**Course Outcomes - B.Sc Physics**

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The Board of Studies in Physics (UG) recognizes that curriculum, course content and assessment of scholastic achievement play complementary roles in shaping education. The committee is of the view that assessment should support and encourage the broad instructional goals such as basic knowledge of the discipline of Physics including phenomenology, theories and techniques, concepts and general principles. This should also support the ability to ask physical questions and to obtain solutions to physical questions by use of qualitative and quantitative reasoning and by experimental investigation. The important student attributes including appreciation of the physical world and the discipline of Physics, curiosity, creativity and reasoned scepticism and understanding links of Physics to other disciplines and to societal issues should gave encouragement. With this in mind, we aim to provide a firm foundation in every aspect of Physics and to explain a broad spectrum of modern trends in physics and to develop experimental, computational and mathematics skills of students.

The programme also aims to develop the following abilities:

1. Read, understand and interpret physical information – verbal, mathematical and graphical.

2. Impart skills required to gather information from resources and use them.

3. To give need based education in physics of the highest quality at the undergraduate level.

4. Offer courses to the choice of the students.

5. Perform experiments and interpret the results of observation, including making an

B Sc Programme in Physics, anassessment of experimental uncertainties.

6. Provide an intellectually stimulating environment to develop skills and enthusiasms of students to the best of their potential.

7. Use Information Communication Technology to gather knowledge at will.

8. Attract outstanding students from all backgrounds.

Objectives: The syllabi are framed in such a way that it bridges the gap between the plus two and post graduate levels of Physics by providing a more complete and logical framework in almost all areas of basic Physics.

By the end of the first year (2nd semester), the students should have attained a common level in basic mechanics, a secure foundation in mathematics, Chemistry(otherwise specified), Languages and other relevant subjects to complement the core for their future courses and developed their experimental and data analysis skills through experiments at laboratories.

By the end of the second year (4thsemester), the students should have been introduced to powerful tools for tackling a wide range of topics in Optics, Laser, Fiber optics, semiconductor devices and circuits. Along with Languages, they should have been familiar with additional relevant techniques in mathematics, Chemistry or Electronics/Computer application and developed their experimental and data analysis skills through a wide range of experiments through practical at laboratories.

By the end of the third year (6th semester)r, the students should have developed their understanding of core Physics by covering a range of topics in almost all areas of physics including Classical and Quantum Mechanics, Electricity and Electrodynamics,

Relativity and spectroscopy, Thermal and Statistical Physics, Nuclear and Particle physics, Solid State Physics, Digital Electronics etc. along with one choice based courses, Open course and had experience of independent work such as projects; seminars etc. and thereby developing their experimental skills through a series of experiments which also illustrate major themes of the lecture courses.

**SEMESTER I**

**PH1 B01: METHODOLOGY OF SCIENCE AND PHYSICS**

This course will be an introduction to the pursuit of Physics, its history and methodology. The course also aims at emphasizing the importance of measurement, measuring instruments, sources of errors and estimation of errors which is central to physics. Developmental stages of physics and biography of scientists especially Indian scientists develop scientific appreciation and scientific interest among students.

**SEMESTER II**

**PH2 B02: PROPERTIES OF MATTER, WAVES & ACOUSTICS**

This course would empower the student to acquire engineering skills and practical knowledge, which help the students in their everyday life. The properties of solids especially knowledge of elasticity help the students to identify the materials suitable for the construction of buildings, houses etc. Properties of fluids especially knowledge of viscosity and surface tension help the students in their daily life and agriculture. This syllabus will cater the basic requirements for their higher studies. This course will provide a theoretical basis for doing experiments in related areas.

**SEMESTER III**

**PH3 B03: MECHANICS**

The course uses the Laws of Mechanics to predict forces in and motions of machines and structures. Use scalar and vector analytical techniques for analysing forces and moments in mechanical systems. We Apply fundamental concepts of kinematics and kinetics of particles and rigid bodies to the analysis of simple, practical problems. The course gives us basic knowledge of maths and physics to solve real-world problems

**SEMESTER IV**

**PH4 B04: ELECTRODYNAMICS – I**

Electricity and Electrodynamics have the key role in the development of modern technological world. Without electric power and communication facilities, life on earth stands still. A course in electricity and electrodynamics is thus an essential component of physics programme at graduate level. This course is expected to provide a sound foundation in Electricity and Electrodynamics.

                             Students should familiarise with electrical circuits, electrical connections, and storage devices their working etc. which will be quite useful in their daily life. Theoretical and practical knowledge about signal generating circuits enable the students to identify different communication techniques which will be useful in their daily life and higher studies

**SEMESTER V**

**PH5 B06 : ELECTRODYNAMICS-II**

                             The students should be familiar with Maxwell’s equation , E.M Waves , Poynting vector and theorem. Students should familiarise with electrical circuits, electrical connections, and storage devices their working etc. which will be quite useful in their daily life. Theoretical and practical knowledge about signal generating circuits enable the students to identify different communication techniques which will be useful in their daily life and higher studies

**PH5 B09: ELECTRONICS (ANALOG & DIGITAL)**

We are living in a wonder world of Electronics. The knowledge of   basic principles and applications of Electronics is most necessary for a physics student. Students will get the ability to identify almost all electronic components and their working principles. Practical in this course will definitely enable the students to service or repair basic electronic equipments like radio, television, electronic chokes, lamps etc. This course is intended to provide theoretical and practical knowledge about electronics.Students will familiarise with logic circuits and their applications which enables them to design logic circuits of their own

**PH5 B07: QUANTUM MECHANICS**

This course gives an elementary introduction to quantum physics, starting with a historical description of the developments of early last century which made it necessary to use a quantum mechanical description for phenomena such as black-body radiation, the photoelectric effect, and Compton scattering. From this starting-point we then develop a more formal quantum mechanics, and learn how to perform calculations on simple systems using the Schrödinger equation; we introduce Heisenbergs principle of uncertainty, the concept of spin and the Pauli principle. Finally, we look at uses of quantum mechanics to describe phenomena such as tunnelling, the properties of atoms and molecules, as well as some elementary nuclear and particle physics

**PH5 B08 PHYSICAL OPTICS AND MODERN OPTICS**

This course aims to provide necessary foundation in optics and photonics which prepare the students for an intensive study of advanced topics at a later stage. Covering the very important and fascinating areas of interference diffraction and polarization with many experiments associated with it.

**THERMAL AND STATISTICAL PHYSICS**

This course is to develop a working knowledge of Thermal and statistical mechanics and to use this knowledge to explore various applications related to topics in material science and the physics of condensed matter.

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**Open course**

**PH5 D01(1): NON CONVENTIONAL ENERGY SOURCES**

To impart the knowledge of basics of different non conventional types of power generation & power plants in detail so that it helps them in understanding the need and role of Non-Conventional Energy sources particularly when the conventional sources are scarce in nature.

**SEMESTER VI**

**PH6 B12 : NUCLEAR PHYSICS, PARTICLE PHYSICS & ASTROPHYSICS**

This course intended to explore the interior of nucleus and interaction between nucleons. Students will get good theoretical basis of nuclear fission, which is the basis of atom bomb and nuclear fusion, basis of hydrogen bomb and energy production in stars. Students also familiarise with fundamental particles of nature and how these particles are interacting with each other and matter.

**PH6 B11 : SOLID STATE PHYSICS, SPECTROSCOPY AND LASER PHYSICS**

This course is intended to provide an introduction to the physics of Condensed Matter. The atomic and molecular spectroscopy is discussed in details during the course. The structure of Solids gives them an idea about the behaviour of matter.This study attempts to explain various types of phenomena like electro-magnetic properties, super-conductivity and super fluidity. Material science is a very wide branch where extensive research is going on. Thermal, electrical, optical and magnetic properties of matter provide a strong foundation in that direction

**PH6 B10: THERMAL AND STATISTICAL PHYSICS**

Introduction to thermodynamics and statistical mechanics for graduate students of physics and related disciplines. Einstein famously said that, of all major theories of physics, only thermodynamics would never be overthrown. It is a “meta-theory” concerned with general relationships among macroscopic properties of systems in equilibrium. Statistical mechanics builds on atomistic models to predict thermodynamic properties of physical systems. Topics covered include thermodynamic equilibrium, conversion of heat into useful work, phase transitions, classical and quantum fluids, and the approach to equilibrium

**PH6 B13(E2): NANO SCIENCE AND TECHNOLOGY**

This course introduces the fundamentals of nano-scale engineering and manufacturing. Current and future applications of nanostructured materials will be reviewed with respect to their impact in commercial products and technologies

**COMPLEMENTARY COURSE**

**COMPLEMENTARY PROGRAMME OUTCOME**

The syllabus is drafted to generate new concepts with practical thinking and multidimensional applicability of physics in other science programmes so as to empower studentswho have undergone grading system of education at under graduate level.It is restructured in order to correlate the concepts of Physics with other core programmes andalso to generate exhaustive interest in physics course through series of activities like problemsolving, active participation in laboratory programme, smart class room lectures etc.

**SEMESTER -1**

**Complementary course-1**

**PH1C01: Properties of matter & Thermodynamics**

This course is meant to develop the basic knowledge of fundamental concepts like elasticity , viscosity and surface tension. The curriculam also includes a nutshell of the concepts thermodynamics , heat enginesetc.

**SEMESTER - 2**

**Complementary course-II**

**PH2 C02: Mechanics, Relativity, Waves & Oscillations**

The course uses the Laws of Mechanics to predict forces in and motions of machines and structures. Use scalar and vector analytical techniques for analysing forces and moments in mechanical systems The properties of solids especially knowledge of elasticity help the students to identify the materials suitable for the construction of buildings, houses etc

**SEMESTER - 3**

**Complementary course-III**

**PH3 C03: Optics , Laser , Electronics & communication**

This course aims to provide necessary foundation in optics and photonics which prepare the students for an intensive study of advanced topics at a later stage. Covering the very important and fascinating areas of interference diffraction and polarization with many experiments associated with it. Students will get the ability to identify almost all electronic components and their working principles. Practical in this course will definitely enable the students to service or repair basic electronic equipments like radio, television, electronic chokes, lamps etc

**SEMESTER - 4**

**Complementary course-IV**

**PH4 C04: Electricity, Magnetism and Nuclear physics**

Electricity and Electrodynamics have the key role in the development of modern technological world. This course is expected to provide a sound foundation in Electricity and Electrodynamics. This course intended to explore the interior of nucleus and interaction between nucleons. Students will get good theoretical basis of nuclear fission, which is the basis of atom bomb and nuclear fusion, basis of hydrogen bomb and energy production in stars. Students also familiarise with fundamental particles of nature and how these particles are interacting with each other and matter