Department of Physics

Programme Name - B.Sc. (Physics)

Programme Outcomes

Knowledge Outcomes

After completing B.Sc. (Physics) Programme students will be able to:

1. Apply the basic principles of Physics to the events occurring around us and also in the world.
2. Try to find out or analyze scientific reasoning for various things.

Skill Outcomes

After completing B.Sc. (Physics) Programme students will be able to:

1. Use of computers and various software and programming skills
2. apply the knowledge to develop the sustainable and eco-friendly technology for pollution free environment
3. collaborate effectively on team-oriented projects in the field of Physics
4. Communicate scientific information in a clear and concise manner both orally and in writing or through audio video presentations

Generic outcomes

Students will

1. develop ability to work in group
2. develop capacity of critical reasoning, judgment and communication skills.
3. Develop abilities for logical thinking

Programme Specific Outcomes

PSO1: Students get acquainted with techniques which are useful in industry.

PSO2: Students get conceptual knowledge of entrepreneurships through the co-curricular activities

PSO3: learn the organizational skills and working in group.

PSO4: Students will be well versed with use of computers

Course outcomes

In each course students will learn different concepts and theories as mentioned below.

First Year

Course------111- Mechanics and Properties of Matter

CO1 - Application of Newton's laws of motion to solve various problems related to day today life.

CO2 - Concepts like zero work done, conservative forces, mass energy equivalence ($E= mc^2$).

CO3 - Effect of force on various types of materials is described and physical properties like elasticity, different moduli etc. along with their relation.

CO4 - Examples of surface tension in nature and its applications in our day today life.

CO5 - Concept of viscosity of fluids, Bernoulli's Equation and its applications.

Course------112- Physics Principles and Applications

CO1 - Students could learn in detail different atomic models and the Bohr's orbits, atomic radius, energies, emission of spectral lines and also experimental verification of this.
They could also understand the background of LASER invention, Production of Laser, Concept of spontaneous and stimulated emission, Optical pumping, Population inversion. Difference between other light sources and Laser. High level of monochromaticity and coherence. Types of Lasers. Vast number of fields where laser can be used.

CO2- The students were supposed to understand different forces which hold the atoms together. Different types of chemical and physical bonds like ionic, covalent, Van der Waal's bonds. Energy levels of rotating and vibrating molecules.

CO3- History, types and production of electromagnetic waves. Applications of electromagnetic radiations in different fields like energy, medical, industrial and defense. Construction and working of solar cells.

Second Year

Semester I

Course------PH 211- Mathematical Methods in Physics

CO1- Studying De Moivree's theorem students will understand how the power of given complex number is calculated

CO2- Many times students come across the term divergence, curl, gradient but they don't understand their physical meaning. From this course their concept will clear.

CO3- Students can understand what is exact use of partial differentiation concept in physics is.

CO4- Students can also understand what is the need of complex no. is during mathematical calculation.

Course-------PH 212 (A)- Electronics

CO1- Various network theorems which use to solve problems related to complicated circuits by converting them into simpler circuits. This has wide applications in electronic and transmission circuits.

CO2 - Knowledge about semiconductors since it is a basic materials used in many electronic components like diode, transistors FET, UJT etc.

CO3- Characteristics and working of operational amplifiers which are useful in various medical and scientific investigations to amplify the signals.

CO4 - Generation of high frequency signals using oscillator circuits and their applications in radio and TV communication

CO5- Concepts of regulated power supply, rectifiers, filters and regulators.

CO6- An introduction to digital electronics which is useful in digital computers. Also logic gates and their applications.

Course------PH 212 (B) - Instrumentation

CO1- History and need of Instrumentation, Components of measurement system, Standards of Measurement, errors in measurement. Importance and methods of calibration. Static and dynamic characteristics of measurements.

CO2- Transduction principle, types of transducers. Use of transducers in measurement of displacement, force and temperature.

CO3- Comparative study of Pressure scales, pressure units, concept of vacuum, Different pressure measurement systems. Types and use of diaphragms and strain gauges

CO4- Need and use of signal conditioning. Detailed study of construction, working and characteristics of OPAMP. Circuits indicating use of OPAMP for different applications.
Study of filter circuits for use as signal conditioning component

CO5- Methods of analog display and recording. Graphical and Oscillographic recorders.

Semester II

Course- PH221 - Waves, Oscillations and Sound

CO1- Learn how does the body oscillate without damping amplitude and what are the necessary conditions for it.

CO2- Learn how we can set any object in the forced oscillations that is in continuous motion

CO3- Doppler effect and its use in in day to day life. Using this concept students can get idea of expanding universe.

CO4- Studying sound concept we can understand why the sound of male and female are different and the reason behind it.

Course- PH 222- Optics

CO1- Formulas relating to geometrical optics, Deviation, Magnification, Concept for Equivalent lens and Cardinal Points

CO2- Different types of monochromatic and chromatic aberrations and Achromatism in lenses

CO3- Construction and working of Simple Microscope, Compound Microscope, Ramsden's Eyepiece and Huygen's Eyepiece

CO4- Interference and diffraction of light, Formation of fringes, Resolution

CO5- Concept of Polarization, Double refraction, Construction and working of Nicol Prism

Third Year

Semester I

Course------ Ph 331- Mathematical Methods in Physics

CO1- The three commonly used co-ordinate systems and general curvilinear co-ordinate system.

CO2- Concept of relativity, length contraction, relativistic mass, time dilation and twin paradox.

CO3- Various methods to solve different differential equations.

CO4- Properties of Legendre polynomials, Hermite polynomials and Bessel function. These are useful to solve the problem of linear simple harmonic oscillator in quantum mechanics.

Course-------PH 332- Solid State Physics

CO1- Students will able to define crystalline material, crystal structures, miller indices, inteplaner distances, interatomic forces and bonds.
From this students get basic knowledge of solid state physics.

CO2- Students will understand Bragg's diffraction, Bragg's law. X-ray diffraction and characterization techniques. With the help of this knowledge students know the principles of structures determination by X-ray diffraction method.

CO3- Students can understand electrical and thermal conductivity of free electron in metals, Energy levels of free electrons in one and three dimensions.

They will learn significance of Pauli's exclusion principle, Bloch theorem, Fermi energy, and Hall effect and energy bands in materials.

CO4- Students can Describe and explain the behaviour of permanent magnet including induced magnetism, behaviour of paramagnetic, diamagnetic, ferromagnetic materials in terms of magnetic domain.

CO5- Students can understand superconducting materials, their properties and technological applications of superconductivity.

Course----Ph 333- Classical Mechanics

CO1- Students will able to define, Present and demonstrate basic mechanical concepts and their applications used in daily life.

CO2- Students can understand the motion of a body, Equations of motions, trajectory of an objects in constant field such as electrical, magnetic field.
With the help of this knowledge students can understand process involved in cathode ray Oscilloscope.

CO3- With the help of this knowledge students will understand how to launch rockets and satellites. Motion of planets and satellites and dynamic molecular collisions. How the mechanical concepts used in sports and military.

CO4- Students will learn Lagrangian and Hamiltonian formulations. Canonical transformation, Passion's Bracket concept.
Using the technique of Lagrangian and Hamiltonian formulation students will explain motions of different bodies in simple form such as kinetic and potential energy.

CO5- Students can learn Newton's laws such as projectile motion and rocket motion. Also Kepler's laws related to motion. Scattering of particles.

CO- 6 Mathematical and thinking skills will develop among students by solving problems.

Course------- PH334- Atomic and Molecular Physics

CO1- There are many models to explain atomic structure. But none of the model explained atomic structure fully. A new model could explain all parameters of atomic structure called vector model. Studying this model students can draw vector diagrams easily.

CO2 Students learn how to find out interaction energy from different coupling scheme.

CO3 Students scientifically understand, how the x-rays produces. Also they will understand what precaution should take during handling it.

CO4- Studying molecular spectroscopy students understand how important rotational and vibrational energy levels are?

Course-------PH 335- Computational Physics

CO1- Learn the Basic Programming Concept.

CO2- Improve the logical as well as Computational ability.

CO3- Memory allocation and utilization technique learning.

CO4- Applicability of computer resources in physics.

CO5- Learn Graphical technique using some Graphical Commands in C programming.

Course-------PH 336 B- Elements of Material Science

CO1- Studying defects in solid, students can identify the defect exist in given solid.
CO2- Students will learn different polymers. To make superior quality polymer, how the polymerization process is important.
CO3- Students will understand which type of ceramic material used for particular purpose.
CO4- Smart materials are newly discovered materials which are useful to human being in day to day life. Students will study such advanced materials.

Third Year- Semester II

Course-------PH 341- Electrodynamics

CO1- Learn the Basic Programming Concept.

CO2- Improve the logical as well as Computational ability.

CO3- Memory allocation and utilization technique learning.

CO4- Applicability of computer resources in physics.

CO5- Learn Graphical technique using some Graphical Commands in C programming.

Course-------PH 342-- Quantum Mechanics

CO1- Introduction to Quantum Mechanics, Historical background, Matter Waves, Wave particle duality, Phase and Group Velocity, Heisenberg's Uncertainty Principle

CO2- Physical Interpretation of Wave function, Schrödinger's Wave Equation, Eigen Function and Eigen values

CO3- Free Particle, One Dimensional and Three dimensional Rigid Box, Potential Barrier
CO4- Spherically symmetric potential, Examples of Rigid Rotor and hydrogen atom

CO5- Hermition and Other Operators in Quantum Mechanics, Commutator brackets and concept of parity

Course-------PH 341- Electrodynamics

CO1- Learn the Basic Programming Concept.

CO2- Improve the logical as well as Computational ability.

CO3- Memory allocation and utilization technique learning.

CO4- Applicability of computer resources in physics.

CO5- Learn Graphical technique using some Graphical Commands in C programming.

Course------- Thermodynamics and Statistical Physics

CO1- To study the transport phenomenon such as viscosity, thermal conductivity, diffusion.

CO2- To learn about thermodynamic functions, variables and their relations.

CO3- To acquire the skill of solving problems based of particle distribution.

CO4- To study about types of ensembles viz. Microcanonical, canonical and grand canonical.

CO5- To get the knowledge about Maxwell Boltzmann statistics, Bose Einstein statistics and Fermi Dirac Statistics

Course------- 344- Nuclear Physics

CO1- Studying Basic properties of nucleus, student got the idea of inner information of the nucleus.

CO2- From radioactivity chapter student knew that which radiations emits from radioactive material and how they are useful and harmful for the human.

CO3- From nuclear force student understood that apart from alpha, beta, gamma particle how many other particles are inside the nucleus.

CO4- Studying molecular spectroscopy students understand how important rotational and vibrational energy levels are?

CO5- Student learnt by using accelerators we can produce high energy particle which can be used for research purpose

CO 6- From nuclear reactors we can produce huge amount of heat energy.

Course------- 345- Electronics

CO1- Special Purpose diodes like LED, photodiode, Varactor, Octocoupler

CO2- Amplifiers, Class A, Class B and Class C , Push Pull emitter follower and differential amplifier

CO3- Junction Field Effect Transistor and MOS Field Effect Transistor, Working and applications

CO4- Operational Amplifiers its parameters, characteristics and applications

CO5- 555 timer, Astable, Monostable and Bistable Multivibrator

CO6- Regulated power supply using IC 723

CO7- Combinational Circuits like Adder, Subtractor and Multiplexer, Binary to Gray code conversion

CO8- Sequential Logic Circuits, Flip- Flop, Counters and Shift Register

Course-------346 J- Electroacoustics and Entertainment Electronics

CO1- Human Hearing Mechanism, Human Voice production Mechanism, Theories of Hearing

CO2- Types of Microphones, Construction and working of Microphones, Sensitivity and its directional Characteristics, Types of Loudspeakers, Construction and working, Loudspeaker cabinets

CO3- Architectural acoustics, Reverberation time and concept of Open Window. Studio and Room acoustics

CO4- Sound Equalizers, Compressors, Acoustic Delay, Magnetic Tape recording, CD recording, Hi-Fi systems, Studio Articulation Test

CO5- Ultrasonic and its applications