Shri Lal Bahadur Shastri Degree College, Gonda

Department of Physics

National Education Policy-2020

Program Outcome and Course Outcome

For

First three years of Higher Education (UG)

Subject Physics

PROGRAMME OUTCOMES (POs)

The practical value of science for productivity, for raising the standard of living of the people is surely recognized. Science as a power, which provides tools for effective action for the benefit of mankind or for conquering the forces of Nature or for developing resources, is surely highlighted everywhere. Besides the utilitarian aspect, the value of science lies in the fun called intellectual enjoyment. Science teaches the value of rational thought as well as importance of freedom of thought. Our teaching so far has been aimed more at formal knowledge and understanding instead of training and application oriented. Presently, the emphasis is more on training, application and to some extent on appreciation, the fostering in the pupils of independent thinking and creativity. Surely, teaching has to be more objective based. The process of application-based training, whether we call it a thrill or ability, is to be emphasized as much as the content. Physics is a basic science; it attempts to explain the natural phenomenon in as simple a manner as possible. It is an intellectual activity aimed at interpreting the Multiverse. The starting point of all physics lies in experience. Experiment, whether done outside or in the laboratory, is an important ingredient of learning physics and hence the present programme integrates six experimental physics papers focusing on various aspects of modern technology-based equipment. With all the limitations imposed (even the list of experiments as given in the syllabus) if the spirit of discovery by investigation is kept in mind, much of the thrill can be experienced.

1. The main aim of this programme is to help cultivate the love for Nature and its manifestations, to transmit the methods of science (the contents are only the means) to observe things around, to generalize, to do intelligent guessing, to formulate a theory & model, and at the same time, to hold an element of doubt and thereby to hope to modify it in terms of future experience and thus to practice a pragmatic outlook.

2. The programme intends to nurture the proficiency in functional areas of Physics, which is in line with the international standards, aimed at realizing the goals towards skilled India.

3. Keeping the application-oriented training in mind; this programme aims to give students the competence in the methods and techniques of theoretical, experimental and computational aspects of Physics so as to achieve an overall understanding of the subject for holistic development. This will cultivate in specific application-oriented training leading to their goals of employment.

4. The Bachelor's Project (Industrial Training / Survey / Dissertation) is intended to give an essence of research work for excellence in explicit areas. It integrates with specific job requirements / opportunities and provides a foundation for Bachelor (Research) Programmes

PROGRAMME SPECIFIC OUTCOMES (PSOs)

FIRST YEAR

CERTIFICATE IN BASIC PHYSICS & SEMICONDUCTOR DEVICES

This programme aims to give students the competence in the methods and techniques of calculations using Newtonian Mechanics and Thermodynamics. At the end of the course the students are expected to have hands on experience in modelling, implementation and calculation of physical quantities of relevance. An introduction to the field of Circuit Fundamentals and Basic Electronics which deals with the physics and technology of semiconductor devices is practically useful and gives the students an insight in handling electrical and electronic instruments. Experimental physics has the most striking impact on the industry wherever the instruments are used. The industries of electronics, telecommunication and instrumentation will specially recognize this course.

SECOND YEAR

DIPLOMA IN APPLIED PHYSICS WITH ELECTRONICS

This programme aims to introduce the students with Electromagnetic Theory, Modern Optics and Relativistic Mechanics. Electromagnetic Wave Propagation serves as a basis for all communication systems and deals with the physics and technology of semiconductor optoelectronic devices. A deeper insight in Electronics is provided to address the important components in consumer Optoelectronics, IT and Communication devices, and in industrial instrumentation. The need of Optical instruments and Lasers is surely highlighted everywhere and at the end of the course the students are expected to get acquaint with applications of Lasers in technology. Companies and R&D Laboratories working on Electromagnetic properties, Laser Applications, Optoelectronics and Communication Systems are expected to value this course.

THIRD YEAR

DEGREE IN BACHELOR OF SCIENCE

This programme contains very important aspects of modern-day course curriculum, namely, Classical, Quantum and Statistical computational tools required in the calculation of physical quantities of relevance in interacting many body problems in physics. It introduces the branches of Solid-State Physics and Nuclear Physics that are going to be of utmost importance at both undergraduate and graduate level. Proficiency in this area will attract demand in research and industrial establishments engaged in activities involving applications of these fields. This course amalgamates the comprehensive knowledge of Analog & Digital Principles and Applications. It presents an integrated approach to analogue electronic circuitry and digital electronics. Present course will attract immense recognition in R&D sectors and in the entire cutting-edge technology-based industry

FIRST YEAR

Course Outcomes (COs)

FOR

CERTIFICATE IN BASIC PHYSICS & SEMICONDUCTOR DEVICES

Semester I

Theory Paper-1 Mathematical Physics & Newtonian Mechanics

1. Recognize the difference between scalars, vectors, pseudo-scalars and pseudo-vectors.

2. Understand the physical interpretation of gradient, divergence and curl.

3. Comprehend the difference and connection between Cartesian, spherical and cylindrical coordinate systems.

4. Know the meaning of 4-vectors, Kronecker delta and Epsilon (Levi Civita) tensors.

5. Study the origin of pseudo forces in rotating frame.

6. Study the response of the classical systems to external forces and their elastic deformation.

7. Understand the dynamics of planetary motion and the working of Global Positioning System (GPS). 8. Comprehend the different features of Simple Harmonic Motion (SHM) and wave propagation

Semester: First

Subject: Physics practical

Course Title: Mechanical Properties of Matter

Course Outcomes (COs)

Experimental physics has the most striking impact on the industry wherever the instruments are used to study and determine the mechanical properties. Measurement precision and perfection is achieved through Lab Experiments. Online Virtual Lab Experiments give an insight in simulation techniques and provide a basis for modelling.

SEMESTER II

Theory Paper-1 Thermal Physics & Semiconductor Devices

Course Outcomes (COs)

1. Recognize the difference between reversible and irreversible processes.
2. Understand the physical significance of thermodynamical potentials.
3. Comprehend the kinetic model of gases w.r.t. various gas laws.
4. Study the implementations and limitations of fundamental radiation laws.
5. Utility of AC bridges.
6. Recognize the basic components of electronic devices.
7. Design simple electronic circuits.
8. Understand the applications of various electronic instruments.

Semester: Second

Subject: Physics Practical

Course Title: Thermal Properties of Matter & Electronic Circuits

Course Outcomes (COs)

Experimental physics has the most striking impact on the industry wherever the instruments are used to study and determine the thermal and electronic properties. Measurement precision and perfection is achieved through Lab Experiments. Online Virtual Lab Experiments give an insight in simulation techniques and provide a basis for modelling.

SECOND YEAR

SEMESTER III

DIPLOMA IN ADVANCED PHYSICS WITH ELECTRONICS

Theory Paper-1: Electromagnetic Theory & Modern Optics

Course Outcomes (Cos)

1. Better understanding of electrical and magnetic phenomenon in daily life.

2. To troubleshoot simple problems related to electrical devices.

3. Comprehend the powerful applications of ballistic galvanometer.

4. Study the fundamental physics behind reflection and refraction of light (electromagnetic waves). 5. Study the working and applications of Michelson and Fabry-Perot interferometers.

6. Recognize the difference between Fresnel's and Fraunhofer's class of diffraction.

7. Comprehend the use of polarimeters.

8. Study the characteristics and uses of lasers.

Semester: Third

Subject: Physics Practical

Course Title: Demonstrative Aspects of Electricity & Magnetism

Course Outcomes (COs)

Experimental physics has the most striking impact on the industry wherever the instruments are used to study and determine the electric and magnetic properties. Measurement precision and perfection is achieved through Lab Experiments. Online Virtual Lab Experiments give an insight in simulation techniques and provide a basis for modelling.

Semester: Fourth

Course Title: Perspectives of Modern Physics & Basic Electronics

Course Outcomes (COs)

1. Recognize the difference between the structure of space & time in Newtonian & Relativistic mechanics.

2. Understand the physical significance of consequences of Lorentz transformation equations.

3. Comprehend the wave-particle duality.

4. Develop an understanding of the foundational aspects of Quantum Mechanics.

5. Study the comparison between various biasing techniques.

6. Study the classification of amplifiers.

7. Comprehend the use of feedback and oscillators.

8. Comprehend the theory and working of optical fibres along with its applications.

Semester: Fourth

Subject: Physics Practical

Course Code: B010402P

Course Title: Basic Electronics Instrumentation

Course Outcomes (COs)

Basic Electronics instrumentation has the most striking impact on the industry wherever the components / instruments are used to study and determine the electronic properties. Measurement precision and perfection is achieved through Lab Experiments. Online Virtual Lab Experiments give an insight in simulation techniques and provide a basis for modelling.

THIRD YEAR

Semester Fifth

Theory Paper-1 Classical & Statistical Mechanics

Course Outcome (COs)

1. Understand the concepts of generalized coordinates and D'Alembert's principle.
2. Understand the Lagrangian dynamics and the importance of cyclic coordinates.
3. Comprehend the difference between Lagrangian and Hamiltonian dynamics.
4. Study the important features of central force and its application in Kepler's problem.
5. Recognize the difference between macrostate and microstate.
6. Comprehend the concept of ensembles.
7. Understand the classical and quantum statistical distribution laws.
8. Study the applications of statistical distribution laws.

Theory Paper-2 Quantum Mechanics & Spectroscopy

Course Outcomes (COs)

1. Understand the significance of operator formalism in Quantum mechanics.
2. Study the eigen and expectation value methods.
3. Understand the basis and interpretation of Uncertainty principle.
4. Develop the technique of solving Schrodinger equation for 1D and 3D problems.
5. Comprehend the success of Vector atomic model in the theory of atomic spectra.
6. Study the different aspects of spectra of Group I & II elements.
7. Study the production and applications of X-rays.
8. Develop an understanding of the fundamental aspects of Molecular spectra.

Course Code: B010503P

Course Title: Demonstrative Aspects of Optics & Lasers

Practical Course Outcomes (COs)

Experimental physics has the most striking impact on the industry wherever the instruments are used to study and determine the optical properties. Measurement precision and perfection is achieved through Lab Experiments. Online Virtual Lab Experiments give an insight in simulation techniques and provide a basis for modelling.

THIRD YEAR

Semester Sixth

Course Code: B010601T

Paper I: Solid State & Nuclear Physics

Course Outcomes (Cos)

1. Understand the crystal geometry w.r.t. symmetry operations.

2. Comprehend the power of X-ray diffraction and the concept of reciprocal lattice.

3. Study various properties based on crystal bindings.

4. Recognize the importance of Free Electron & Band theories in understanding the crystal properties.

5. Study the salient features of nuclear forces & radioactive decays.

6. Understand the importance of nuclear models & nuclear reactions.

7. Comprehend the working and applications of nuclear accelerators and detectors.

8. Understand the classification and properties of basic building blocks of nature.

Course Code: B010602T

Paper II: Analog & Digital Principles & Applications

Course Outcomes (COs)

1. Study the drift and diffusion of charge carriers in a semiconductor.

2. Understand the Two-Port model of a transistor.

3. Study the working, properties and uses of FETs.

4. Comprehend the design and operations of SCRs and UJTs.

5. Understand various number systems and binary codes.

6. Familiarize with binary arithmetic.

7. Study the working and properties of various logic gates.

8. Comprehend the design of combinational and sequential circuits.

Course Outcome (COs) for Practical

Analog & digital circuits have the most striking impact on the industry wherever the electronics instruments are used to study and determine the electronic properties. Measurement precision and perfection is achieved through Lab Experiments. Online Virtual Lab Experiments give an insight in simulation techniques and provide a basis for modelling.