter, Optics, Electricity and Basic Electronics.
SEMESTER - III		
21UPH03 THERMAL AND STATISTICAL PHYSICS	CO1	Students will gain profound knowledge in specific heat, thermodynamics functions, potentials and transfer of heat.
	CO2	These concepts will leads to understanding the application of thermodynamics and statistical physics.
	CO3	Realise various principles and laws of heat. Derive expressions and find experimental verifications for the laws studied.
	CO4	Analyse the applications of heat and thermodynamics in various areas and solvethe real life problems.
	CO5	Outline of kinetic theory of gases, its concepts and their applications.
21UPHS01 CAREER COMPETENCY SKILLS - I	CO1	Obtain knowledge of resume formats.
	CO2	Know how to lead a group.
	CO3	Know how to face an interview.
SEMESTER - IV		
	CO1	Students will gain thorough knowledge in the geometry of lenses, interference, diffraction and polarization.



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21UPH04 OPTICS AND SPECTROSCOPY	CO2	These perceptions will help to understand the spectroscopic techniques.
	CO3	Classify the different types of aberrations and Demonstrate the dispersive power of prism through experiments in laboratories
	CO4	Interpret the interference pattern form and refractometer.
	CO5	Experiment with the Fresnel and Fraunhofer diffraction and identify the dispersive power of grating through laboratory experiments.
	CO6	Identify the plane, circularly and elliptically polarized light and compare different types of microscopes
	CO7	Make use of the principle of spectroscopy for their applications
21UPHS01 CAREER COMPETENCY SKILLS – II	CO1	Obtain knowledge on shortcuts to calculate number series.
	CO2	Understand the core concepts of permutations and combinations.
	CO3	Carry out mathematical calculations using shortcuts.
	CO4	Perform new methods for aptitude calculations.
21UPHP02 PRACTICAL – MAJOR PRACTICAL - II	CO1	Understand and apply the principle of physics by doing related experiments in properties of matter, optics, electricity, electromagnetism and basic electronics.
	CO2	Apply the concepts of Specific heat capacity and Young's Modulus of different substances.
	CO3	Acquire the knowledge of Physical optics using Spectrometer.
	CO4	Evaluate principles and applications of Potentiometer, Magnetometer and BG.
SEMESTER - V		
	CO1	Recognize basic principles and applications of electrometers.
	CO2	Effectively formulate the electrical circuit problem into a mathematical problem using circuits, laws and theorems.
	CO3	Effectively formulate the electrical circuit problem into a mathematical problem using circuits, laws



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21UPH05 ELECTRICITY AND MAGNETISM		and theorems.
	CO4	Understand the fundamental problem in creating efficient thermoelectric materials.
	CO5	Evaluate technical problems associated with LR circuits and coils.
	CO6	Solve technical problems associated with the uniform and non-uniform magnetic fields on moving charges
21UPH06 SOLID STATE PHYSICS	CO1	This course facilitates the student to understand the macroscopic properties of solids in terms of microscopic particles (components) of the solid.
	CO2	Learn about different features of crystals.
	CO3	Classify solids based on band theory.
	CO4	Explain free electron theory and determine Hall effect through experiments in laboratory.
	CO5	Understand dielectric and know about the concepts of superconductivity.
	CO6	Classify magnetic materials based on domain theory.
21UPH07 ANALOG AND DIGITAL ELECTRONICS	CO1	Understand the implications of characteristics of special diodes.
	CO2	Understand the implications of characteristics of Transistors.
	CO3	Gain knowledge on FET, MOSFET, UJT and SCR.
	CO4	Know the operating characteristics of a transistor amplifier.
	CO5	Gain an understanding of multivibrators, operational amplifiers and their applications.
21UPHE01 MATERIALS SCIENCE	CO1	Understand the mechanical properties of materials.
	CO2	Familiar with the optical properties.
	CO3	Understand the basics of Nonlinear optics.
	CO4	Explore the knowledge in modern engineering materials.



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21UPHS03 COMPUTATIONAL METHODS AND PROGRAMMING IN – C	CO1	The student will be acquainted with the importance of errors in computing.
	CO2	The student will understand the various types of errors and their propagation in computing.
	CO3	Will acquire the knowledge of iterative techniques for a nonlinear function.
	CO4	Get exposures to the basics of the C programming language.
21UPHS04 INSTRUMENTATION	CO1	Acquire the knowledge of characteristics of an Instrumentation system.
	CO2	Understand the functions of Electrical, Digital, Medical and Pollution Monitoring Instruments.
	CO3	Know the various applications of the instruments.
SEMESTER - VI		
21UPH08 ATOMIC PHYSICS	CO1	Acquire knowledge of the fundamentals of atomic physics.
	CO2	Understand the concepts and potential of atomic physics.
	CO3	Analyses the atomic spectra.
	CO4	Explain the concept of positive rays and atom models.
	CO5	Identify the fine spectral notation of the atoms.
	CO6	Illustrate the x-ray and photoelectric effect with atoms.
21UPH09 NUCLEAR PHYSICS	CO1	Acquire knowledge and apply it.
	CO2	Acquire knowledge of the structure of the nucleus.
	CO3	Understand the formation of the nucleus and its binding energy.
	CO4	Students can analyse the energy released by the nucleus during the fission and fusion process.
	CO5	Outline the concepts of nuclear forces and radioactivity.
	CO6	Construct the kinematics of nuclear reaction and elementary particles.



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<p style="text-align: center;">21UPH10 QUANTUM MECHANICS AND RELATIVITY</p>	CO1	Understand the basics concepts of quantum particles.
	CO2	Apply the basic to construct and solve the particle equations in one dimension and threedimension form.
	CO3	Understand the basic concept of properties of waves, de Broglie wavelength and photoelectric effect.
	CO4	Explain uncertainty principle, its physical significance and applications.
	CO5	Understand theory of relativity and Lorentz transformation.
	CO6	Apply the concepts of Schrodinger equation to one dimensional problem.
<p style="text-align: center;">21UPHE04 ELECTRONIC COMMUNICATION SYSTEMS</p>	CO1	Students will be able to distinguish different sources and its principle of operation in the field of communication.
	CO2	Students will able to demonstrate the different elements of the communication systems.
	CO3	Differentiate between different types of amplifiers and their applications.
	CO4	Apply switching ideas to various devices.
	CO5	Design operational amplifier circuits and to analyse their properties.
<p style="text-align: center;">21UPHS05 HARDWARE SKILLS</p>	CO1	Infer the functions of measurement instrument like multimeters and voltmeters.
	CO2	Apply the fundamental of CRO voltmeter to its applications.
	CO3	Explain the classification & characterization of signal generators.
	CO4	Illustrate the technical problems associated with various forms of bridges and their measurements.
	CO5	Make use digital voltmeter & multimeter.
<p style="text-align: center;">21UPHS06 MICROPROCESSOR AND ITS APPLICATIONS</p>	CO1	Understand the microprocessor architecture.
	CO2	Explain memory and I/O devices.
	CO3	Develop assemble language programming.
	CO4	Learn about the additional instructions in programming techniques.
	CO5	Recall on code conversions and stack instructions.



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21UPHP03 PRACTICAL – MAJOR PRACTICAL - III	CO1	Understand and apply the principle of physics by doing related experiments in properties of Matter, Optics, Electricity and electromagnetism.
	CO2	Design different types of Power supplies, Amplifiers and Oscillators.
	CO3	To analyze the characteristics of various Electronic devices like BJT, UJT, LDR, and Solar cell.
	CO4	Acquire the knowledge of the characteristics of an operational amplifier.
21UPHP04 PRACTICAL – MAJOR PRACTICAL - IV	CO1	Understand the basic role of various components in an electronic circuit, to build the circuits such as amplifiers, oscillators, digital circuits and to do the simple programs in 8085 microprocessor.
	CO2	Update the knowledge of Microprocessor programming.
	CO3	Realize the applications of registers in computers.
21UPHA01 ALLIED PHYSICS – I	CO1	Acquire the knowledge of various properties of matter.
	CO2	Help to understand the natural physical process.
	CO3	Explain the basic concept of temperature and specific heat mechanics.
	CO4	Acquire knowledge of sound waves and their application.
	CO5	Describe the fundamentals of electricity and magnetism.
21UPHA02 ALLIED PHYSICS – II	CO1	Understand the principles of the atom and nuclear models.
	CO2	Understand the structure and bonding in crystals.
	CO3	Familiar with the basic analog and digital electronic circuits.
21UPHAP01 ALLIED PHYSICS PRACTICAL	CO1	It is aimed at exposing the undergraduate allied students to the technique of handling simple measuring instrument and also make them measure certain properties of materials.
	CO2	Understand and apply the principle of physics by doing related experiments in properties of Matter, Optics, Electricity and electromagnetism.
	CO3	Acquire the knowledge of Physical optics using Spectrometer.



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PROGRAMME OUTCOMES OF PG PROGRAMMES (2021 ONWARDS)

Name of the Programme: M.Sc Physics	
PO1	Producing graduates who are well acquainted with the fundamentals of Physics and requisite skills, in order to use their knowledge in Physics in a wide range of practical applications.
PO2	Developing creative thinking and the power of imagination to enable graduates work in research in academia and industry for broader applications.
PO3	Relating the training of Physics graduates to the employment opportunities within the country.
PO4	To promote societal values through Physics related activities.
PO5	Understand the concepts of advanced physics and capable to apply them in real time problems to find appropriate solutions.
PO6	Develop model and analyse to derive solution using the background of theoretical physics.
PO7	Augment the application feasibility of Physics theoretical formulations in combination with relative concepts belongs to other discipline.
PO8	Apply learned experimental skill to develop newer materials with unique characteristics employing variety of synthesis techniques.
PO9	Develop software tools by applying the learned concepts in combination belongs to Mathematical physics, Quantum mechanics and computational physics.
PO10	Perceive novel and contemporary research philosophies globally facilitate to work at par with international standards.
PO11	Meet any challenge globally for employment in academic, research and industry by exposing the learned skill in diverse zone under Physics discipline.



PROGRAMME SPECIFIC OUTCOMES OF PG COURSES (2021 ONWARDS)

Name of the Programme: M.Sc Physics	
PSO1	Apply theoretical knowledge of principles and concepts of Physics to practical problems.
PSO2	Develop skills in planning and carrying out advanced physics experiments.
PSO3	Solve scientific problems by applying a combination of theory, numerical simulation, and experiments.
PSO4	Relate critically to scientific models.
PSO5	Examining specific phenomena theoretically and experimentally, to contribute to the generation of new scientific insights or to the innovation of new applications of physics research.
PSO6	Be a potential graduate with the stuff of vibrant subject knowledge in every subdivision of Physics especially in Classical Mechanics, Quantum Mechanics, Mathematical Physics, Nuclear Physics, Electronics and Materials Science with application tendency.
PSO7	Be a science person to extend the application of Physics discipline to different sectors of common or needy people.
PSO8	Have the competence to get clear any comprehensive examination offers superior opportunity in official, academic and research sectors.
PSO9	Have the skill to manage computational tools to explore scientific activity even at subatomic particle level using theoretical concepts without empirical approach.
PSO10	Be a skillful to perceive rare or exceptional scientific phenomena using the concepts of physical science and to find solution to any challengeable task.
PSO11	Be an efficient to employ research work by applying the subject knowledge acquired from diverse objectives of Physics.
PSO12	Have the ability to meet any employment challenge demands intense subject proficiency.



COURSE OUTCOMES OF PG COURSES (2021 ONWARDS)

Name of the Programme: M.Sc Physics		
Course Code & Course Title	Course Outcome	
SEMESTER - I		
21PPH01 Classical Mechanics, Thermodynamics and Statistical Mechanics	CO1	Apply Lagrangian equation of motion to oscillator and pendulum.
	CO2	Construct the Hamilton equation and canonical transformation.
	CO3	Relate the thermodynamics, microstates through thermodynamics postulates, quantities and relations.
	CO4	Identify the micro and macroscopic properties of the matter.
	CO5	Inspect the classical and quantum distribution laws and their relations.
	CO6	Apply the transport properties, different phases of matter, equilibrium and nonequilibrium process.
21PPH02 Mathematical Physics	CO1	Outline the concept of gradient, divergence, curl and matrices.
	CO2	Identify the definite integrals using Complex variables.
	CO3	Make use of the Special function and its properties through the expansion of a function in terms of orthogonal polynomials.
	CO4	Examine the differential equations for first and second order equations.
	CO5	Value the concept of tensors and group theory.
	CO6	Understand vector calculus and also able to write operators in different coordinate system.
	CO7	Evaluate real integrals appearing in science and engineering problems.
	CO1	Outline about various semiconductor diodes.
	CO2	Identify and Construct various transistors biasing and Opto Electronic devices.



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21PPH03 Electronics	CO3	Interpret the operational amplifier with their applications.
	CO4	Examine the principle and working of various semiconductor memories.
	CO5	Solve analog to digital convertors (ADC) and digital to analog convertors (DAC).
	CO6	Study the characteristics of Op-amp and it's applications.
21PPHE01 Microprocessor & Microcontroller	CO1	Outline the architecture of microprocessor 8085.
	CO2	Make use of instruction sets to write assemble language program.
	CO3	Experiment with the architecture and programming of 8086 microprocessor.
	CO4	Demonstrate the interfacing in 8085 microprocessor.
	CO5	Contrast microprocessor and microcontroller and perform basic arithmetic programs.
21PCSED2 Fundamentals of Computers and Communications	CO1	Understanding the basics and internal parts of Computers
	CO2	Gaining the knowledge on OS and its types
	CO3	Studying the basics of networks and Internet
	CO4	Learning the databases and DBMS concepts
SEMESTER - II		
21PPH04 Theory of Semiconductor Devices	CO1	Outline about band structure of semiconductors
	CO2	Identify the physical characteristics of semiconductors
	CO3	Apply the concept of band gap engineering
	CO4	Examine the principle and working of semiconductors in electronics, spintronics and valleytronics
	CO5	Explain the density functional theory of semiconductors.
	CO6	Enhance the day to day requirements in industries, research fields
	CO1	Explain basic concept and the application of Schrödinger wave equation.
	CO2	Solve one dimensional problem and apply it to simple harmonic oscillator.



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21PPH05 Quantum Mechanics - I	CO3	Utilize quantum mechanics to three dimensional wave equations.
	CO4	Compare Heisenberg and Schrödinger wave equations.
	CO5	Identify angular momentum and the system of identical particles.
21PPH06 Computational Physics & C++ Programming	CO1	Apply the Numerical solution of Linear equations for bisection method.
	CO2	Solve the set of Linear Algebraic equations.
	CO3	Interpret the concept of Numerical differentiation and integration.
	CO4	Identify the Interpolation Formulae for equal interval.
	CO5	Take part in Programming Skills in C++.
21PPHE04 Laser Physics & Non-Linear Optics	CO1	Explain the principle and construction of various lasers.
	CO2	Identify the operation technique of lasers.
	CO3	Construct the laser beam characteristics.
	CO4	Inspect the focusing of Laser beam.
	CO5	Examine the Non linear optical media and make use in various applications.
21PHR01 Human Rights	CO1	Understand the historical growth of the idea of human rights.
	CO2	Demonstrate an awareness of the international context of human rights.
	CO3	Position of human rights in the UK prior to 1798
	CO4	Demonstrate an awareness of the understand the importance of the Human Rights Act 1798.
	CO5	Students will able to analyze and evaluate concepts and ideas.
21PPHP01 Practical - General Physics Experiments	CO1	Understand the basics of experimental physics and compare the results with theoretical calculations.
	CO2	Gain knowledge of new conception in practical oriented problems.
	CO3	Equip the students in basic communication skills in the course of performing the laboratory experiments in groups and by interpreting the results.



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<p>21PPHP02 Practical - Electronics (Analog & Digital) Experiments</p>	CO1	The basic principles of electronics.
	CO2	Fundamental components of electronics.
	CO3	Electronics devices and application.
	CO4	Analog electronics system and Applications.
	CO5	Digital electronics system and Applications.
SEMESTER - III		
<p>21PPH07 Electromagnetic Theory & Plasma Physics</p>	CO1	Summarize the fundamentals of electrostatics.
	CO2	Outline the concepts of magnetostatics.
	CO3	Develop the skills to solve problems of motion of charged particles in various fields.
	CO4	Analyze the concept of electromagnetic theory in electromagnetic waves.
	CO5	Classify the different wave of plasma.
<p>21PPH08 Quantum Mechanics - II</p>	CO1	Outline on the approximation methods and its applications.
	CO2	Explain the scattering theory and Partial wave analysis.
	CO3	Identify the use of time independent perturbation theory.
	CO4	Utilize the Klein-Gordon equation in Dirac equation.
	CO5	Analyze Euler Lagrange's equation and Hamiltonian formulation.
	CO6	Compute corrections in energy and wavefunctions using approximation technique.
<p>21PPH09 Molecular Physics & Spectroscopy</p>	CO1	Outline the molecular structure and bonding.
	CO2	Interpret the molecular symmetry.
	CO3	Experiment with the molecular interaction and mechanics.
	CO4	Identify the molecular reaction dynamics.
	CO5	Examine quantum theory to electron transfer, electronic structure and spectra.



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<p>21PPHE05 Physics of Non-conventional Energy Resources</p>	CO1	Outline about energy sources and their availability.
	CO2	Illustrate non- conventional energy sources.
	CO3	Explain biomass energy and the generation of bio gas.
	CO4	Utilize the principle solar cells to find its applications.
	CO5	Summarize additional energy sources and its developments.
<p>21PELED1 Basic Electronics</p>	CO1	Understanding the symbol, operations, applications of diode, transistor, zener diode and amplifiers.
	CO2	Justification of inverting, non inverting, comparator, integrated and differentiator circuits.
	CO3	Design the solar cell, 555 timer, automatic street light and multivibrators.
	CO4	Ability and to understand the digital signals, logic gates and flipflops.
	CO5	Designing and operations of various digital instruments knowing the concept of various applications.
SEMESTER - IV		
<p>21PPH10 Nuclear & Elementary Particle Physics</p>	CO1	Interpret the various properties of nuclei.
	CO2	Apply the laws of radioactivity decay for various applications.
	CO3	Explain the properties of nuclear forces and nuclear reaction dynamics.
	CO4	Identify alpha, beta and gamma decay based on its theory.
	CO5	Analyze the concepts of elementary particles.
	CO6	Can promote the exchange of ideas and research within the nuclear/atomic science community.
<p>21PPH11 Condensed Matter Physics</p>	CO1	Outline the crystal structure and bonding of atoms.
	CO2	Illustrate the lattice vibration of atoms and thermal properties.
	CO3	Solve free electron theory by Fermi Dirac distribution and bloch theorem.
	CO4	Identify the classification and theory of magnetic materials and dielectrics.
	CO5	Examine the theory on superconductivity, its applications and imperfection in crystals.
	CO1	Become effective communicators and critical consumers of messages preparing



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21PPHE06 Electronic Communications		them for life.
	CO2	Integrate the strengths of the liberal arts tradition with the theoretical foundation to enter in the research.
	CO3	Gain knowledge in microwave analysis and design techniques.
	CO4	Apply knowledge of mathematics, science and engineering fundamentals to the solution of complex engineering problems in electronic circuits and communication system.
	CO5	Familiar with design consideration of fiber optics system.
21PPHP03 Microprocessor Experiments	CO1	Outline the architecture of microprocessor 8085.
	CO2	Make use of instruction sets to write assemble language program.
	CO3	Experiment with the architecture and programming of 8086 microprocessor.
	CO4	Demonstrate the interfacing in 8085 microprocessor.
	CO5	Contrast microprocessor and perform basic arithmetic programs.
21PPHP04 Micro Controller & C++ Programming Experiments	CO1	Learn instruction set of micro Controller.
	CO2	Perform experiments using Intel 8051 microcontrollers and interfacing experiments such as seven segment display, stepper motor control, traffic light control. Identify architecture of microcontroller and use microcontrollers in instrumentation applications.
	CO3	Know the various peripheral devices of Intel 8051 and interfacing them.
	CO4	Create interface between laboratory experiments and microcontroller, and write instruction code.
	CO5	Able to implement the solution using C++ programming language.
21PPHPR1 Project & Viva-Voce	CO1	Assess them regarding knowledge gained during programme.
	CO2	Able to gather and document requirement.
	CO3	Able to store the data store layout.
	CO4	Able to implement the solution using programming language.
	CO5	Face to prospective technical interview.



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