**Format for PSO and CO for AY 2019-20**

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| **Name of Faculty** | **Science and Technology** |
| **Name of Department** | **Physics** |
| **UG Programme** | **B.Sc.**  |
| **Programme Specific Outcomes (PSO)** |
| 1. To foster scientific attitude, provide in-depth knowledge of scientific and technologicalconcepts of Physics.
2. To enrich knowledge through problem solving, minor/major projects, seminars, tutorials,review of research articles/papers, participation in scientific events, study visits, etc.
3. To familiarize with recent scientific and technological developments.
4. To create foundation for research and development in Physics.
5. To help students to learn various experimental and computational tools thereby developinganalytical abilities to address real world problems.
6. To train studentsin skills related to research, education, industry, and market.
7. To help students to build-up a progressive and successful career in Physics
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| **Course Outcomes (CO) F. Y. B. Sc.** |
| **PHY-111 : Mechanics and Properties of Matter**1. To understand the laws of motion and their problems
2. To understand different type of energy.
3. To understand fluid mechanics and their applications.
4. To understand properties of matter.

**PHY-112 : Physics Principles and Applications**1. To understand the general structure of atom, spectrum of hydrogen atom.
2. To understand the atomic excitation and LASER principles.
3. To understand the bonding mechanism and its different types.
4. To demonstrate an understanding of electromagnetic waves and its spectrum.
5. Understand the types and sources of electromagnetic waves and applications.
6. To demonstrate quantitative problem solving skills in all the topics covered

**PHY-121 Heat and Thermodynamics**1. To understand thermodynamics laws.
2. To understand second law of thermodynamics and entropy.
3. To understand principle and working of heat engines and refrigerator and thermometry.

**PHY-121 : Electricity and Magnetism**1. To understand the concept of the electric force, electric field and electric potential forstationary charges.
2. Able to calculate electrostatic field and potential of charge distributions using Coulomb'slaw and Gauss's law.
3. To understand the dielectric phenomenon and effect of electric field on dielectric.
4. To study magnetic materials and its properties.
5. Demonstrate quantitative problem solving skills in all the topics covered

**PHY-113 : Physics Laboratory 1A** and **PHY-123 : Physics Laboratory 1BLaboratory courses**1. Correlation between theory and practical to improve the understanding.
2. To learn solar cell efficiency, Basic experiments in electrostatics, heat and other related theory.
3. To development of practical skills and use innovative ideas in experiments.
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| **Course Outcomes (CO) S. Y. B. Sc.** |
| **PH211: Mathematical Methods in Physics**1. Understand the complex algebra useful in physics courses.
2. Understand the concept of partial differentiation.
3. Understand the role of partial differential equations in physics.
4. Understand vector algebra useful in mathematics and physics.
5. Understand the singular points of differential equation.To understand the laws of

 motion and their problems.**PH212: Electronics**1. Apply laws of electrical circuits to different circuits.
2. Understand the relations in electricity.
3. Understand the properties and working of transistors.
4. Understand the functions of operational amplifiers.
5. Design circuits using transistors and operational amplifiers.
6. Understand the Boolean algebra and logic circuits.

**PH221: Oscillations, Waves and Sound**1. Understand the physics and mathematics of oscillations.
2. Solve the equations of motion for simple harmonic, damped, and forcedoscillators.
3. Formulate these equations and understand their physical content in a varietyof applications.
4. Describe oscillatory motion with graphs and equations, and use thesedescriptions to solve problems of oscillatory motion.
5. Explain oscillation in terms of energy exchange, giving various examples.
6. Solve problems relating to undamped, damped and force oscillators andsuperposition of oscillations.
7. Understand the mathematical description of travelling and standing waves.
8. Recognise the one-dimensional classical wave equation and solutions to it.
9. Calculate the phase velocity of a travelling wave.
10. Explain the Doppler effect, and predict in qualitative terms the frequencychange that will occur for a stationary and a moving observer.
11. Define the decibel scale qualitatively, and give examples of sounds at variouslevels.
12. Explain in qualitative terms how frequency, amplitude, and wave shape affectthe pitch, intensity, and quality of tones produced by musical instruments

**PH222: Optics**1. Acquire the basic concepts of wave optics.2. To describe how light can constructively and destructively interfere.3. Explain why a light beam spreads out after passing through an aperture.4. Summarize the polarization characteristics of electromagnetic waves.5. Appreciate the operation of many modern optical devices that utilize waveoptics.6. Understand optical phenomena such as polarisation, birefringence, interference and diffraction in terms of the wave model.7. Analyse simple examples of interference and diffraction phenomena.8. Be familiar with a range of equipment used in modern optics.**PH223: Practical Course**1. After completing this practical course students will be able to Use various instruments and equipment.2. Design experiments to test a hypothesis and/or determine the value of anunknown quantity.3. Investigate the theoretical background to an experiment.4. Set up experimental equipment to implement an experimental approach.5. Analyse data, plot appropriate graphs and reach conclusions from your dataanalysis.6. Work in a group to plan, implement and report on a project/experiment.7. Keep a well-maintained and instructive laboratory logbook. |

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| **Course Outcomes (CO) T. Y. B. Sc.** |
| **PH-331: Mathematical Methods in Physics II**1. Describe different methods in physics to solve problems in physics
2. To understand special theory of relativity – length contraction, time dilation, variation of mass with velocity.
3. To study general and orthogonal curvilinear coordinate system

**PH 332: Solid State Physics**1. To understand basic structure of solid material and their properties.
2. X- ray diffraction and Bragg’s diffraction condition, Ewald’s construction, Debye Scherer method.
3. Characterizations of solid material- Thermo Gravimetric Analysis (TGA)Spectroscopy: Ultra-Violet (UV), Electron Spectroscopy : Scanning Electron Microscopy (SEM)
4. To understand band theory of solid.
5. To learn the basic magnetic properties of materials.

**PH-333: Classical Mechanics**1. To understand the Mechanics of system of particles.
2. To study the motion in central force field.
3. To study and understand the concept of scattering of particles.
4. To study the Langrangian and Hamiltonian dynamics.
5. To understand the concept of canonical transformation and Poisson’s bracket.

**PH-334: Atomic and Molecular Physics**1. To study the atomic structure by different theories.
2. To study the effect of one and two valance electron system. Including Pauli’s exclusion principle, spectral terms, spin-orbit interaction, Lande’s interval rule.
3. To study the Zeeman Effect and Stark Effect.
4. To study the X-ray Spectroscopy, Molecular Spectroscopy, Raman Spectroscopy.

**PH-335: Computational Physics** 1. To learn the basic concept of Java Programming. To develop programming logic. 2. To understand how to use programming in day to day applications. 3. To build the necessary skill set and analytical abilities for developing computer based solutions for real life problems. 4. To improve quality software development practices.  5. To boost and inspire students in professional skills related to Software development in Industries. **PH-336 Elective I: E Renewable Energy Sources**1. To understand the conventional and non conventional energy sources.
2. To study the structure and characteristics of the sun.
3. To understand the principle, construction and working of the flat plate collector, solar distillation, solar drying, solar cooker etc.
4. To study and understand the concept of photovoltaic system.
5. To understand the bio-mass conversion technology.
6. To study the wind energy and understanding the classification and description of wind machins.

**PH-341: Classical Electrodynamics**1. To study the different laws of electrostatics. Such as Coulomb’s law, Gauss law etc.
2. To understand the concept of method of image charges.
3. To study the different laws of magnetostatics. Such as Biot-Savart’s law, Ampere’s law.
4. To understand the B-H curve.
5. To study the development of Maxwell’s equations.

**PH-342: Quantum Mechanics**1. To understand the basic concept of quantum mechanics.
2. To learn applications of Schrodinger’s equation – free particle in 3D, Step potential, barrier potential, one dimensional harmonic oscillator, and rigid rotator.
3. To understand commutator in quantum mechanics.

**PH-343: Thermodynamics and Statistical Physics**1. To understand the kinetic theory of gases.
2. To study the Maxwell relations and its applications.
3. To understand the concept of statistics.
4. To understand the different statistical distributions.
5. To understand the ensemble theory and quantum statistics.

**PH-344: Nuclear Physics**1. To study the basic properties of nucleus.
2. To study the radioactivity and nuclear forces.
3. The understand the working of different accelerators and detectors.
4. To study the different nuclear reactions.

**PH-345: Electronics- II**1. To study the principle and working of diodes and transistors.
2. To study and understand the working of JFET and MOSFET.
3. To study the Operational Amplifier and IC555.
4. To understand the construction of combinational circuits and logic gates.

**PH-346 Elective II :K Lasers**1. To understand the concept of laser.
2. To study the laser action, laser oscillator and laser output.
3. To understand the different characteristics of laser.
4. To study the types and applications of laser.

**PH-347: Laboratory Course I**1. To understand basic concept through practical.
2. To use skill and create innovative experimental setup.
3. To understand general physics experiment- mechanics, heat, Magnetics and optics.

**PH-348: Laboratory Course II**1. To understand electronics practical and their design.2. To understand laser characteristics and renewable energy sources3. To create programmed by using ‘c’ language.**PH-349: Laboratory Course III (Project)**1.To develop a set of skills pertaining to the laboratory work apart from the cognition of students.2. The student upgrade knowledge of clear and strong link with the principles of basic physics and/or their applications.3. Better understanding of physics concepts and brings out the creativity in the students.4. Student develop the skills and understanding of the physics concepts at the time of presentation of the final report viva voce.  |