PROGRAMME SPECIFIC OUTCOMES, PROGRAMME OUTCOMES AND COURSE OUTCOMES

PG DEPARTMENT OF PHYSICS

B.Sc and M.Sc Physics - CORE, CORE PRACTICAL, ELECTIVES, SKILL-BASED COURSES, NON-MAJOR ELECTIVE COURSES,EXTRACREDIT COURSES & VALUE-ADDED COURSES

PSO, PO & CO STATEMENTS - 2023 ONWARDS

	B.Sc PHYSICS - PROGRAMME OUTCOMES
POs	**Description of POs**
PO1	**PO1: Disciplinary Knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate programme of study.
PO2	**PO2: Critical Thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO3	**PO3: Problem Solving:** Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's earning to real life situations.
PO4	**PO4: Developing Practical Skills:** Ability to acquire the practical knowledge of various theoretical concepts by doing relevant experiments. Use standard methods to calibrate the given measuring instruments by applying the knowledge of mathematics, physics and instrumentation**.** Able to do error analysis and correlate results.
PO5	**PO5: Analytical Reasoning:** Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints.
PO6	**PO6: Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team.
PO7	**PO7: Scientific Reasoning:** Ability to analyse, interpret and draw conclusions from quantitative / qualitative data; and critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.

PO8	**PO8**: **: Self-directed learning:** Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.
PO9	**PO9**: **Reflective Thinking**: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society
PO10	**PO10:Lifelong Learning:** Ability to acquire knowledge and skills, including, learning how to learn", that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge & skill development

B.Sc PHYSICS - COURSE OUTCOMES

	Description of Cos	**Bloom's Taxonomy / Cognitive Domain**
	Core –I Properties of Matter and Acoustics	
CO1.	Relate elastic behavior in terms of three modulii of elasticity and working of torsion pendulum.	Remember (Level K1) & Understand (Level K2)
CO2.	Able to appreciate concept of bending of beams and analyze the expression, quantify and understand nature of materials.	Understand (Level K2)
CO3.	Explain the surface tension and viscosity of fluid and support the interesting phenomena associated with liquid surface, soap films provide an analogue solution to many engineering problems.	Understand (Level K2)
CO4.	Analyze simple harmonic motions mathematically and apply them. Understand the concept of resonance and use it to evaluate the frequency of vibration. Set up experiment to evaluate frequency of ac mains	Understand (Level K2)**&** Application (Level K3)
CO5.	Understand the concept of acoustics, importance of constructing buildings with good acoustics. Able to apply their knowledge of ultrasonics in real life, especially in medical field and assimilate different methods of production of ultrasonic waves.	Remember (Level K1) **&** Application (Level K3)
	Core Paper II -Practical 1	
CO1	Apply knowledge of mathematics, physics and instrumentation	Understand (Level K2)
CO2	Use standard methods to calibrate the given measuring instruments	Understand (Level K2)
CO3	Learning a experience in properties of matter as elastic nature of materials	Application (Level K3)
CO4	Acquire the practical knowledge of surface tension and viscosity	Application (Level K3)
CO5	Able to do error analysis and correlate results	Understand (Level K2)
	ALLIED PHYSICS – I	
CO1.	Understand the types of motion and extend their knowledge in the study of various dynamic motions Relate theory with practical applications in medical field.	Remember (Level K1) & Understand (Level K2)
CO2.	Understand the materials and their behaviors and apply it to various situation in laboratory and real life.	Remember (Level K1) **&** Application (Level K3)
CO3.	Understand the basic concepts of thermodynamics, entropy and associated theorems. Acquire the knowledge of low temperature Physics.	Remember (Level K1) & Understand (Level K2)

CO4.	Acquire knowledge of electricity and magnetism. Correlate the connection between electric field and magnetic field	Remember (Level K1) & Understand (Level K2)
CO5.	Understand the digital electronics principles. Using Boolean algebra acquire the elementary idea of digital circuits. Acquire information about various Govt. programs/ institutions in this field.	Remember (Level K1) & Understand (Level K2)
	ALLIED PRACTICAL– I	
CO1.	Acquire practical skills on basic principles of Physics.	Understand (Level K2)
CO2.	Enable the students acquire practical knowledge with lecture sessions translated to the laboratory sessions.	Application (Level K3)
CO3.	Gain knowledge and understanding the components and handling equipments.	Application (Level K3)
CO4.	Provide a hands-on learning in using simple equipments.	Application (Level K3)
CO5.	Get knowledge to verify the experimental results with theoretical values.	Application (Level K3)
	SEC – 1 / NME – I Astrophysics	
CO1.	Understand the electromagnetic radiation from celestial objects. Analyze the wave nature of light in the form of ray diagram. Apply the knowledge of phenomenon of how diffraction limits the resolution of any system having a lens or mirror. Distinguish between reflecting and refracting telescopes and their usage.	Understand (Level K2)
CO2.	Recall and explain solar system and to know the recent advances in astrophysics	Application (Level K3)
CO3.	Understand the basics of eclipse and its types	Understand (Level K2)
CO4.	Have a deep knowledge of fundamentals of stellar evaluation.	Remember (Level K1) & Understand (Level K2)
CO5.	Remember and illustrate the structure of our Milky way galaxy. Classify the types of galaxies. Understand the presence of dark matter in the universe	Application (Level K3)
	Part – IV - Foundation Course – Introductory Physics	
CO1.	Apply concept of vectors to understand concepts of Physics and solve problems	Remember (Level K1) & Understand (Level K2)
CO2.	Appreciate different forces present in Nature while learning about phenomena related to these different forces.	Understand (Level K2)
CO3.	Quantify energy in different process and relate momentum	Application (Level K3)
CO4.	Differentiate different types of motions they would encounter in various courses and understand their basis	Understand (Level K2)**&** Application (Level K3)
CO5.	Relate various properties of matter with their behaviour and connect them with different physical parameters involved.	Application (Level K3)
	Core Paper III - Heat, Thermodynamics and Statistical Physics	

CO1.	Acquires knowledge on how to distinguish between temperature and heat. Introduce him/her to the field of thermometry and explain practical measurements of high temperature as well as low temperature Physics. Student identifies the relationship between heat capacity, specific heat capacity and the study of Low temperature Physics.	Understand (Level K2)**&** Application (Level K3)
CO2.	Derive the efficiency of Carnot's engine. Discuss the implications of the laws of Thermodynamics in diesel and petrol engines.	Understand (Level K2)
CO3.	Able to analyze performance of thermodynamic systems viz efficiency by problems. Gets an insight into thermodynamic properties like enthalpy, entropy	Application (Level K3)
CO4.	Study the process of thermal conductivity and apply it to good and bad conductors. Quantify different parameters related to heat, relate them with various physical parameters and analyse them	Understand (Level K2)**&** Application (Level K3)
CO5.	Interpret classical statistics concepts such as phase space, ensemble, Maxwell-Boltzmann distribution law. Develop the statistical interpretation of Bose-Einstein and Fermi-Dirac . Apply to quantum particles such as photon and electron	Application (Level K3)
	Core Paper IV - Practical 2	
CO1.	Understand the concepts of specific heat, thermal conductivity of good conductor.	Understand (Level K2)
CO2.	Use standard methods to calibrate the given measuring instruments	Understand (Level K2)
CO3.	Determine the thermal conductivity of bad conductor by Lee's disc method.	Application (Level K3)
CO4.	Learning a experience in theory of stretched string, frequency of an electrically maintained tuning fork.	Application (Level K3)
CO5.	Able to determine the Frequency of AC by using sonometer.	Understand (Level K2)
	Allied II -	
CO1.	Understand the concepts of interference diffraction using principles of superposition of waves and rephrase the concept of polarization based on wave patterns	Understand (Level K2)
CO2.	Outline the basic foundation of different atom models and various experiments establishing quantum concepts. Relate the importance of interpreting improving theoretical models based on observation.	Understand (Level K2)
CO3.	Summarize the properties of nuclei, nuclear forces structure of atomic nucleus and nuclear models. Solve problems on delay rate half-life and mean-life. Interpret nuclear processes like fission and fusion. Understand the importance of nuclear energy and safety measures carried.	Application (Level K3)
CO4.	To describe the basic concepts of relativity like equivalence principle, inertial frames and Lorentz transformation. Extend their knowledge on concepts of relativity and vice versa. Relate this with current research in this field and get an overview of research projects of National and International importance, like LIGO, ICTS, and opportunities available.	Understand (Level K2) **&** Application (Level K3)

CO5.	Summarize the working of semiconductor devices like junction diode, Zener diode, transistors and practical devices we daily use like USB chargers and EV charging stations.	Application (Level K3)
	Allied II – Practical II	
CO1.	Gain knowledge in the scientific methods and learn the process of measuring different Physical variables	Understand (K2)
CO2.	Have a deep knowledge of fundamentals of optics electric circuits and electronics	Understand (K2)
CO3.	Know the application side of the experiments by using spectrometers, Microscopes	Application (Level K3)
CO4.	Use standard methods to calibrate the ammeter and to measure resistance of the given coil and various physical quantities	Application (Level K3)
CO5.	Apply the theory to design the basic electronic circuits	Application (Level K3)
	SEC 2 - (NME II) Physics for Everyday Life	
CO1.	Know where all Physics principles have been put to use in daily life	Understand (K2)
CO2.	Use optical instruments and LASER in everyday life.	Application (Level K3)
CO3.	Apply the basic Physics principles for home appliances	Application (Level K3)
CO4.	Gain the knowledge on usage of solar energy.	Understand (K2)
CO5.	Know about Indian Physicist and their contributions.	Application (Level K3)
	SEC-3 - Nano Science and Nano Technology	
CO1.	Gain an overall understanding of Nanoscience and Nanotechnology	Application (Level K3)
CO2.	Understand the different types of nanomaterials, their properties,	Understand (K2)
CO3.	Acquire adequate knowledge on fabrication methods and	Understand (K2)
CO4.	Analyze the various characterization techniques.	Application (Level K3)
CO5.	Know the applications of nanomaterials in recent medical field.	Application (Level K3)

	Core V –**Mechanics**	
CO1.	Understand the Newton's Law of motion, understand general theory of relativity, Kepler's laws and Realize the basic principles behind planetary motion	Remember (Level K1) & Understand (K2)
CO2.	Acquire the knowledge on the conservation laws	Understand (K2)
CO3.	Apply conservation law and calculate energy of various systems, understand and differentiate conservative and non-conservative forces	Understand (K2) & Application (Level K3)
CO4.	Gain knowledge on rigid body dynamics and solve problems based on this concept	Application (Level K3)
CO5.	Appreciate Lagrangian system of mechanics, apply D' Alemberts principle	Application (Level K3)
	Core Vi - Physics Practical Iii	
CO1.	Use the standard methods to calibrate the given measuring instruments	Application (Level K3)
CO2.	Gain knowledge in scientific methods and learn the process of measuring different physical variables	Application (Level K3)
CO3.	Understand the usage of basic laws and theories to determine the various properties of materials	Understand (K2)
CO4.	Apply the theory to design basic electric circuits	Remember (Level K1) & Application (Level K3)
CO5.	Understand the application side of experiments	Application (Level K3)
	Part– IV- SEC- IV - Fundamentals of Computer and Ms Office (Entrepreneurial Based)	
CO1.	Describe the usage of computers and why computers are essential components in business and society.	Remember (Level K1)
CO2.	Work with the basic features of Word, create high quality document designs and layouts.	Application (Level K3)
CO3.	Modify worksheet data and structure and format data in a Worksheet	Remember (Level K1)
CO4.	Sort data, manipulate data using formulas and functions and add and modify charts in a worksheet	Application (Level K3)
CO5.	Prepare power point presentation for a seminar	Application (Level K3)
	Part Iv - Sec-5 Astronomy	
CO1.	Understand the basics of celestial bodies	Understand (K2)

CO2.	Apply the knowledge to find how diffraction limits the resolution of any system having a lens or mirror. Distinguish between reflecting and refracting telescopes and their usage.	Application (Level K3)
CO3.	Understand the basics of eclipse and its types	Understand (K2)
CO4.	Have a deep knowledge of fundamentals of stellar evolution	Understand (K2)
CO5.	Remember and illustrate the structure of our Milky way galaxy and types of galaxies.	Application (Level K3)
	Core – VII - Optics And Laser Physics	
CO1.	Outline basic knowledge of methods of rectifying different defects in lenses, articulate technological applications of eyepieces	Remember (Level K1) & Understand (K2)
CO2.	Discuss the principle of superposition of wave, use these ideas to understand the wave nature of light through working of interferometer	Understand (K2) & Application (Level K3)
CO3.	Extend the knowledge about nature of light through diffraction techniques; apply mathematical principles to analyse the optical instruments	Application (Level K3)
CO4.	Interpret basic formulation of polarization and gain knowledge about polarimeter, appraise its usage in industries	Understand (K2) & Application (Level K3)
CO5.	Relate the principles of optics to various fields of IR, Raman and UV spectroscopy and understand their instrumentation and application in industries	Application (Level K3)
	Core – Viii - Physics Practical Iv	
CO1.	Outline basic knowledge of methods of rectifying different defects in lenses, articulate technological applications of eyepieces	Remember (Level K1) & Understand (K2)
CO2.	Discuss the principle of superposition of wave, use these ideas to understand the wave nature of light through working of interferometer	Understand (K2) & Application (Level K3)
CO3.	Extend the knowledge about nature of light through diffraction techniques; apply mathematical principles to analyse the optical instruments	Application (Level K3)
CO4.	Interpret basic formulation of polarization and gain knowledge about polarimeter, appraise its usage in industries	Understand (K2) & Application (Level K3)
CO5.	Relate the principles of optics to various fields of IR, Raman and UV spectroscopy and understand their instrumentation and application in industries	Application (Level K3)
	SEC-6 - Computer Programming In 'C'	
CO1.	Students get a basic knowledge of fundamental concepts of 'C' programming language	Remember (Level K1)
CO2.	Students become bale to write algorithm and are able to draw flow charts.	Understand (K2)
CO3.	They come to know how to write simple programmes in 'C'	Application (Level K3)

CO4.	They gained thorough knowledge of various control statements, if, if-else, do-while, while switch case. They understand how to use 'for' loops to create iteration	Understand (K2)
CO5.	They are able to write programs with structure, union and pointers	Application (Level K3)
	Sec-7 - Biomedical Instrumentation	
CO1.	Learn the fundamentals of bioelectric potentials and electrodes	Remember (Level K1)
CO2.	Understand the basics of transducers and its types	Understand (K2)
CO3.	Learn about the function of ECE and EEG,	Remember (Level K1)
CO4.	Know the working of EMG, ERG and EOG. Pacemakers and its types	Application (Level K3)
CO5.	Understand applications of Computer Tomotography(CT)	Understand (K2)
	Core – IX - Electricity, Magnetism and Electromagnetism	
CO1.	Describe various thermo-electric effects and their properties.	Application (Level K3)
CO2.	Apply Biot and Savart law to study the magnetic effect of electric current.	Application (Level K3)
CO3.	Use Faraday and Lenz laws in explaining self and mutual inductance.	Understand (K2) & Application (Level K3)
CO4.	Analyze the time variation of current and potential difference in AC circuits.	Analyze (Level K4)
CO5.	Relate different physical quantities used to explain magnetic properties of materials.	Remember (Level K1) & Application (Level K3)
	Core – X - Atomic And Nuclear Physics	
CO1.	List the properties of electrons and positive rays, define specific charge of positive rays and know about different mass spectrographs.	Remember (Level K1) ,Understand (K2) & Application (Level K3)
CO2.	Outline photoelectric effect and the terms related to it**,** State laws of photoelectric emission, Explain experiments and applications of photo electric effect, Solve problems based on photoelectric equation.	Understand (K2) & Application (Level K3)
CO3.	Explain different atom models**,** Describe different quantum numbers and different coupling schemes.	Remember (Level K1) & Understand (K2)
CO4.	Differentiate between excitation and ionization potentials, Explain Davis and Goucher's experiment**,** Apply selection rule, Analyse Pasche - Back effect, Compare Zeeman and Stark effect.	Understand (K2) & Application (Level K3)
CO5.	List the properties of electrons and positive rays, define specific charge of positive rays and know about different mass spectrographs.	Remember (Level K1) ,Understand (K2) &

		Application (Level K3)
Core XI - Analog And Communication Electronics		
CO1.	Explain the basic concepts of semiconductors devices.	Understand (K2) & Application (Level K3)
CO2.	Know and classify the basic principles of biasing and transistor amplifiers	Remember (Level K1) & Understand (K2)
CO3.	Acquire the fundamental concepts of oscillators.	Understand (K2) & Application (Level K3)
CO4.	Understand the working of operational amplifiers	Remember (Level K1) & Understand (K2)
CO5.	Learn and analyze the operations of sequential and combinational digital circuits	Understand (K2) & Application (Level K3)
Core XI - CORE PRACTICAL 5		
CO1.	Have a deep knowledge of fundamentals of optics, electric circuits and magnetism	Application (Level K3)
CO2.	Gain the knowledge and understanding the components and handling equipments	Remember (Level K1)
CO3.	Verify the experimental results with theoretical values	Application (Level K3)
CO4.	Get the idea about experimental setup and arrangement of devices	Application (Level K3)
CO5.	Understand the basic concepts in optics and electricity	Remember (Level K1) & Understand (K2)
EC 1 - Option 1- Laser And Fiber Optics		
CO1.	Explore the Laser fundamentals	Understand (K2)
CO2.	Understand the types of Lasers	Application (Level K3)
CO3.	Get adequate knowledge about Industrial and medical applications of laser for day-to-day applications	Understand (K2)
CO4.	Recognize and classify the structure of Optical fibre	Remember (Level K1) &Understand (K2)
CO5.	Understand the Optical sensors and their applications	Understand (K2)& Application (Level K3)
Ec 1 - Option 2 - Mathematical Physics		

CO1.	Solve ordinary and partial differential equations in physical sciences.	Application (Level K3)
CO2.	Use and apply Green Functions	Understand (K2) & Application (Level K3)
CO3.	Use Fourier series and integral transformations and understand the basic theory of vectors and tensors.	Remember (Level K1)
CO4.	Understand the functions of complex variables and elements of distribution theory	Understand (K2)
CO5.	Analyze Fourier series	Application (Level K3)
	Ec 2 - Option 1 - Communication Physics	
CO1.	Understand the principles of photography and image formation.	Understand (K2)
CO2.	Understand the essential components of conventional and cameras.	Application (Level K3)
CO3.	Become familiar with camera using films and its different types.	Application (Level K3)
CO4.	Know the principle, function and types of digital cameras and apply the ideas in recent developments.	Application (Level K3)
CO5.	Recognize the applications of digital imaging system in recent days.	Understand (K2) & Application (Level K3)
	Ec 2 - Option 2 – Digital Photography	
CO1.	Understand the principles of photography and image formation.	Understand (K2)
CO2.	Understand the essential components of conventional and cameras.	Application (Level K3)
CO3.	Become familiar with camera using films and its different types.	Application (Level K3)
CO4.	Know the principle, function and types of digital cameras and apply the ideas in recent developments.	Application (Level K3)
CO5.	Recognize the applications of digital imaging system in recent days.	Understand (K2) & Application (Level K3)
	Part– IV Value Education	
CO1.	Build physical and mental strength of the learners	Synthesis (Level K6)
CO2.	Strengthen the emotional and spiritual aspects of the learners	Synthesis (Level K6)
CO3.	Make the learners responsible and cooperative citizens	Synthesis (Level K6)
CO4.	Develop democratic way of thinking and inculcate spirit of national integration	Application (Level K3)
CO5.	Develop the practice of paying respect for dignity of individual and diversity in society	Application (Level K3)

Part– IV	**Summer Internship / Industrial Training**	
CO1.	Offer a hands-on-learning experience, that allows the learners to maximize the outcome and benefits of their theoretical knowledge through practical implementation.	Remember (Level K1)
CO2.	Add technical skills, soft skills and professional experience to the learners' resume	Understand (Level K2)
CO3.	Enhance their chances of securing the job they desire	Analysis (Level K4)
CO4.	Provide the learners an experience of the real corporate world and thus help them understand the expectations and requirements of the industry	Understand (Level K2)
CO5.	Enable the learners build their network and professional relationships, which turns them into confident future professionals.	Application (Level K3)
	Core - XIII Solid State Physics	
CO1.	Classify the bonding and crystal structure also learn about the crystal structure analysis using X ray diffraction.	Understand (K2) & Application (Level K3)
CO2.	Understand the lattice dynamics and thus learn the electrical and thermal properties of materials.	Remember (Level K1) &Understand (K2)
CO3.	Give reason for classifying magnetic material on the basis of their behaviour.	Application (Level K3)
CO4.	Comprehend the dielectric behavior of materials.	Application (Level K3)
CO5.	Appreciate the ferroelectric and super conducting properties of materials.	Understand (K2) & Application (Level K3)
	Core – XIV - Digital Electronics And Microprocessor 8085	
CO1.	Learn about number systems, Boolean algebra, logical operation and logic gates	Understand (K2) &Application (Level K3)
CO2.	Understand the working of adder, subractors, multiplexers and demultiplexers.	Remember (Level K1)& Understand (K2)
CO3.	Get knowledge on flip-flops and storage devices.	Understand (K2)
CO4.	Gain inputs on architecture of microprocessor 8085.	Understand (K2)
CO5.	Develop program writing skills .on microprocessor 8085.	Application (Level K3)
	Core Course XVI - Project	
CO1.	Learn to be specific in the (her) area of interest	Understand (K2) &Application (Level K3)
CO2.	Understand the method of working highly coherent to the topic.	Remember (Level K1)& Understand (K2)

CO3.	Gain knowledge on the collection of voluminous data.	Understand (K2)
CO4.	Able to analyze the problems arising in doing the project	Understand (K2)
CO5.	Able to solve, criticize and evaluate the results of the project	Application (Level K3)
	Core – Xv - Physics Practical Vi	
CO1.	Acquire practical skills in using electronic devices.	Understand (K2)
CO2.	Provide a hands-on learning in digital electronic circuits	Application (Level K3)
CO3.	Apply the knowledge to make various circuits in digital electronics using ICs.	Application (Level K3)
CO4.	Gain adequate knowledge about fundamental experiments on microprocessor 8085.	Application (Level K3)
CO5.	Apply the knowledge to write programs by themselves.	Application (Level K3)
	Ec 3 - Option – 1 - Energy Physics	
CO1.	To identify various forms of renewable and non-renewable energy sources	Remember (Level K1)
CO2.	Understand the components of solar radiation, their measurement and apply them to utilize solar energy.	Understand (K2)
CO3.	Discuss the working of a windmill and analyze the advantages of wind energy.	Application (Level K3)
CO4.	Distinguish aerobic digestion process from anaerobic digestion.	Analyze (Level K4)
CO5.	Understand the importance of energy storage, advantages and disadvantages and applications of fuel cells and hydrogen storage	Application (Level K3)
	Ec 3 -Option – 2 - Medical Instrumentation	
CO1.	Learn the fundamentals and applications of Biometrics and Audio metry.	Remember (Level K1)
CO2.	Understand the basics of bioelectric potentials and electrodes. Learn about ECE, EEG, EMG and basic principles of pulse oximeter.	Understand (K2)
CO3.	Apply knowledge on Radiation Physics	Application (Level K3)
CO4.	Analyze Radiological imaging and filters	Analyze (Level K4)
CO5.	Assess the principles of radiation protection	Evaluate (Level K5)
	Ec 4 -Option 1-Materials Science	
CO1.	Learn the imperfections in the crystals	Understand (K2)

CO2.	Learn the different kinds of mechanical behavior of materials	Understand (K2) & Application (Level K3)
CO3.	Understand the knowledge of deformation and strengthening methods of materials	Understand (K2)
CO4.	Study the behavior of optical materials and their applications, function of optical devices like LED, LCD	Understand (K2)
CO5.	Apply the various destructive and non destructive methods of testing of materials.	Application (Level K3)
	Ec 4 -Option 2 - Advanced Mathematical Physics	
CO1.	Learn the learn advanced topics and theorems in mathematics based on the fundamentals of matrices and vector calculus learnt in earlier course	Remember (Level K1) & Understand (K2)
CO2.	Acquire the advanced knowledge in vector calculus and apply them in real time cases	Understand (K2) & Application (Level K3)
CO3.	Understand the various special functions	Remember (Level K1) & Understand (K2)
CO4.	Apply the special functions in different problems	Application (Level K3)
CO5.	Apply the knowledge of partial differential equations for different geometrical objects which will be of use in research at a later stage	Application (Level K3)
	Part– IV SEC-8 - Computer Programming In 'C' -Practical	
CO1.	write simple programme in 'C'	Understand (K2)
CO2.	use control statements and simple if else statements in writing programmes	Application (Level K3)
CO3.	write programs using switch case	Application (Level K3)
CO4.	write programe using for loop	Application (Level K3)
CO5.	write programe using functions	Application (Level K3)
	Part– IV / Extension Activity	
CO1.	To arouse social consciousness of the students by providing them opportunities to work with and among the people.	Knowledge (Level K1)
CO2.	To develop an awareness and knowledge of social realities to have concern for the well being of the community and engage in creative and constructive social action.	Application (Level K3)
CO3.	To provide with rich and meaningful educational experiences to them in order to make their education complete and meaningful.	Synthesis (Level K6)

CO4.	To develop skill needed in the exercise of democratic leadership and programme development to help them get self-employed.	Synthesis (Level K6)
CO5.	To give them the opportunities for their personality development	Synthesis (Level K6)
EXTRA-CREDIT COURSES		
All Under-graduation Programmes / Semester – I / Extra-credit Course – I / Energy Harvesting - I		
CO1.	Understand how electrical energy can be used in day today appliances. Acquire knowledge of the Ac currents and generators	Understand (Level K1) & Knowledge (Level K2)
CO2.	Develop an awareness and knowledge of magnetic fields, flux and other magnetic vectors.	Application (Level K3)
CO3.	Provide with useful educational experiences to them in the concept of photovoltaic effects.	Knowledge (Level Understand (K2)) & Analyze (Level K4)
CO4.	Understand and appreciate the use of thermal energy and to develop skill needed in using it.	Application (Level K3)
CO5.	Give them the opportunities to study the concepts nuclear energy and energy generation.	Analyze (Level K4)
All Under-Graduation Programmes / Semester – III / Extra-Credit Course – II / Electrical Appliances		
CO1.	Understand how day today appliances are functioning. Acquire knowledge of the Ac currents and generators	Remember(Level K1) & Understand (K2)
CO2.	Acquire the knowledge of working of Refrigerators and Air conditioner.	Application (Level K3)
CO3.	Provide with useful educational experiences to understand the of the basic idea of Electrical bell and Room heater.	Analyze (Level K4)
CO4.	Understand and appreciate the use of thermal energy and to develop skill needed in using it.	Application (Level K3)
CO5.	Get the opportunities to study the concepts Induction stove and Lightning conductor	Analyze (Level K4)
All Under-graduation Programmes / Semester – V / Extra-credit Course – III / Energy Harvesting - II		
CO1.	Acquire knowledge of the working different thermal devices Understand how solar energy can be used in day today appliances..	Remember(Level K1) & Understand (K2)
CO2.	Get the concept of power in the wind types of wind energy systems horizontal axis wind Turbine – Vertical axis wind Turbine.	Understand (Level K1) & Knowledge (Level K2)
CO3.	Provide with useful educational experiences to them in the concept of Tidal Energy, Ocean Thermal Energy Conversion.	Analyze (Level K4)
CO4.	Appreciate the use of Energy from Biomass.	Analyze (Level K4)
CO5.	Able to estimates of Geothermal power understand the nature of Geothermal fields and Geothermal	Analyze (Level K4)

	sources.	Application (Level K3)
VALUE-ADDED COURSES		
All Under-graduation Programmes / Semester – II / Value-added Course – I / Laboratory Equipment		
CO1.	Gaining knowledge of the basic concepts of measurement of physical quantities.	Understand (K2)
CO2.	Gaining knowledge of the basic principles of transformers	Understand (K2)
CO3.	Applying the principles of power supplies in various circuits.	Application (Level K3)
CO4.	Designing and analyzing electrical and electronic instruments	Analyze (Level K4)
CO5.	Analyzing the frequency responses in various circuits using oscillators	Analyze (Level K4)
All Under-Graduation Programmes / Semester – IV / Value-Added Course – II / Designing & Fabrication Of PCB		
CO1.	Gaining knowledge of the basics of PCB	Understand (K2)
CO2.	Comprehending the different types of PCB	Understand (K2)
CO3.	Applying the gained knowledge to develop Layout	Application (Level K3)
CO4.	Applying the gained knowledge and developing Etching and Soldering	Analyze (Level K4)
CO5.	Analyzing the concept of laminates and printing	Analyze (Level K4)
All Under-graduation Programmes / Semester – VI / Value-added Course – III / Optoelectronic Devices		
CO1.	To understand LEDs their working, advantages and applications	Understand (K2)
CO2.	To know about LCD, their working and uses	Application (Level K3)
CO3.	Understand the function of different semiconductor opto devices	Understand (K2)
CO4.	To discuss the concept of different photo detecting devices	Understand (K2)
CO5.	To learn about the working of CRO	Application (Level K3)

M.Sc PHYSICS	
M.Sc PHYSICS - PROGRAMME SPECIFIC OUTCOMES	
PSOs	**Description of PSOs**
PSO1	To create effective entrepreneurs by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.
PSO2	To produce employable, ethical and innovative professionals to sustain in the dynamic business world. To contribute to the development of the society by collaborating with stakeholders for mutual benefit.

PSO3	Students will utilize e-resources, digital tools and techniques for widening their knowledge base. Student will appreciate the interplay of mathematics, physics and technology.
PSO4	Students will develop adequate knowledge and skills for employment and entrepreneurship. An awareness of civic and ecological duties as good citizens and importance of human values will be inculcated in students.

M.Sc PHYSICS - PROGRAMME OUTCOMES	
POs	**Description of POs**
PO1	**PO1.** Apply knowledge of Management theories and Human Resource practices to solve business problems through research in Global context.
PO2	**PO2.** Foster analytical and critical thinking abilities for data-based decision-making.
PO3	**PO3**. Ability to incorporate quality, ethical and legal value-based perspectives to all organizational activities.
PO4	**PO4**. Ability to develop communication, managerial and interpersonal skills.
PO5	**PO5**. Capability to lead themselves and the team to achieve organizational goals.
PO6	**PO6**. Inculcate contemporary business practices to enhance employability skills in the competitive environment.
PO7	**PO7**. Equip with skills and competencies to become an entrepreneur.
PO8	**PO8.** Succeed in career endeavors and contribute significantly to society.
PO9	**PO9**. Possess knowledge of the values and beliefs of multiple cultures and a global perspective.
PO10	**PO10**. Ability to embrace moral/ethical values in conducting one's life.

M.Sc PHYSICS - COURSE OUTCOMES		
	Description of COs	**Bloom's Taxonomy / Cognitive Domain**
Core – I - Mathematical Physics		
CO1.	Understand use of bra-ket vector notation and explain the meaning of complete orthonormal set of basis vectors, and transformations and be able to apply them	Remember (Level K1) & Understand (Level K2)

CO2.	Able to understand analytic functions, do complex integration, by applying Cauchy Integral Formula. Able to compute many real integrals and infinite sums via complex integration.	Understand(Levcel (K2) & Apply((Level K3)
CO3.	Analyze characteristics of matrices and its different types, and the process of diagonalization.	Analyze (K4)
CO4.	Solve equations using Laplace transform and analyze the Fourier transformations of different function, grasp how these transformations can speed up analysis and correlate their importance in technology.	Analyze(K4)& Evaluate (K5)
CO5.	To find the solutions for physical problems using linear differential equations and to solve boundary value problems using Green's function. Apply special functions in computation of solutions to real world problems.	Understand(Level K2) & Evaluate (K5)
Core–II - Linear And Digital Ics And Applications		
CO1.	Learn about the basic concepts for the circuit configuration for the design of linear integrated circuits and develops skill to solve problems	Remember (K1) & Evaluate (K5)
CO2.	Develop skills to design linear and non-linear applications circuits using Op-Amp and design the active filters circuits.	Apply((Level K3)
CO3.	Gain knowledge about PLL, and develop the skills to design the simple circuits using IC 555 timer and can solve problems related to it.	Remember (K1) & Apply(Level K3)
CO4.	Learn about various techniques to develop A/D and D/A converters.	Understand(Level K2)
CO5.	Acquire the knowledge about the CMOS logic, combinational and sequential circuits.	Remember (K1) & Analyze(K4)
Core–III - Practical - I		
CO1.	Understand the strength of material using Young's modulus. Acquire knowledge of thermal behaviour of the materials.	Remember (K1) & Understand(Level (K2)
CO2.	Understand theoretical principles of magnetism through the experiments. Acquire knowledge about arc spectrum and applications of laser	Remember (K1) & Apply (Level K3)
CO3.	Improve the analytical and observation ability in Physics Experiments. Conduct experiments on applications of FET and UJT	Analyze(K4) & Evaluate (K5)
CO4.	Analyze various parameters related to operational amplifiers. Understand the concepts involved in arithmetic and logical circuits using IC's.	Understand(Level K2) & Analyze(K4)
CO5.	Acquire knowledge about Combinational Logic Circuits and Sequential Logic Circuits. Analyze the applications of counters and registers.	Remember (K1) & Analyze(K4)
Major Elective–I / Option-I / Energy Physics		
CO1.	To identify various forms of renewable and non-renewable energy sources	Remember(K1)**&** Understand(**Level** K2)
CO2.	Understand the principle of utilizing the oceanic energy and apply it for practical applications.	Understand(Level K2)
CO3.	Discuss the working of a windmill and analyze the advantages of wind energy.	Apply(Level K3)

CO4.	Distinguish aerobic digestion process from anaerobic digestion.	Apply(Level K3)& Analyze(K4)
CO5.	Understand the components of solar radiation, their measurement and apply them to utilize solar energy.	Understand(LevelK2) & Evaluate (K5)
Major Elective–I/ Option–II / Analysis Of Crystal Structures		
CO1.	Understand crystal symmetry and reciprocal lattice concept for X-ray diffraction.	Understand(LevelK2)
CO2.	Gain a working knowledge of X-ray generation, X-ray photography with Laue, oscillation and moving film methods, and space group determination.	Remember (K1) & Apply(Level K3)
CO3.	Get an exposure to crystal structure determination using program packages.	Remember (K1) & Analyze(K4)
CO4.	Understand the instrumentation used for powder diffraction, data collection, data interpretation, and structure refinement using Rietveld method.	Understand(LevelK2) & Analyze(K4)
CO5.	Get an insight into the structural aspects of proteins and nucleic acids, crystallization of proteins and methods to solve protein structures.	Evaluate (K5)
Major Elective – II /Option– I/Advanced Optics		
CO1.	Discuss the transverse character of light waves and different polarization phenomenon	Remember(K1))& Understand(LevelK2)
CO2.	Discriminate all the fundamental processes involved in laser devices and to analyze the design and operation of the devices	Understand(LevelK2)
CO3.	Demonstrate the basic configuration of a fiber optic – communication system and advantages	Apply(LevelK3)& Analyze(K4)
CO4.	Identify the properties of nonlinear interactions of light and matter	Analyze(K4)
CO5.	Interpret the group of experiments which depend for their action on an applied magnetics and electric field	Evaluate (K5)
Major Elective – II/ Option–II/ Non - Linear Dynamics		
CO1.	Gain knowledge about the available analytical and numerical methods to solve various nonlinear systems.	Remember(K1)& Analyze(K4)
CO2.	Understand the concepts of different types of coherent structures and their importance in science and technology.	Understand(LevelK2)
CO3.	Learn about simple and complex bifurcations and the routes to chaos	Remember(K1)& Understand(LevelK2)
CO4.	Acquire knowledge about various oscillators, characterization of chaos and fractals.	Remember(K1))& Understand(LevelK2)
CO5.	To analyze and evaluate the applications of solutions in telecommunication, applications of chaos in	Apply(Level K3)

	cryptography, computations and that of fractals.	& Evaluate (K5)
Core–IV/ Statistical Mechanics		
CO1.	To examine and elaborate the effect of changes in thermodynamic quantities on the states of matter during phase transition	Evaluate (K5)
CO2.	To analyze the macroscopic properties such as pressure, volume, temperature, specific heat, elastic moduli etc. using microscopic properties like intermolecular forces, chemical bonding, atomicity etc. Describe the peculiar behaviour of the entropy by mixing two gases Justify the connection between statistics and thermodynamic quantities	Analyze(K4)
CO3.	Differentiate between canonical and grand canonical ensembles and to interpret the relation between thermodynamical quantities and partition function	Remember(K1) & Understand(LevelK2)
CO4.	To recall and apply the different statistical concepts to analyze the behaviour of ideal Fermi gas and ideal Bose gas and also to compare and distinguish between the three types of statistics.	Analyze(K4)& Evaluate (K5)
CO5.	To discuss and examine the thermodynamical behaviour of gases under fluctuation and also using Ising model	Apply(Level K3)
Core–V/ Quantum Mechanics		
CO1.	Demonstrates a clear understanding of the basic postulates of quantum mechanics which serve to formalize the rules of quantum Mechanics.	Remember(K1)& Evaluate(K5)
CO2.	Is able to apply and analyze the Schrodinger equation to solve one dimensional problems and three dimensional problems.	Apply(Level K3)& Analyze(K4)

CO3.	Can discuss the various representations, space time symmetries and formulations of time evolution	Remember(K1) & Understand(LevelK2)
CO4.	Can formulate and analyze the approximation methods for various quantum mechanical problems	Analyze(K4) & Evaluate(K5)
CO5.	To apply non-commutative algebra for topics such as angular and spin angular momentum and hence explain spectral line splitting.	Apply(Level K3)& Analyze(K4)
Core–VI/ Practical - II		
CO1.	Acquire knowledge of thermal behaviour of the materials	Remember(K1) & Understand(LevelK2)
CO2.	Acquire knowledge about arc spectrum and applications of laser	Remember(K1) & Understand(LevelK2)
CO3.	Improve the analytical and observation ability in Physics Experiments	Analyze(K4)
CO4.	Analyze various parameters related to operational amplifiers	Analyze(K4)
CO5.	Acquire knowledge about Combinational Logic Circuits and Sequential Logic Circuits	Apply(Level K3)
Major Elective –III/Option–I/ Plasma Physics		
CO1.	Understand the collision, cross section of charged particles and to able to correlate the magnetic effect of ion and electrons in plasma state.	Remember(K1) & Understand(LevelK2)
CO2.	Understand the plasma and learn the magneto-hydrodynamics concepts applied to plasma.	Understand(LevelK2)
CO3.	Explore the oscillations and waves of charged particles and thereby apply the Maxwell's equation to quantitative analysis of plasma.	Remember(K1) & Apply(Level K3)
CO4.	Analyze the different principle and techniques to diagnostics of plasma.	Understand(LevelK2) & Evaluate(K5)
CO5.	Learn the possible applications of plasma by incorporating various electrical and electronic instruments.	Analyze(K4)
Major Elective – III / Option – II / Advanced Mathematical Physics		
CO1.	Gained knowledge of both discrete and continuous groups	Remember(K1) & Understand(LevelK2)
CO2.	Apply various important theorems in group theory	Apply(Level K3)
CO3.	Construct group multiplication table, character table relevant to important branches of physics.	Evaluate(K5)
CO4.	Equipped to solve problems in tensors	Analyze(K4)& Evaluate(K5)
CO5.	Developed skills to apply group theory and tensors to peruse research	Understand(Level K2) &

		Apply(Level K3)
Major Elective–IV / Option– I/ Solar Energy Utilization		
CO1.	Gained knowledge in fundamental aspects of solar energy utilization	Remember(K1)& Understand(LevelK2)
CO2.	Equipped to take up related job by gaining industry exposure	Apply(Level K3)
CO3.	Develop entrepreneurial skills	Evaluate(K5)
CO4.	Skilled to approach the needy society with different types of solar cells	Analyze(K4)
CO5.	Gained industrialist mindset by utilizing renewable source of energy	Analyze(K4)& Apply(Level K3)
Major Elective –IV/Option–II/ Characterization Of Materials		
CO1.	Describe the TGA, DTA, DSC and TMA thermal analysis techniques and make interpretation of the results.	Remember(K1)& **Apply(Level K3)**
CO2.	The concept of image formation in Optical microscope, developments in other specialized microscopes and their applications.	Understand(LevelK2)
CO3.	The working principle and operation of SEM, TEM, STM and AFM.	Understand(LevelK2)& Apply(Level K3)
CO4.	Understood Hall measurement, four –probe resistivity measurement, C-V, I-V, Electrochemical, Photoluminescence and electroluminescence experimental techniques with necessary theory.	Apply(Level K3)& Analyze(K4)
CO5.	The theory and experimental procedure for x- ray diffraction and some important spectroscopic techniques and their applications.	Analyze(K4)& Evaluate(K5)
SEC – I / NME – I / / Medical Physics		
CO1.	Learn the fundamentals, production and applications of X-rays.	Remember(K1) **&** Understand(LevelK2)
CO2.	Understand the basics of blood pressure measurements. Learn about sphygmomanometer, EGC, ENG and basic principles of MRI.	Understand(LevelK2)
CO3.	Apply knowledge on Radiation Physics	Apply(Level K3)
CO4.	Analyze Radiological imaging and filters	Analyze(K4)
CO5.	Assess the principles of radiation protection	Evaluate(K5)
Core – VII / Classical Mechanics And Relativity		
CO1.	Understand the fundamentals of classical mechanics.	Understand(LevelK2)
CO2.	Apply the principles of Lagrangian and Hamiltonian mechanics to solve the equations of motion of	Apply(Level K3)

	physical systems.	
CO3.	Apply the principles of Lagrangian and Hamiltonian mechanics to solve the equations of motion of physical systems.	Apply(Level K3)& Evaluate(K5)
CO4.	Analyze the small oscillations in systems and determine their normal modes of oscillations.	Analyze(K4) & Evaluate(K5)
CO5.	Understand and apply the principles of relativistic kinematics to the mechanical systems.	Understand(LevelK2)& Apply(Level K3)
	Core-VIII/ Nuclear And Particle Physics	
CO1.	Gain knowledge about the concepts of helicity, parity, angular correlation and internal conversion.	Remember(K1)& Evaluate(K5)
CO2.	Demonstrate knowledge of fundamental aspects of the structure of the nucleus, radioactive decay, nuclear reactions and the interaction of radiation and matter.	Understand(LevelK2)& Apply(Level K3)
CO3.	Use the different nuclear models to explain different nuclear phenomena and the concept of resonances through Briet-Weigner single level formula	Apply(Level K3))
CO4.	Analyze data from nuclear scattering experiments to identify different properties of the nuclear force.	Apply(Level K3)
CO5.	Summarize and identify allowed and forbidden nuclear reactions based on conservation laws of the elementary particles.	Evaluate(K5)
	Core- IX/ Numerical Methods And Computer Programming	
CO1.	Recall the transcendental equations and analyze the different root finding methods. Understand the basic concept involved in root finding procedure such as Newton Raphson and Bisection methods, their limitations.	Remember(K1)& Understand(LevelK2)
CO2.	Relate Simultaneous linear equations and their matrix representation Distinguish between various methods in solving simultaneous linear equations.	Evaluate(K5)
CO3.	Understand, how interpolation will be used in various realms of physics and Apply to some simple problems Analyze the newton forward and backward interpolation	Understand(LevelK2)& Apply(Level K3)
CO4.	Recollect and apply methods in numerical differentiation and integration. Assess the trapezoidal and Simson's method of numerical integration.	Apply(Level K3)& Analyze(K4)
CO5.	Understand the basics of C-programming and conditional statements.	Understand(LevelK2)
	Core-X/(Numerical Methods And Computer Programming (Fortran/C) / Practical – III	
CO1.	Program with the C Program/ FORTRAN with the C or any other high level language	Remember(K1))& Understand(LevelK2)
CO2.	Solve problem, critical thinking and analytical reasoning as applied to scientific problems.	Evaluate(K5)

CO3.	To enhance the problem-solving aptitudes of students using various numerical methods.	Evaluate(K5)
CO4.	To apply various mathematical entities, facilitate to visualise any complicate tasks.	Apply(Level K3)
CO5.	Process, analyze and plot data from various physical phenomena and interpret their meaning	Analyze(K4)
Major Elective– V/Option–I/ Materials Science		
CO1.	Acquire knowledge on optoelectronic materials	Remember(K1))& Understand(LevelK2)
CO2.	Be able to prepare ceramic materials	Apply(Level K3)
CO3.	Be able to understand the processing and applications of polymeric materials	Understand(LevelK2)& Apply(Level K3)
CO4.	Be aware of the fabrication of composite materials	Evaluate(K5)
CO5.	Be knowledgeable of shape memory alloys, metallic glasses and nanomaterials	Remember(K1))**&** Understand(LevelK2)
Major Elective– V /Option–II/ Bio Physics		
CO1.	Understand the structural organization and function of living cells and should able to apply the cell signaling mechanism and its electrical activities.	Understand(LevelK2)& Apply(Level K3)
CO2.	Comprehension of the role of biomolecular conformation to function.	Remember(K1))& Understand(LevelK2)
CO3.	Conceptual understanding of the function of biological membranes and also to understand the functioning of nervous system.	Understand(LevelK2)& Evaluate(K5)
CO4.	To know the effects of various radiations on living systems and how to prevent ill effects of radiations.	Remember(K1)& Evaluate(K5)
CO5.	Analyze and interpret data from various techniques viz., spectroscopy, crystallography, chromatography etc.,	Analyze(K4)
SEC – II / NME - II / Sewage And Waste Water Treatment And Reuse		
CO1.	Gained knowledge in solid waste management	Remember(K1))& Understand(LevelK2)
CO2.	Equipped to take up related job by gaining industry exposure	Evaluate(K5)
CO3.	Develop entrepreneurial skills	Apply(Level K3)
CO4.	Will be able to analyze and manage the status of the solid wastes in the nearby areas	Analyze(K4)
CO5.	Adequately sensitized in managing solid wastes in and around his/her locality	Evaluate(K5)

Part – IV / Internship / Industrial Activity		
CO1.	A chance to learn practically from theoretical knowledge through interaction, working methods in large industries.	Remember(K1))**&** Understand(LevelK2)
CO2.	opportunity to interact with industrial experts, how the machines are working, and which principles they work for.	Understand(LevelK2)
CO3.	It provides an opportunity to explore different sectors in which the students are passionate about it, Manufacturing, services, finance, and marketing.	Apply(Level K3)
CO4.	To know about the latest technologies. Technology development could be the main factor	Understand(LevelK2)
CO5.	Building relationships with companies, helps to get a good job in the future	Evaluate(K5)
Core-XI/ Spectroscopy		
CO1.	Understand fundamentals of rotational spectroscopy, view molecules as elastic rotors and interpret their behaviour. Able to quantify their nature and correlate them with their characteristic properties.	Understand(LevelK2)
CO2.	Understand the working principles of spectroscopic instruments and theoretical background of IR spectroscopy. Able to correlate mathematical process of Fourier transformations with instrumentation. Able to interpret vibrational spectrum of small molecules.	Understand(LevelK2)& Apply(Level K3)
CO3.	Interpret structures and composition of molecules and use their knowledge of Raman Spectroscopy as an important analytical tool	Evaluate(K5)
CO4.	Use these resonance spectroscopic techniques for quantitative and qualitative estimation of a substances	Analyze(K4)
CO5.	Learn the electronic transitions caused by absorption of radiation in the UV/Vis region of the electromagnetic spectrum and be able to analyze a simple UV spectrum.	Remember(K1) &Evaluate(K5)
Core-XII/ Practical -IV		
CO1.	Develop the programming skills of Microprocessor	Evaluate(K5)
CO2.	Appreciate the applications of Microprocessor programming	Apply(Level K3)
CO3.	Understand the structure and working of 8085 microprocessor and apply it.	Remember(K1) & Apply(LEvel K3)
CO4.	Acquire knowledge about the interfacing peripherals with 8085 microprocessor.	Remember(K1)& Analyze(K4)
CO5.	Acquire knowledge about the interfacing 8051 microcontroller with various peripherals.	Remember(K1)& Analyze(K4)
Project with Viva-Voce		
CO1.	The most effective ways for students to understand scientific concepts and processes.	Understand(LevelK2)

CO2.	Hands-on projects help students visualize how these concepts work in the real world and instill an understanding that they can apply their knowledge	Apply(Level K3)
CO3.	They provide an opportunity for learners to experiment themselves which helps improve critical thinking skills by observing various outcomes with different variables set up within specific parameters.	Analyze(K4)
CO4.	The opportunity to design and execute their own experiments also helps students develop a sense of ownership which in turn encourages them to take more responsibility for what they learn.	Analyze(K4)
CO5.	Science Experiments emphasize critical thinking skills, problem-solving techniques, communication skills, and higher-order thinking.	Evaluate(K5)
Elective–VI / Option–I/ Solid Waste Management		
CO1.	Gained knowledge in solid waste management	Remember(K1)& Understand(LevelK2)
CO2.	Equipped to take up related job by gaining industry exposure	Evaluate(K5)
CO3.	Develop entrepreneurial skills	Apply(Level K3)
CO4.	Will be able to analyze and manage the status of the solid wastes in the nearby areas	Analyze(K4)
CO5.	Adequately sensitized in managing solid wastes in and around his/her locality	Evaluate(K5)
Elective–VI /Option–II/Microprocessor 8085 And Microcontroller 8051		
CO1.	Gain knowledge of architecture and working of 8085 microprocessor.	Remember(K1))& Understand(LevelK2)
CO2.	Get knowledge of architecture and working of 8051 Microcontroller.	Remember(K1))**&** Understand(LevelK2)
CO3.	Be able to write simple assembly language programs for 8085A microprocessor.	Understand(LevelK2)& Apply(Level K3)
CO4.	Able to write simple assembly language programs for 8051 Microcontroller.	Apply(Level K3)& Analyze(K4)
CO5.	Understand the different applications of microprocessor and microcontroller.	Apply(Level K3)& Evaluate(K5)
SEC–III/ Communication Electronics		
CO1.	Discuss and compare the propagation of electromagnetic waves through sky and on earth's surface Evaluate the energy and power radiated by the different types of antenna	Remember(K1)& Evaluate(K5)
CO2.	Compare and differentiate the methods of generation of microwaves analyze the propagation of microwaves through wave guides- discuss and compare the different methods of generation of microwaves	Analyze(K4)
CO3.	Classify and compare the working of different radar systems- apply the principle of radar in detecting	Apply(Level K3)

	locating, tracking, and recognizing objects of various kinds at considerable distances – discuss the importance of radar in military- elaborate and compare the working of different picture tube	
CO4.	Classify, discuss and compare the different types of optical fiber and also to justify the need of it-discover the use of optical fiber as wave guide	Remember(K1)& Apply(Level K3)
CO5.	Explain the importance of satellite communication in our daily life-distinguish between orbital and geostationary satellites elaborate the linking of satellites with ground station on the earth	Analyze(K4)
	Extension Activity	
CO1.	It's an exceptional way to engage in active learning and develop sufficient science literacy	Remember(K1)& Understand(LevelK2)
CO2.	Able to take their natural curiosity and advance their understanding in a given area through research	Understand(LevelK2)
CO3.	Deepening of student's knowledge, understanding and skills in alignment elements of effective practice	Remember(K1)
CO4.	Promoting the development of higher order thinking skills like evaluation, logical reasoning and problem solving	Apply(Level K3)
CO5.	It is a foundation for lifelong learning dispositions	Analyze(K4) & Evaluate(K5)