Taranath Shikshana Samsthe

LAXMI VENKATESH DESAI COLLEGE, RAICHUR-584103.

(Affiliated to Raichur University, Raichur)

DEPARTMENT OF PHYSICS

UG & PG

PROGRAMME OUTCOMES,

PROGRAMME SPECIFIC OUTCOMES

&

COURSE OUTCOMES

Programme Outcomes

Graduate Attributes.
Undergraduate Programmes.

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:Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.

PO3: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.

PO4: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 learning to real life situations.

PO5:Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyses and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.

PO6:Research-related skills: A sense of inquiry and capability for asking relevant/ appropriate questions, problematizing, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.

PO7: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. 8 Learning Outcomes-based Curriculum Framework for Undergraduate Education.

PO8: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.

PO9:Reflective thinking: Critical sensibility to lived experiences, with self-awareness and reflexivity of both self and society.

PO10:Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO11:Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.

PO12:Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.

PO13:Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

PO14:Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.

PO15: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/reskilling.

——As per UGC's LOCF Framework——

Graduate Attributes.

Postgraduate Programmes.

PO1:Advanced Knowledge and Expertise: Postgraduate students deepen their understanding of their chosen field through rigorous study and research, becoming experts in specialized areas.

PO2:Critical Thinking and Analysis: Graduates are adept at critically evaluating complex issues, theories, and research findings, enabling them to make informed decisions and contribute original insights.

PO3:Research and Inquiry Skills: Postgraduates master advanced research methodologies, allowing them to conduct independent investigations, contribute to scholarly knowledge, and drive innovation.

PO4:Problem-Solving Abilities: Graduates are skilled at identifying, analysing, and solving comp **PO** lex problems, often requiring innovative approaches and interdisciplinary thinking.

PO5:Communication Proficiency: Postgraduates effectively communicate complex ideas to both technical and non-technical audiences through writing, presentations, and discussions.

Collaboration and Interdisciplinary Engagement: Graduates excel in interdisciplinary collaborations, working with diverse teams to tackle multifaceted challenges and benefit from different perspectives.

Leadership and Initiative: Postgraduate students demonstrate leadership by taking initiative, guiding projects, and influencing positive change within their academic and professional communities.

Ethical and Professional Integrity: Graduates uphold high ethical standards in their research, acknowledging sources, conducting themselves ethically, and respecting intellectual property.

Adaptability and Lifelong Learning: Postgraduates are equipped to adapt to new technologies, emerging trends, and changing contexts, and they embrace lifelong learning to stay current in their fields.

Global and Cultural Awareness: Graduates recognize the global impact of their work and possess cultural sensitivity, enabling effective interactions in diverse settings.

Innovation and Creativity: Postgraduates foster innovative thinking, identifying new solutions, pushing boundaries, and contributing to advancements in their field.

Time Management and Organization: Graduates effectively manage complex projects, balance academic and personal commitments, and meet deadlines while maintaining high standards.

Data Analysis and Interpretation: Postgraduates develop advanced skills in analyzing data, drawing meaningful conclusions, and translating findings into actionable insights.

Teaching and Mentoring Abilities: Graduates are capable of imparting knowledge and mentoring others, whether through formal teaching roles or peer interactions.

Resourcefulness and Resilience: Postgraduates exhibit resilience in the face of challenges, adapting to setbacks, and finding creative solutions to overcome obstacles.

Entrepreneurial Mindset: Graduates are equipped with entrepreneurial skills, including identifying opportunities, evaluating risks, and potentially translating research into commercial ventures.

Contribution to Society: Postgraduates recognize their role in contributing positively to society, whether through academic research, community engagement, or policy advocacy.

——As per UGC's LOCF Framework——

Programme Outcomes

Bachelor of Science (B Sc.)

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. Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.

PO3. Critical Thinking: Capability to apply analytic thought to a body of knowledge; analyze 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.

PO4. 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 learning to real life situations.

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. Co-operation/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.Scientific Reasoning: Ability to analyze, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open- minded and reasoned perspective

PO8. Information/digital Literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.

PO9. Moral and Ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.

PO10. Leadership readiness/qualities: Capability for mapping out the tasks of a team

or an organization and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision and using management skills to guide people to the right destination, in a smooth and efficient way.

PO11. 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 adopting to changing trades.

——As per UGC's LOCF Framework——

DEPARTMENT OF PHYSICS (UG)

PROGRAMME OUTCOMES

PO1: The Objective of the Department is educating students on various areas of both theoretical and practical aspects of Physics, such that employment in the industries is possible. Students are also encouraged to pursue further studies or go for research.

PO2: The main aim of the department is to provide high quality learning in physics, grooming bright undergraduates who will push frontiers of knowledge in physics and its related disciplines through scholarly activities.

PO3: Students studying physics are set to work on newest ideas in science and technology, in academia, the government, or the private sector.

PO4: A physicist can opt for basic research in astrophysics, cosmology, particle physics, atomic physics, photonics or condensed matter physics, renewable energy, quantum information science, materials development, biophysics or medical physics.

PO5: The physicists are in the forefront of all technical adventures in science and technology. Careers include teaching, medicine, law (especially intellectual property or patent law), science writing, history of science, philosophy of science, science policy, energy policy, government, or management in technical fields.

PO6: Study of Physics prepares the students for almost any career, because students learn how to analyze complex frustrating problems and they are equipped with a strong quantitative background that can be applied in any technical field.

PROGRAMME SPECIFIC OUTCOMES

The completion of this Under Graduate programme will

PSO1: Provide a fundamental knowledge in the core areas of Physics supported by the interdisciplinary courses.

PSO2: Deliver an effective knowledge in the fundamental areas of Physics with a clear and a potential understanding of the integrated approach of Theory with Practicals.

PSO3: Facilitate in acquiring intrinsic skills in the relevant Core areas to progress towards Higher education and Research.

PSO4: Accomplish the individual with employable skills thus evolving one as a self-disciplined personality committed to serve the society with an environment friendly attitude.

AS PER CBCS SYLLUBUS

COURSE OUTCOMES

Class	Course/Paper	Course Learning outcomes
B. Sc.I Semester (CBCS)	**DSC1-PHYT:104T** Mechanics	**CO1**. To understand the Newtonian mechanics and solve the problems related to the motion of system of particles. **CO2.** To understand basic theories related with properties of matter and its application to determine values of various physical quantities associated with matter. **CO3.** To understand frames of reference and Newton's laws and apply them in calculations of the motion of simple Systems. **CO4.** To acquire the knowledge of linear and angular momenta and apply them in solving physical problems. **CO3.**To understand the Newtonian relativity, Michelson Morley experiment and concepts of special theory of relativity. **CO4.** To understand the concepts - gravitation, elasticity. **CO5.** To study the Block diagram of CRO and functions of various control knobs of front panel, explanation of waveform display and uses of CRO.
	DSC-PHYP:104P Practicals	**CO1.**Solve problems and perform experiments in the topics related to moment of inertia, young's modulus, rigidity modulus, Poisson's ratio, Torsional pendulum, Bar pendulum, Parallel axes theorem and Use of CRO.
B. Sc.II Semester (CBCS)	**DSC-PHYT:201** Thermal Physics and Fluid Mechanics	**CO1.** To qualitatively understand distribution functions in case of Maxwell-Boltzmann statistics, Bose Einstein statistics and Fermi-Dirac statistics and the comparison between them. Bose-Einstein and Fermi-Dirac distributions. **CO2.** To understand Carnot's ideal heats engine, Carnot cycle and its efficiency, Carnot's theorem, Otto and Diesel engines with their efficiencies.

		CO3. The course will also develop understanding of fundamental laws of thermodynamics.
		CO4. To learn the concept of radiations, Stefan's law & its derivation using radiation pressure. Determination of Stefan's constant. Wein's displacement law, Rayleigh-Jeans's law, Planck's law of radiation, Ferry's total radiation Pyrometer. **CO5.** To understand H-R diagrams.To qualitatively understand the formation and evolution of stars. **CO6.** Analyze the viscous nature of the fluids and to determine the property of the liquids. Basics of Surface Tension, Determine the surface tension of different liquids and correlate the property with different natural phenomena
	DSC-PHYP:202 Practicals	**CO1.**Perform experiment with appropriate equipments and procedures for the determination of particular physical parameter. **CO2.**Draw the electrical circuit, select the appropriate meters, perform the experiments, record and interpret the results
B. Sc.III Semester	**PHY 3.1 :** Geometrical Optics and Electricity	**CO1.** Understand the properties of light like reflection, refraction, Understand the Fermat's Principle and Lagrange's law. Understand the natural behavior of aberration in lens **CO2.** Gain Knowledge on the basic concepts of electric and magnetic fields. concept of conductors, dielectrics, Understand the polarization in dielectrics. Clausius-Mosotti equation and limitations, the concept of electric Images and its uses. **CO3.** Learn Biot-savart's law and its applications, theory of Helmholtz Galvanometer. Ampere's circuital law & its applications to solenoid and toroid, the concept of time constant in transient circuits (RC,RL) **CO4.** To learn the concept of 'j' operator to analyze AC series and parallel resonant circuits. Q factor, sharpness

		of resonance. **CO5.**Understand the theory of B.G capacitance of
		capacitor using BG by absolute method, self inductance by Rayleigh's method and mutual inductance by direct method. Theory of earth inductor.
	PHY 3.2 : **Physics** **Lab – III** Practicals	**CO1.**Use optical sources and lasers for the determination of optical parameters with appropriate procedure, tabulate the findings and analyze the results. **CO2.**Connect the electrical circuit, select the appropriate meters, perform the experiments, record and interpret the results.
B. Sc.IV Semester	**PHY 4.1 :** Physical Optics, Thermoelectricity and Electromagnetic theory	**CO1.** Study the theory & relevant experiments of interference using Biprism, air wedge, Newton's rings and michelson interferometer **CO2.** Study the theory and experimental past of diffraction by fresnels and fraunhoffer methods **CO3.** Study the theories for production of polarization of light **CO4.** Understand the resolving power of different optical instruments. **CO5.** Understand different types of thermoelectricity and thermoelectric diagrams **CO6.** Gain knowledge on Mathematical background – gradient of scalar, divergence and curl of a vector, their physical significance, Gauss', Stoke's and Green's theorems, EM waves, propagation and their properties. Maxwell's equations in differential forms, integral forms & their physical significance. Poynting theorem
	PHY 4.2 : **Physics** **Lab – IV** Practicals	**CO1.** Use optical instruments- spectrometer, biprism, polarimeter, telescopes, sources and lasers for the determination of optical parameters with appropriate procedure, tabulate the findings and analyze the results. **CO2**. Connect the electrical circuit, select the appropriate meters, performs the experiments, record and

		interprets the results.

B. Sc.V Semester	**PHY 5.1 :** Classical Mechanics, Quantum Mechanics and Atomic Spectra	**CO1.**To understand the Newtonian mechanics and solve the problems related to the motion of system of particlesdifferent types of Constraints, degrees of freedom, virtual work. Familiarize with Lagrangian and Hamiltonian formulations of classical mechanics **CO2.** To study the fundamentals of Quantum Physics, the uncertainty principle. Schrodinger time dependentand time independent wave equation, Understand physical interpretation of wave function, dual nature of matter **CO3.** To study Bose-Einstein and Fermi-Dirac statistics. **CO4.** Understand different models of atom, different types of interactions, familiar with LS and jj coupling schemes. **CO5.** To learn Normal and Anomalous Zeeman effects. energy level diagram of sodium
	PHY 5.2 : Molecular Spectra, Lasers, Relativity and Electronics	**CO1.** To study different kinds of motions in molecules and to understand rotational spectra. **CO2.** To understand Rayleigh and Raman scattering. **CO3.** To describe the theory and working of Gas and Diode lasers. **CO4.** To understand the Newtonian relativity, Michelson Morley experiment and concepts of special theory of relativity. **CO5.** To study Thevenin's and Norton's theorems. **CO6.** Analyze the characteristics of transistor and FET, transistor and FET biasing circuits, working of single stage and multistage amplifiers using, transistor and FET. the relationship between amplifier and oscillators
	PHY 5.3 : Physics Lab –V Practicals	**CO1.**Draw the electrical circuit, select the appropriate meters, performs the experiments, record and interprets the results.
	PHY 5.4 : Physics Lab –VI Practicals	**CO1.**Draw the electrical circuit, select the appropriate meters, performs the experiments, record and interprets the results.

B. Sc.VI Semester	**PHY 6.1:** Solid State Physics, Nuclear Physics, and Nanoscience	**CO1.** To study the crystal systems and understand different crystal structures, thermal and electrical properties in the free-electron model. **CO2.** Know the fundamental principles of semiconductors, including pn-junctions, the charge carrier mobility and density. Fermi surface, basic models of magnetism, Occurrence of superconductivity, destruction of superconductivity by magnetic field, Meissner effect, isotope effect and applications **CO3.**To understand the liquid drop model and shell model , particle detectors and accelerators. **CO4.** To study about nanomaterials, their properties quantum structures: quantum wells, wires and dots; nanomaterials; synthesis, characterization, properties and applications.
	PHY 6.2: Astrophysics, Computational Physics, Electronics and Communication	**CO1.** To understand H-R diagrams, the formation and evolution of stars. End stages of stars – white dwarfs, neutron stars and black holes. Different types of telescopes and their characteristics. **CO2.** To study the basics of C-Programming. Write C program for problem based on numerical analysis and mathematical concepts, execute it for its output. **CO3.** To describe the workings of DTL gates. **CO4**. To learn about Operational amplifiers and different types of filters. **CO5.** To understand the necessity of modulation and demodulation.
	PHY 6.3 : Physics Lab –VII Practicals	**CO1.** Draw & connect the electrical circuit, select the appropriate meters, perform the experiments, record and interpret the results
	PHY 6.4 : Physics Lab –VIII Practicals	**CO1.** Draw & connect the electrical circuit, select the appropriate meters, perform the experiments, record and interpret the results. **CO2.** Executing C Programs for period of a simple pendulum and range & height of a projectile.

AS PER NEP-20202 SYLLBUS
SCIENCE STREAM
DEPARTMENT OF PHYSICS (UG)

PROGRAMME OUTCOMES

PO1: The Objective of the Department is educating students on various areas of both theoretical and practical aspects of Physics, such that employment in the industries is possible. Students are also encouraged to pursue further studies or go for research.

PO2: The main aim of the department is to provide high quality learning in physics, grooming bright undergraduates who will push frontiers of knowledge in physics and its related disciplines through scholarly activities.

PO3: Students studying physics are set to work on newest ideas in science and technology, in academia, the government, or the private sector.

PO4: A physicist can opt for basic research in astrophysics, cosmology, particle physics, atomic physics, photonics or condensed matter physics, renewable energy, quantum information science, materials development, biophysics or medical physics.

PO5: The physicists are in the forefront of all technical adventures in science and technology. Careers include teaching, medicine, law (especially intellectual property or patent law), science writing, history of science, philosophy of science, science policy, energy policy, government, or management in technical fields.

PO6: Study of Physics prepares the students for almost any career, because students learn how to analyze complex frustrating problems and they are equipped with a strong quantitative background that can be applied in any technical field.

PROGRAMME SPECIFIC OUTCOMES

- To understand the basic laws and explore the fundamental concepts of physics To understand the concepts and significance of the various physical phenomena.
- To carry out experiments to understand the laws and concepts of Physics
- To apply the theories learnt and the skills acquired to solve real time problems.
- To acquire a wide range of problem solving skills, both analytical and technical.
- To enhance the student's academic abilities, personal qualities and transferable skills.
- This will give them an opportunity to develop as responsible citizens.
- To produce graduates who excel in the competencies and values required for leadership to serve a rapidly evolving global community. To motivate the students to pursue PG courses in reputed institutions.

semester	Paper code	Paper code	Course outcomes
Semester-I (NEP)	DSC-A1	Mechanics and Properties of matter	CO-1Will learn fixing units, tabulation of observations, Analysis of data (Graphical /analytical). CO-2 Will learn about accuracy of measurement and sources of errors, importance of significant figures. CO-3Will knows how g can determined experimentally and derive satisfactorily. CO-4Students will see the difference between simple and tensional pendulum and their use in the determination various physical parameters. CO-5 Students will come to know how various elastic modules can be determined. CO-6 Students will measure surface tension and viscosity and appreciate the methods adopted
Semester-II (NEP)	DSC-A2	Electricity and magnetism	CO-1 Demonstrate Gauss law, coulomb's law for the electric field and apply it to systems of point charges as well as line, surface and volume distributions of charges. CO-2 Explains and differentiates the vector (electric fields, coulombs law) and scalar (electric potential, electric potential energy) formalisms of electrostatics. CO-3 Applies Gauss's law of electrostatics to solve variety of problems. CO-4 Describes the magnetic field produced by magnetic dipoles and electric currents. CO-5 Explain faraday-Lenz and Maxwell laws to attriculate the relationship between electric and magnetic fields. CO-6 Describe how magnetism is produced and list examples where its effects are observed.
Semester-III (NEP)	DSC3	Thermal Physics and statistical mechanics	CO-1 Students will learn kinetic theory of gases in detail with examples. CO-2 Students are able to understand and identify in detail with application of thermal conductivity and theory of radiation. CO-3 Students will learn classification characteristics of laws of thermodynamics. CO-4 Students will learn about reversible and irreversible process. CO-5 Students will understand classification and characteristics of entropy and thermodynamic potential.

Semester-IV (NEP)	DSC 4	Waves and Optics	CO-1 Students will learn in detail with application, superposition of simple harmonic motion. CO-2 Students are able understand in detailed application of wave motion. CO-3 Deliberate in detail with examples sound wave optics and transducers. CO-4 They learn details of interference, diffraction and polarization. CO-5 They learn in detail with the application of acoustics.
SemesterV (NEP)		Classical Mechanics and Quantum Mechanics -I	After the successful completion of the course, the student will be able to CO1: Identify the failure of classical physics at the microscopic level. CO2: Find the relationship between the normalization of a wave function and the ability to correctly calculate expectation values or probability densities. CO3: Explain the minimum uncertainty of measuring both observables on any quantum state. CO4: Describe the time-dependent and time-independent Schrödinger equation for simplepotentials like for instance one-dimensional potential well and Harmonic oscillator. CO5: Apply Hermitian operators, their eigenvalues and eigenvectors to find various commutation and uncertainty relations.
Semester V (NEP)		Elements of Atomic,Molecular& LaserPhysics	CO1: Describe atomic properties using basic atomic models. CO2: Interpret atomic spectra of elements using vector atom model. CO3: Interpret molecular spectra of compounds using basics of molecular physics. CO4: Explain laser systems and their applications in various fields.
Semester VI (NEP)		Elements of condensed Matter and Nuclear Physics	CO1: Explain the basic properties of nucleus and get the idea of its inner information. CO2:Understand the concepts of binding energy and binding energy per nucleon v/s mass number graph. CO3: Describe the processes of alpha, beta and gamma decays based on well-established theories. CO4: Explain the basic aspects of interaction of gamma radiation with matter by photoelectric effect, Compton scattering and pair production. CO5: Explain the different nuclear radiation detectors such as ionization chamber, Geiger-Mueller counter etc.

			CO6: Explain the basic concept of scintillation detectors, photo-multiplier tube and semiconductor detectors
Semester VI (NEP)		Electronic Instrumentation & Sensors	CO1: Identify different types of tests and measuring instruments used in practice and understand their basic working principles. CO2: Get hands on training in wiring a circuit, soldering, making a measurement using an electronic circuit used in instrumentation. CO3: Have an understanding of the basic electronic components viz., resistors, capacitors, inductors, discrete and integrated circuits, colour codes, values and pin diagram, their practical use. CO4: Understanding of the measurement of voltage, current, resistance value, identification of the terminals of a transistor and ICs. CO5: Identify and understand the different types of transducers and sensors used in robust and hand-held instruments. CO6: Understand and give a mathematical treatment of the working of rectifiers, filter, data converters and different types of transducers

PG DEPARTMENT OF PHYSICS

PROGRAMME OUTCOME

- PO1 Attained profound Expertise in Discipline.
- PO2 Acquired Ability to function in multidisciplinary domains .
- PO3 Attained ability to exercise Research Intelligence in investigations and Innovations .
- PO4 Learnt Ethical Principles and be committed to Professional Ethics.
- PO5 Incorporated Self-directed and Life-long Learning.
- PO6 Obtained Ability to maneuver in diverse contexts with Global Perspective.
- PO7 Attained Maturity to respond to one's calling.

PROGRAMME SPECIFIC OUTCOME

With successful completion of this program the students become enable to teach secondary, higher secondary levels. They can be absorbed in international schools also. Completing this program one can appear as data analyst, material analyst also. They get ample opportunity of pursuing their higher education (e.g. M.Tech, MS, M.Phil, Ph.D). Students coming out with flying colours in M.Sc Physics get professional options in any interdisciplinary area related to Physics.

Semester I

HCT1.1 Classical Mechanics:

- CO1: This course allows to understand the Newton's laws and its application to study the motion of a system.
- CO2: This course provides the information how the system moves in space under different types of fields. There are many approaches to study the moving systems.
- CO3: Effect of rotation of earth about its own axis on the systems moving on the surface of earth and similar motions are understood. New topic – Rocket dynamicsc reates interest in students.
- CO4: provides the information how spacemissions are to be planned.

HCT1.2 Electrodynamics:

- CO1: The concept of dielectric and the field in material medium are also grown within the students in this course.
- CO2: Understanding of Maxwell's equations help students for a complete grip over the subject.
- CO3: The perception regarding dipole is shaped in this course and that assists the students to understand Nuclear Physics with clarity.
- CO4: The idea of retarded potential and the point charge makes the thinking ability of the students stronger.
- CO5: The critical thinking ability of the students is developed amongst the students from the topic Special theory of relativity

HCT1.3 Introductory Quantum Mechanics I:

- CO1: This course provides understanding and knowledge to realize the basics of molecular, atomic and subatomic physics. Concept of wave function and wave packet is introduced.
- CO2: Students get their critical thinking ability developed by studying uncertainty principle. Study of probability, expectation value and Ehrenfest's theorem assist students to be enriched with mathematical calculation.
- CO3: The concept of Schrodinger equation creates analytical power of students.
- CO4: The knowledge of quantization is clarified by studying energy levels. The study of different potentials nourish them to think about system and its function with the help of mathematical tools.

- CO5: Students get skilled by studying the formalism of quantum mechanics in describing the systems mathematically and this knowledge becomes very useful for their study of particle physics, spectroscopy and research..

SCT1.1 Mathematical Physics :

- CO1: This course provides knowledgeof many newer mathematical formulations and solving complicated differential equations.
- CO2: Group theory helps in understanding the behavior of molecular vibrations and atomic nuclear structures.
- CO3: New topic Monte Carlo Methods introduced is another technique used by scientific community to study the behavior of physical systems. This method is useful only if the students enter into associated research field.
- CO4: In the course the pupil are learn different mathematical technique to solve the physical problems.

SemesterII

HCT2.1 Basic Nuclear Physics :

- CO1: Students will learn the basic properties of atomic nucleus, nuclear forces and nuclear scattering.
- CO2: Also they will be able to understand the theory behind the nuclear detectors, accelerators and reactors.
- CO3: In this course students are able to understand the concept of subatomic particles, structure of the nucleus, forces acting in between to hold t hem in such small space.
- CO4: The course involves the basics of natural radioactivity and the applications.

HCT2.2 Basic Solid state Physics:

- CO1: This course will provide knowledge about the type of crystal, crystal formation and x-ray diffraction experiment.

- CO2:Students are able to understand the concept of Band theory of solids, Electrical and thermal properties.
- CO3:Students will learn to summarize the Magnetic properties of materials
- CO4:Also understand the optical phenomena of superconductivity, its types and their applications.

SCT2.1 Atomic and Molecular Physics (General):

- CO1: Chronological study of basic atomic models helps to understand the process of development in this field; thus the logical understanding and comprehensive skill are built.
- CO2: Lasers are the present day devices which arebeing used in all fields – industry, medicine, basic science.
- CO3: On studying this course, the students will understand working principle of lasers in detail.
- CO4: Concepts of atomic spectra are cleared.
- CO5: Study of hydrogen atom with fine structure correction makes the comprehensive knowledge very strong.
- CO6: The concept of fine structure and the hyperfine structure provides the understanding of spectral lines in detail.
- CO7: Study of Zeeman effect, Paschen Beck effect grows the nature of cultivating mathematical and analytical staffs.

Semester III

HCT3.1 Electronics and Instrumentation :

- CO1: This course deals with working principle of electronic components and circuits.
- CO2: The students of physics must have the ideas behind the digital world.
- CO3: Optical fiber communication section tells why we could talk to a person at far away in real time.

- CO4: From this electronic course the students will gain the knowledge of electronic circuit, digital and fast communication.

HCT3.2 Mathematical Physicas

- CO1: It deals with Partial Differential Equations (PDE), Green's Functions, Integral Equations, Group Theory and Numerical Techniques and C Programming.
- CO2: Students learn to set the mathematical scenario of different physical system by writing the PDE's and reveal the underlying sense by solving them. Thus PDE help to develop their analytical skill.
- CO3: Knowledge of Green's function assist students to solve the non homogeneous differential equations. Learning of methodology and application of the Green's function clarifies the basics of calculus and analytical skill.
- CO4: Integral equations (and its kernels) are needed to understand the modern day Physics. Studying Group theory, the concept of arrangement and representation of real physical properties by mathematics is developed.
- CO5: Learning Numerical techniques and C programming analytical power is grown within the students. As well as the students get practiced to find accurate and precise values.

SCT3.1 Solid state Physics I

- CO1 Understanding various crystal structures are expected
- CO2 Understanding lattice vibrations and how it influencing fundamental properties of materials
- CO3 Understanding different theoretical models to explain the fundamental properties of materials
- CO4 Understanding how electric and magnetic properties in materials are generated and their classification
- CO5 Understanding different environments in which superconducting properties in materials are generated
- CO6 Understanding nanomaterials and how shape or size influencing the material properties

Semester IV

Course HCT 4.1 Statistical Mechanics:

- CO1: Students are made to understand how the macro and micro particles behave collectively.
- CO2: Understand how statistics of the microscopic world can be used to explain the thermal features of the macroscopic world.
- CO3: Use thermal and statistical principles in a wide range of applications and Learn a variety of mathematical techniques.
- CO4: Understand Bose-Einstein and Fermi Dirac statistics.and also Establish connection between statistics and thermodynamics.

HCT4.2 Quantum Mechanics II:

- CO1: Describes the structure of the hydrogen atom and show an understanding of quantisation of angular momentum;
- CO3: apply techniques such as Fourier methods and ladder operators for selected problems in quantum mechanics;
- CO4: use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations.
- CO5: The already introduced Quantum Mechanics finds application in this course and hence this is the appropriate course to introduce Atomic Physics so that the students get continuity in their progress.
- CO6: Student will also learn the behaviour of atoms in magnetic and electric field. This course is essential for progress to higher studies and research career in physics.
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SCT4.2 Solid State Physics II:

- Deeper knowledge of crystal structure is provided.
- This course how the electric current; temperature are transported in crystals taught which is essential in device fabrication. Why the crystals show elastic properties are studied.

- How and why to classify the matter into different categories based on its use like conductors, semiconductors and insulators; ferro-magnets, paramagnets and diamagnets etc.
- Also the functioning of semiconductors, superconductors.

PROJECT WORK :

- CO1: In a particular subject-area students become very expert during exploring their project related to basic research.
- CO2: The analytical, mathematical and experimental concept of the students in the corresponding topic gets very strong and leads them to choose research or higher education as their career.