**Institution: Govt. College Jind**

**Course: B.Sc.**

**Physics Department**

**B.Sc. 1st Semester**

**Subject: Classical Mechanics and Theory of Relativity**

**Subject code: PH-101**

**Learning Objective**

This Course Enables the Student

1. To distinguish between ‘inertial frame of reference’ and ‘non-inertial frame of reference’

2. To know how to impose constraints on a system in order to simplify the methods to be used in solving physics problems

3. To know what central, conservative and central-conservative forces mathematically understand the conservative theorems of energy, linear momentum and angular Momentum.

4. To know the importance of concepts such as generalized coordinates and constrained motion

5. To know the importance of theory of relativity.

**Course Outcomes**

Upon successful completion of this course it is intended that a student will be able to:

1. Students learn about Lagrangian and Hamiltonian formulation of Classical Mechanics.

2. State the conservation principles involving momentum, angular momentum and energy and understand that they follow from the fundamental equations of motion

3. Have a deep understanding of frame of references.

4. Students learn about how the parameters like length of object, time, mass, velocity etc. are related to speed of object and speed of light.

**B.Sc. 1st Semester**

**Subject: Electricity Magnetism and Electromagnetic Theory**

 **Subject Code: PH-102**

**Learning Objective**

1. This paper deals with the study of Electric field, Magnetic field, and Electromagnetic theory.

2. The first unit gives the mathematical idea behind the electrostatic field.

3. The second unit deals with the physics behind the Magneto statistics.

4. Last unit deals with the electromagnetic theory.

**Course Outcomes**

After the completion of the course, Students will be able to

1. Explain various phenomenon like Ferromagnetism, ant ferromagnetism etc.

2. Understand the relation in between Electromagnetic theory.

3. Explain various phenomenon in light of Maxwell equations.

**B.Sc. 2nd Semester**

**Subject: Properties of Matter and Kinetic Theory of Gases**

 **Subject Code: PH-201**

**Learning Objective**

1. To provide knowledge about elasticity.

2. To provide knowledge of kinetic theory of gases.

3. The course provides knowledge of M.I.

4. The course provides the students about the knowledge of hollow cylinder and solid cylinder.

**Course Outcomes**

1. Students learn about concept of elasticity and modulus of rigidity of material.

2. Students learn about kinetic theory of gases, Maxwell velocity distribution, and degree of freedom.

3. Students learn the concept of moment of inertia and learn how to apply this concept for different bodies like solid sphere, hollow sphere, cylinder, disc etc.

4. Students learn to find out the moment of inertia of any irregular body, fly wheel.

**B.Sc. 2nd Semester**

**Subject: Semiconductor Devices Subject Code: PH-202**

**Learning Objective**

1. Discuss basic idea of doping, p-n junction diode and its V-I characteristics using graphical and mathematical methods.

2. Explain wave shaping circuits and voltage multipliers in electronics and its responses.

3. Illustrate various biasing circuits of a transistor.

4. Analyse various transistor amplifier circuits.

5. Design simple oscillator circuits.

**Course Outcomes**

1. Students learn about basic idea of doping, p-n junction diode and its characteristics.

2. Students learn about various types of transistors, their circuits and characteristics.

3. Students learn about uses of transistor in various circuits like amplifiers, in feedback circuits etc.

4. Students gets knowledge about cathode ray oscilloscope i.e. C.R.O.

**B.Sc. 3rd Semester**

**Subject: Computer Programming & Thermodynamics**

 **Subject Code: PH-301**

**Learning Objective**

1. Develop a greater understanding of the issues involved in programming language design and implementation.

2. Develop an in-depth understanding of functional, logic, array etc.

3. Students learn about the concepts of heat, work, and energy.

4. Student learns the different laws of thermodynamics.

5. To learn thermo-dynamical functions and there relations.

**Course Outcomes**

After the completion of the course, Students will be able to

1. Understand the FORTRAN programming language.

2. Students become capable of specifying the simplified syntax of programming languages (FORTRAN).

3. Understand the concept of thermodynamics and there laws.

4. Understand the Heat Engine and there uses.

5. Describe the thermodynamic function and there relations.

**B.Sc. 3rd Semester**

**Subject: Wave and optics I**

**Subject Code: PHY-302**

**Learning Objective**

1. Course provides knowledge about wave nature of light by explaining the phenomenon interference and diffraction of light.

2. To calculate the wavelength of light source and thickness of transparent sheet with interference.

3. To study the types of diffraction and resolving power of optical instruments.

**Course Outcomes**

1. Students learn about interference of light by methods of division of amplitude and division of wave front.

2. Students learn to find out the thickness of paper, wavelength of light etc. with the help of interference.

3. Students learn about two types of diffraction i.e. Fresnel’s And Fraunhoffer diffraction.

4. Students learn about resolution criteria of Rayleigh and hence experiments of resolving power of prism and grating.

**B.Sc. 4th Semester**

**Subject: Statistical Physics Subject Code: PHY-401**

**Learning Objective**

1. This course in statistical mechanics provides the basic idea of probability to the students. There are ways of calculating probability for various statistical systems of particles.

2. Students will study basic ideology of phase space, microstate and macro state.

3. The objective is to apply the principles of probability in distribution of particles in various systems and to calculate thermodynamic probability.

4. The course gives the insight of postulates of statistical physics.

5. Students will learn the different types of statistics distribution and particles. They will learn which particles follow which statistics and why.

6. The aim is to apply these statistical distributions in real life problems and understand their problems.

**Course Outcomes**

1. After taking this course students are able to determine the probability of any type of events. They are able to interpret different types of events.

2. Students have understood the concept of phase space and its volume.

3. They can easily distinguish between different types of particles and statistics and can easily distribute bosons, fermions and classical particles among energy levels.

4. After studying Fermi Dirac statistics, students have learnt to deal with many electron systems in real life.

**B.Sc. 4th Semester**

**Subject: Wave and optics II**

**Subject Code: PHY-402**

**Learning Objective**

1. The main objective of this subject is to aware the students about various phenomenon of optics.

2. The study of the paper describes the phenomenon Polarization and Fourier transformation.

3. The study of different types of aberrations and achromatism.

4. The study of optical fibre.

**Course Outcomes**

After the completion of the course, Students will be able to

1. Understand the physics behind various optical phenomenon.

2. Understand various natural phenomenons which is happening in their surroundings related to polarization.

3. Students learn about optical fibre and its applications.

**B.Sc. 5th Semester**

**Subject: Quantum and Laser Physics Subject Code: PHY-501**

**Learning Objective**

1. To study the basic principles of quantum mechanics.

2. Explain the operator formulation of quantum mechanics.

3. Students learn the concept of wave function.

4. Student will learn Schrodinger equation and their applications.

5. Basic Laser principles, Laser behaviour, Properties of laser radiations, Different types of Lasers and Laser applications.

**Course Outcomes**

1. Understand and explain the differences between classical and quantum mechanics.

2. Understand the idea of wave function.

3. Understand the uncertainty relations.

4. Solve Schrodinger equation for simple potentials.

5. Students learn about the principle, different types of laser and their applications in different field.

**B.Sc. 5th Semester**

**Subject: Nuclear Physics Subject Code: PHY-502**

**Learning Objective**

1. This is a basic course in Physics which deals with the phenomena taking place in the nuclear domain. Students will be given an insight into the dimensions of a nucleus.

2. The aim is to tell them about the stability of nucleus and various other properties.

3. The students will learn about various types of radiations and their interaction with matter.

4. The course is such designed to teach students about various types of nuclear reactions and their energetics.

5. Students will learn the methods to find the mass and charge of any nucleus by using some instruments.

6. Various ways will be taught to extract energy from nuclei in real life.

**Course outcomes**

1. After taking this course, students are able to determine the charge, mass of any nucleus by using various spectrographs.

2. They are able to understand the size of nucleus and all its properties.

3. This course has led the students to understand interaction of various types of radiation with matter which they observe in their daily life. It’s easy for them now to relate the theory to practical.

4. Students now know various methods of accelerating various types of particles to perform scattering experiments.

5. Students are able to understand the detecting methods and instruments for different types of charged and neutral particles.

**B.Sc. 6th Semester**

**Subject: Solid State and Nano Physics Subject Code: PHY-601**

**Learning Objective**

This Course Enables the Student to

1. Describe the difference between crystalline and amorphous materials.

2. Describe the arrangement of atoms and ions in crystalline structures

3. Schematically diagram face-centered cubic, body-centered cubic and hexagonal close-packed unit cells.

4. Recognize and also give the lattice parameter relationships for all seven crystal systems--i.e., cubic, hexagonal, tetragonal, rhombohedral, orthorhombic, monoclinic, and triclinic.

5. Given a unit cell and the Miller indices for a plane, draw the plane represented by these indices referenced to this unit cell.

6. Given the unit cell for some crystal structure, be able to draw the atomic packing arrangement for a specific crystallographic plane.

7. Explain the use of X-ray diffraction measurements in determining crystalline structures

8. Explanation of nano technology ,its types and its application in different fields of our daily life.

**Course Outcomes**

1. Demonstrate an understanding of the crystal lattice and how the main lattice types are described

2. Formulate the theory of X-ray diffraction in the reciprocal lattice (k-space) formalism and apply this knowledge to generalize the formulation for matter waves

3. Students become able to perform structure determination of simple structures

4. Learn that Dulong-Petit Law is valid only at high temperature.

5. Learn that lattice specific heat of solid vary T3 at very low temperature.

6. Students learns about basic concept of nano technology and its applications

**B.Sc. 6th Semester**

**Subject: Atomic and Molecular Spectroscopy Subject Code: PHY-602**

**Learning Objective**

1. Describe the atomic spectra of one and two valance electron atoms.

2. Explain the change in behaviour of atoms in external applied electric and magnetic field.

3. Explain rotational, vibrational, electronic and Raman spectra of molecules.

4. Describe electron spin and nuclear magnetic resonance spectroscopy and their applications.

**Course Outcomes**

After the completion of the course, Students will be able to

1. Describe theories explaining the structure of atoms and the origin of the observed spectra.

2. Identify atomic effect such as Zeeman effect and Stark effect.

3. List different types of atomic spectra.

4. Explain the observed dependence of atomic spectral lines on externally applied electric and magnetic fields.