Taranath Shikshana Samsthe

XMI VENKATESH DESAI COLLEGE, RAICHUR-584103.

(Affiliated to Raichur University, Raichur)

DEPARTMENT OF PHYSICS

PG PROGRAMME OUTCOMES,

PROGRAMME SPECIFIC OUTCOMES

&

COURSE OUTCOMES

Programme Outcomes

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 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.

COURSE OUTCOMES

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.