RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

M.Sc.(Physics) 1st Sem.

Subject: Mathematical Physics **Subject Code: PHY-101**

Learning Objective

This Course Enables the Student to

1. Understand the linear equations, vector spaces, matrices, linear transformations, determinants, eigenvalue, eigenvectors, etc.
2. Learn to use Laplace transform methods to solve differential equations.
3. Introduce the Fourier series and its application to the solution of partial differential equations

Learning Outcomes

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

1. Students will demonstrate competence with the basic ideas of linear algebra including concepts of linear systems, independence, theory of matrices, linear transformations, bases and dimension, eigenvalues, eigenvectors and Diagonalization.
2. Use the method of Laplace transforms to solve initial-value problems for linear differential equations with constant coefficients.
3. Solve a Cauchy problem for the wave or diffusion equations using the Fourier Transform.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

M.Sc.(Physics) 1st Sem.

Subject: Classical Mechanics **Subject code: PHY-102**

Learning Objective

This Course Enables the Student

1. To distinguish between 'inertia 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 establish that Kepler's laws are just consequences Newton's laws of gravitation and that of motion
6. understand Poisson brackets, understand canonical transformations
7. To find the linear approximation to any dynamical system near equilibrium and also know how to derive and solve the wave equation for small oscillations.

Learning 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 Newton's laws,
4. Students learn about motion of a particle under central force field.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

M. Sc (Physics) 1st Semester

Subject: Quantum Mechanics- I **Subject Code: PHY-103**

Learning objectives

1. The main objective of this course is to make students aware about the basic formulations in quantum mechanics. There are many different types of representations of state and operators that are very useful in studying the subject deeply.
2. The course takes up the responsibility to give information about hermitian operators, their eigenvalues and eigenvectors. It teaches about various commutation and uncertainty relations.
3. Students will be given knowledge about unitary transformations, dirac delta function, matrix representation of operators and their applications.
4. Main focus is on angular momentum operator and their representation in spherical coordinates. Addition of angular momenta is also taught.
5. Students will be given insight to solve Schrodinger wave equation in three dimensions.
6. Basic idea of time independent perturbation theory is provided .

Learning outcomes

1. After taking this course students will be able to appreciate the beauty of quantum mechanics. They will be knowing all types of representations of operators and ways to apply them in different problems.
2. The most important thing students learned form this course was how to solve the hydrogen atom problem by using quantum mechanics.
3. Students learned about time independent degenerate and non degenerate perturbations and to apply them in harmonic oscillator.
4. Students got an idea of Pauli spin matrices which are very important in nuclear and particle physics as well as atomic and molecular physics.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

M.Sc.(PHYSICS) 1st Semester

Subject : Electronics Devices **Subject Code : PHY-104**

Learning Objective

1. The course will provide the students about the electronic Components diode,transistor.
2. This will provide the students the knowledge of IC fabrication.
3. It give an imp. Information about the optoelectronic devices.
4. This course offered a variety of diodes like zener diode .
5. It will give the knowledge of switching circuit.

Learning Outcomes

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

1. IC fabrication is very imp. For the electronic industry.this will give the knowledge of many circuits.
2. Optoectronic devices help the students for the conversion of energy,like light to electrical energy.
3. The study of semiconductor devices makes the base of student in the electronic field.
4. Zener diode study tells that it act as a voltage regulator and how to control the voltage.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

M.Sc.(Physics) 2nd Sem.

Subject: Statistical Mechanics **Subject code: PHY-201**

Learning Objective

1. This course provides an introduction to the microscopic formulation of thermal physics, generally known as statistical mechanics.
2. We explore the general principles, from which emerge an understanding of the microscopic significance of entropy and temperature.
3. We develop the machinery needed to form a practical tool linking microscopic models of many-particle systems with measurable quantities.
4. We consider a range of applications to simple models of crystalline solids, classical gases, quantum gases and blackbody radiation.

Learning Outcomes

On completion of this course a student should be able to:

1. define and discuss the concepts of microstate and macrostate of a model system
2. define and discuss the concepts and roles of entropy and free energy from the view point of statistical mechanics
3. apply the machinery of statistical mechanics to the calculation of macroscopic properties
   resulting from microscopic models of magnetic and crystalline systems
4. define the Fermi-Dirac and Bose-Einstein distributions; state where they are applicable;
   understand how they differ and show when they reduce to the Boltzmann distribution
5. apply the Fermi-Dirac distribution to the calculation of thermal properties of electrons in metals apply the Bose-Einstein distribution to the calculation of properties of black body radiation.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

M. Sc (Physics) 2nd Semester

Subject : Quantum Mechanics- II **Subject Code : PHY- 202**

Learning objectives

1. This is an advanced level course in Quantum mechanics which objects to teach about various approximation methods in physics to calculate the approximate values of energy for various systems.
2. Students will be able to learn the methods to find transition probability for absorption and emission.
3. The objective is to give them ideas about laboratory and center of mass frame and study the scattering phenomena in both these frames.
4. This course will let students appreciate the beauty of quantum mechanics in the form of the Born approximation and its validity.
5. Students will be able to study the wave functions of system of identical particles.

Learning outcomes

1. After studying this course, students can calculate the ground state and excited state energies of various real life systems by using Principle , WKB method and perturbation methods.
2. Students will be knowing about the Einstein's coefficients and relating them to lasers.
3. They know about scattering in two different frames and can easily calculate scattering amplitude and scattering cross section.
4. Students can write total energy and wave function as slater determinant for system of identical fermions.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

M.Sc.(Physics) 2nd Sem.

Subject: Atomic and Molecular Physics **Subject code: PHY-203**

Learning Objective

This Course Enables the Student to

1. study and develop the Bohr theory of the hydrogen atom
2. Observe the fine structure lines of HCl molecule and the Zeeman splitting of one or more of these lines as a function of magnetic field.
3. Outline the selection rules for rotational and vibrational spectra and rationalize the role of the molecular dipole moment in the selection rules.
4. Distinguish between the energy levels of a rigid and a non rigid rotor.

Learning Outcomes

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

1. They should be able to calculate the Zeeman effect and the Lande g-factor
2. They should be able to calculate the effects of an electric field on the energy levels of the hydrogen atom (the Stark effect).
3. They should be able to discuss the rotational spectra of molecules.
4. They should be able to apply the Simple Harmonic Oscillator to determine the vibrational spectrum of diatomic molecules.
5. You will understand how the new theory could explain the fine structure in the spectra of hydrogen and hydrogen-like ions, and how this theory can be extended to atoms which have a single electron in their outermost shell, i.e. the alkali metal atoms.
6. Students learn about fine structure of Hydrogen atoms.
7. Students learn about rotational and vibrational energy levels of diatomic molecules and Raman spectroscopy.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

M.Sc.(Physics) 2nd Sem.

Subject: Physics of Laser and Laser Applications **Subject code: PHY-205**

Learning Objective

The course aims to present various aspects of the foundations, design, operation and application of lasers. In particular the course will consider:

1. Fundamentals of light-matter interaction
2. Einstein treatment of transition rates
3. Finite laser bandwidth and spectral broadening mechanisms - population inversion and optical amplification gain.
4. Comparison of two, three, and four -level schemes - laser operation and gain saturation.
5. Treatment of optical resonators and Gaussian beams - laser stabilisation and mode purification.
6. Pulsed lasers by active and passive pulsing techniques - ultrashort lasers gas lasers: concepts and examples.
7. Crystalline lasers: concepts and examples.
8. Semiconductor lasers: concepts and examples.

Learning Outcomes

Within the course structure offered, students will gain a good understanding of the building blocks of lasers. In particular, they will be able to

1. Predict fundamental (and ultimate) characteristics of laser systems based on specific laser materials, such as output power and lasing threshold.
2. Assess and design the optical cavities for different laser systems.
3. Determine the laser behaviour depending on the line broadening mechanism.
4. Solve the rate equations in steady state for a laser.
5. Find the interrelations between Einstein coefficients.
6. Quantitatively describe the key characteristics of pulsed lasers and their interrelation
7. Describe concrete major example laser systems in detail and understand their technological challenges Students should therefore gain a significantly enhanced understanding of how lasers work and which types of lasers are most relevant for specific performance specifications and subsequent applications.

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RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

M.Sc.(Physics) 3rd Semester

Subject : Condensed Matter Physics **Subject Code : PHY-301**

Learning Objective

1. The objective of the paper is to aware the students about the field of Condensed matter physics
2. This paper enable the students to understand about the crystal structure, interaction with X-ray, lattice vibrations, defects, electronic properties and the magnetic properties etc.
3. It also helps the students to understand various properties about crystals.
4. This paper deals with the study of structural properties of solids.

Learning Outcomes

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

1. Understand the physics behind structural properties of the solids.
2. Tailor the properties of solids with proper understanding.
3. Pursue the research work in the field of material science and nanotechnology.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

M. Sc (Physics) 3rd Semester

Subject: Electrodynamics and Wave propagation Subject Code: PHY-302

Learning objectives

1. One of the objectives of this course is to introduce students with the formulation of four vectors. They are to be introduced by the Lorentz transformations and the invariance of various quantities in four dimensions.
2. Main aim is to feed student's mind by fields and radiations from various types of dipoles and localized sources. They will be taught to calculate power radiated in each case.
3. Students will be introduced by the formation and characteristics of ionosphere and how waves propagate through it.
4. The objective is to introduce them about wave guides and their applications.
5. They will be taught about the transmission lines and propagation of waves through them.

Learning outcomes

1. After taking this course, students are able to appreciate the need and necessity of four vector notation. They have applied it for Lorentz transformation and written the dual field tensor which is one of the major aspects of theoretical physics.
2. They have understood the difference between covariance and invariance of various quantities and applied it.
3. One of the major advantages of this course is that it is very much related to the real life where the ionosphere is playing very important part.
4. Students now know the basics of scattering and absorption and relate them to real life phenomena.
5. They have learnt about wave guides and transmission lines and propagation of waves through them.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

M.Sc.(Physics) 3rd Semester

Subject: Electronics-1 **Subject Code: PHY-304**

Learning Objective

1. To learn Number System, Binary Codes and Boolean Algebra.
2. Student will learn Boolean function representation and minimization techniques.
3. To learn about Combinational Logic Circuits and Sequential Logic Circuits.
4. Student learn about Counters and their applications.
5. To learn Shift registers and their applications.

Learning Outcomes

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

1. Understand the fundamentals of converting from one number system to another.
2. Represent signed decimal numbers in 2's complement form, and vice versa.
3. Explain the basic logic operations of NOT, AND, OR, NAND, NOR, and XOR.
4. Apply the laws of Boolean algebra and K-map to simplify circuits and Boolean algebra expressions.
5. Understand the basic electronics of logic circuits, counters, registers and be able to use integrated circuit packages.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

M.Sc.(Physics) 3rd Semester

Subject : Atomic and Molecular Physics-II **Subject Code : PHY-306**

Learning Objective

1. This course will provides an introduction to the knowledge of the different spectroscopy methods.
2. To study Raman spectroscopy: principle, instrumentation and their applications.
3. To study the electronic spectra of diatomic molecules.
4. Explain the IR and Raman spectroscopy in the structure determination of simple molecules.
5. Describe the origin of X-ray and their emission and absorption spectra.

Learning Outcomes

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

1. Understand the difference between Stokes and anti-Stokes lines in a Raman spectrum.
2. Student will be able to select molecular spectroscopy methods suitable for solving given scientific problem.
3. Student will know basic information on molecular methods (IR, Raman, UV etc.)
4. Student will be able to analyze results of measurements using molecular spectroscopy methods.
5. Understand the concept of origin of X-rays.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

M.Sc.(PHYSICS) 4th Semester

Subject : Nuclear and particle physics **Subject Code : PHY-401**

Learning Objective

1. The objective of the course is to appraise the students about the particles .
2. To learn about the decay phenomenon and the process how they will occur.
3. Knowledge of various model compare to nucleus.
4. Knowledge of scattering process.

Learning Outcomes

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

1. Students shall learn about the knowledge of particles.
2. Significance of various decays tells the students about the nuclear process..
3. It will teach the students about the spin parity concept &magic no. Related to shell.
4. About the scattering process how it will occur.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

M.Sc.(Physics) 4th Semester

Subject : Physics of Nano-materials **Subject Code : PHY-402**

Learning Objective

1. This paper deals with the study of various phenomenons of Nano science and Nano technology.
2. First unit describes the free electron theory which can describe various phenomenons.
3. The second unit describes the physics in quantum well, quantum wire and quantum dot.
4. Third unit gives idea about various characterizations like XRD, PL spectra and Raman spectroscopy.
5. The last unit describes various synthesis techniques like cluster beam deposition, ion beam deposition, chemical bath deposition techniques etc.

Learning Outcomes

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

1. Explain the nano science and technology in light of quantum confinement.
2. Understand various phenomenons like quantum dot, quantum wire in light of Schrödinger equation.
3. Synthesis various nonmaterial with various techniques with proper understanding.
4. They can analysis the nano crystal with Structural and opto electrical properties,.
5. The understanding of the subject leads the students in their research work.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

M.Sc.(PHYSICS) 4th Semester

Subject : Electronics II **Subject Code : PHY-404**

Learning Objective

1. The objective of the course is to appraise the students about the process which help In communication.
2. About the various devices which are optoelectronic.
3. Circuit analysis of operational amplifier and IC.
4. Knowledge about digital electronics and digital technique.

Learning Outcomes

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

1. Students shall learn about the significance of communication process which are very useful in daily life.
2. Significance of various devices which are which are beneficial to understand how they will operate and use.
3. Due to circuit analysis of Ic and opamp, it will help in performing the mathematical operation.
4. The modern world is digital world. It is very useful in this time.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

M.Sc.(Physics) 4th Semester

Subject : Atomic and Molecular Physics-I **Subject Code : PHY-406**

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

Learning 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.
5. Explain different Laser used and make a comparison between them.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B.Sc.1st Semester

Subject : MECHANICS **Subject Code : PHY-101**

Learning Objective

1. The students will introduce about the forces, angular momentum and knowledge about the Constraint .
2. The course will give knowledge about the general parameter like velocity, acceleration.
3. The course provide the students about the knowledge of M.I.
4. The course provide the students about the knowledge of hollow cylinder and solid cylinder.

Learning Outcomes

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

1. Get the knowledge about forces help the students in their daily life.
2. The velocity and acceleration parameter give the knowledge about how the vehicles Move.
3. The information will teach the students about the rolling concept.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B.Sc. 1st Semester

Subject : Electricity and Magnetism **Subject Code : PHY-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 Magnetostatistics.
4. Last unit deals with the electromagnetic theory.

Learning 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.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B.Sc. 2nd Sem.

Subject: Properties of Matter, Kinetic Theory and Relativity Subject code: PHY-201

Learning Objective

This Course Enables the Student

1. To describe the concept of stress/strain and in its relation to force/displacement
2. To know the effect of forces during static conditions.
3. To determine axial forces, shear forces and bending moments
4. To express the relationship between the pressure and the average kinetic energy of gas molecules in the form of equation
5. To express the five basic assumptions of the Kinetic Molecular Theory of Gases.
6. To introduce students to the concept of special relativity and its applications to Physical Sciences

Learning Outcomes

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

1. Students will be able to identify the type of force, type of supports and the reactions on beams and plane frames.
2. The students shall be familiar with the fundamental principles of the general theory of relativity. They shall know the meaning of basic concepts like the equivalence principles, inertial frames and time dilation
3. Establish the non-existence of the hypothesized stationary aether through the null result of Michelson-Morley experiments with interferometer.
4. Explain the true nature of Newtonian mechanics and Lorentz Transformation equations.
5. Understand the concept of constant relative motion of different bodies in different frames of references

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B.Sc. 2nd Semester

Subject : Electromagnetic Induction & Electronic Devices Subject Code : PHY-202

Learning Objective

1. The objective of the course is to appraise the students about the electronics industry.
2. To learn about the electronic component like Diode, transistor etc.
3. Structural analysis about the e component.
4. Knowledge about resistance inductor and capacitor.

Learning Outcomes

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

1. Students shall learn about the significance of electric components.
2. Significance of various devices and how they will operate.
3. It will teach the students about the circuit connection.
4. About the graphical relationship of resistance, capacitor and inductor.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B.Sc. 3rd Semester

Subject : Computer Programming & Thermodynamics **Subject Code : PHY-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.

Learning Outcomes

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

1. nderstand the FORTRAN programming language.
2. Be 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.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B.Sc. 3rd Semester

Subject : Optics I **Subject Code : PHY-302**

Learning Objective

1. The main objective of this subject is to aware the students about various phenomenon of waves and optics.
2. First unit of deals with the Fourier analysis and Fourier transformation.
3. The second deals with the matrix method in order to explain various phenomenon.
4. The third unit describe the Phenomenon like interference phenomenon.

Learning Outcomes

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

1. Understand the physics behind various phenomenon in wave and optics.
2. Understand various phenomenon and the cause or origin of them.
3. Explain the relationship in between various optical phenomenon with the Fourier series and matrix.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B.Sc. 4th Semester

Subject : Statistical Mechanics **Subject Code : PHY 401**

Learning objectives

1. This course in statistical mechanics provides the basic idea of probability to the students. There are ways of calculating probability for various statistical system of particles.
2. Students will study basic ideology of phase space, microstate, macrostate.
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 distribution in real life problems and understand their problems.
7. Many real system of particles will be dealt throughout the course to relate the theoretical knowledge to practical one.

Learning 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 system in real life.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B.Sc. 4th Semester

Subject : 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 describe the phenomenon like Interference, Diffraction and Polarization.
3. The study describe the principals behind various phenomenon as described earlier.

Learning Outcomes

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

1. Understand the physics behind various optical phenomenon.
2. Understand various natural phenomenon which is happening in their surroundings.
3. Explain the relationship in between various optical phenomenon.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B.Sc. 5th Semester

Subject: Solid State Physics **Subject code: PHY-501**

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

Learning Outcomes

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

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. be 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.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B.Sc. 5th Semester

Subject : Quantum mechanics **Subject Code : PHY-502**

Learning Objective

1. To study the basic principles of quantum mechanics.
2. Explain the operator formulation of quantum mechanics.
3. Student learn the concept of wave function.
4. Student will learn Schrodinger equation and their applications.
5. To study role of uncertainty in quantum physics.

Learning Outcomes

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

1. Pinpoint the historical aspects of development of quantum mechanics.
2. Understand and explain the differences between classical and quantum mechanics.
3. Understand the idea of wave function.
4. Understand the uncertainty relations.
5. Solve Schrodinger equation for simple potentials.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B.Sc.(Physics) 6th Semester

Subject : Atomic, Molecular and Laser Physics **Subject Code : PHY-601**

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

Learning 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.
5. Explain different Laser used and make a comparison between them.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B. Sc. 6th Semester

Subject : Nuclear Physics **Subject Code : PHY 602**

Learning objectives

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.

Learning outcomes

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

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 1st

Subject: Mathematical Physics-I **Subject Code: PHY-101**

Learning Objective

The emphasis of course is to equip students with the mathematical and critical skills required in solving problems of interest to physicists. The course will also expose students to fundamental computational physics skills enabling them to solve a wide range of physics problems. The skills developed during course will prepare them not only for doing fundamental and applied research but also for a wide variety of careers.

Learning Outcomes

1. Draw and interpret graphs of various functions.
2. Solve first and second order differential equations and apply these to physics problems.
3. Understand the concept of gradient of scalar field and divergence and curl of vector fields.
4. Perform line, surface and volume integration and apply Green's, Stokes' and Gauss's Theorems to compute these integrals.
5. Apply curvilinear coordinates to problems with spherical and cylindrical symmetries.
6. Understand elementary probability theory and the properties of discrete and continuous distribution functions.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 1st

Subject: Mechanics-I **Subject Code : PHY-102**

Learning Objective

This course reviews the concepts of mechanics learnt at school from a more advanced perspective and goes on to build new concepts. It begins with Newton's Laws of Motion and ends with the Fictitious Forces and Special Theory of Relativity. Students will also appreciate the Collisions in CM Frame, Gravitation, Rotational Motion and Oscillations. The students will be able to apply the concepts learnt to several real world problems.

Learning Outcomes

1. Understand laws of motion and their application to various dynamical situations.
2. The concept of conservation of energy, momentum, angular momentum and apply them to basic problems.
3. Understand translational and rotational dynamics of a system of particles.
4. Explain the phenomenon of simple harmonic motion.
5. Understand special theory of relativity - special relativistic effects and their effects on the mass and energy of a moving object.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 1st

Subject: Electricity **Subject code: PHY-103**

Learning Objective

This course reviews the concepts of electromagnetism learnt at school from a more advanced perspective and goes on to build new concepts. The course covers static and dynamic electric and magnetic fields, and the principles of electromagnetic induction. It also includes analysis of electrical circuits and introduction of network theorems. The students will be able to apply the concepts learnt to several real world problems.

Learning Outcomes

1. Demonstrate the application of Coulomb's law for the electric field, and also apply it to systems of point charges as well as line, surface, and volume distributions of charges.
2. Demonstrate an understanding of the relation between electric field and potential, exploit the potential to solve a variety of problems, and relate it to the potential energy of a charge distribution.
3. Apply Gauss's law of electrostatics to solve a variety of problems.
4. Calculate the magnetic forces that act on moving charges and the magnetic fields due to currents (Biot- Savart and Ampere laws)
5. Understand the concepts of induction and self-induction, to solve problems using Faraday's and Lenz's laws.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS
Learning Objective & Outcomes
B. Sc. (Hons.) Semester 1st

Subject: Linear & Digital Integrated Circuits & Instruments-I

Subject Code: PHY-106

Learning Objective

Integrated Circuits design can be divided into the broad categories of digital and analog IC design. The physical world is inherently analog indicating that there is always need for analog circuitry. Today the growth of any industry is dependent upon electronics to a great extent. Integrated circuit is electronics and this course IC application acquaints the students with general analog principles and design methodologies using practical devices and applications. It focuses on process of learning about signal condition, signal generation, instrumentation, timing and control using various IC circuitry. With modern digitization advantages we need to work with digital data and hence digital ICs play a crucial role in connecting physical world to the more sophisticated digital world. This course focuses on analysis, design and applications of modern digital integrated circuits. To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits. To impart how to design Digital Circuits.

Learning Outcomes

1. Convert different type of codes and number systems which are used in digital communication and computer systems.

2. Employ the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency.

3. Analyze different types of digital electronic circuit using various mapping and logical tools and know the techniques to prepare the most simplified circuit using various mapping and mathematical methods.

4. Design different types of with and without memory element digital electronic circuits for particular operation, within the realm of economic, performance, efficiency, user friendly and environmental constraints.

5. Use DeMorgan.s Theorem to simplify a negated expression. Formulate and employ a Karnaugh Map to reduce Boolean expressions and logic circuits to their simplest forms..

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 2nd

Subject: Mathematical Physics-II **Subject Code : PHY-201**

Learning Objective

The emphasis of course is to equip students with the mathematical tools required in solving problems interest to physicists and expose them to fundamental computational physics skills thus enabling them to solve a wide range of physics problems. This course will aim at introducing the concepts of Fourier series, special functions, linear partial differential equations by separation of variable method.

Learning Outcomes

1. Represent a periodic function by a sum of harmonics using Fourier series and their applications in physical problems such as vibrating strings etc.
2. Draw and interpret graphs of various functions.
3. Solve first order differential equations and apply it to physics problems solve linear second order homogeneous and non- homogeneous differential equations with constant coefficients
4. To analyze different kind of errors.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 2nd

Subject: Mechanics-II **Subject Code : PHY-202**

Learning Objective

This UG level course (Newtonian Mechanics-II) is very interesting being physically realizable. In this course we will study systems with the help of fundamental laws of classical mechanics. The mathematics involved in studying the problems/systems in this course is just based on vector differential calculus, differential equations and basics calculus. Concepts (like linear momentum, angular momentum, motion under central force, reduction of a two body problem in one body, fictitious forces, special theory of relativity) of this simple looking course are very useful in studying small size and big size system (like atomic system and solar system). For understanding advance courses in physics we must be knowing this basic course.

Learning Outcomes

1. Calculate the Gravitational field due to spherical shell and solid sphere.
2. Understand the concept of central force and its properties.
3. Know the parameters affecting the trajectory of a particle moving under central force.
4. Learn the concept of various type of fictitious forces.
5. Know how to deal with a system from non-inertial frame of reference.
6. Learn the importance of Special Theory of Relativity in GPS and its importance in studying various atomic/subatomic systems.

In nutshell, I will say that after taking this course students must be knowing basic/fundamental laws of nature and their role in various natural events, like role of Gravitational law and Kepler's laws in studying the motion of planets in Solar system.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 2nd

Subject: Electricity **Subject code: PHY-203**

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 magnetostatic field.

3. The second unit deals with the physics behind the electromagnetic induction.

4. Both unit deals with the electromagnetic theory.

Learning Outcomes

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

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

2. Understand the relation in between Electromagnetic theory.

3. Explain various phenomenon in light of maxwell equations and easly distinguishbetween soft and hard iron for practical purpose.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 2nd

Subject: Linear & Digital Integrated Circuits & Instruments-II Subject Code: PHY-206

Learning Objective

1. The main objective of the course is to appraise the students about the electronics industry and work field.
2. To learn about electronics component like diode.
3. To introduce the basics buildings blocks of integrated circuits.
4. To teach the application of IC 555.
5. To teach the theory of ADC and DAC.
6. To understand and implement the working of basic digital circuits.

Learning Outcomes

1. Students shall be learning about the significance of electronics components.
2. Significance of various devices and how they will operate.
3. It will teach the students about the circuit connections and functions.
4. About the graphical relationship of inductor, resistance and capacitor.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 3rd

Subject: Mathematical Physics-III **Subject Code: PHY-301**

Learning Objective

The emphasis of course is to equip students with the mathematical tools required in solving problems interest to physicists and expose them to fundamental computational physics skills thus enabling them to solve a wide range of physics problems. This course will aim at introducing the concepts of Fourier series, special functions, linear partial differential equations by separation of variable method.

Learning Outcomes

1. Represent a periodic function by a sum of harmonics using Fourier series and their applications in physical problems such as vibrating strings etc.
2. Obtain power series solution of differential equation of second order with variable coefficient using Frobenius method.
3. Understand properties and applications of special functions like Legendre polynomials, Bessel functions and their differential equations and apply these to various physical problems such as in quantum mechanics.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 3rd

Subject: Thermal Physics -I **Subject Code : PHY-302**

Learning Objective

This course deals with the relationship between the macroscopic properties of physical systems in equilibrium. It reviews the concepts of thermodynamics learnt at school from a more advanced perspective and develops them further. The primary goal is to understand the fundamental laws of thermodynamics and their applications to various systems and processes. In addition, it will also give exposure to students about the Kinetic theory of gases, transport phenomena involved in ideal gases, phase transitions and behaviour of real gases.

Learning Outcomes

1. Comprehend the basic concepts of thermodynamics, the first and the second law of thermodynamics.
2. Understand the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations.
3. Know about reversible and Irreversible processes.
4. Learn about Maxwell's relations and use them for solving many problems in Thermodynamics
5. Understand the concept and behavior of ideal and real gases.
6. Learn the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equitation of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion and Brownian motion.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 3rd

Subject: Vibrations & Wave Optics-I **Subject code: PHY-303**

Learning Objective

1. Interference by division of wavefront ,lioyd"s mirror,stokes law.
2. Linearity and superposition principle.
3. Introduction to different models, light waves, electromagnetic nature of light waves.
4. Coherence and Interference.
5. Michelson's interferometer: Theory, form of fringes

Learning Outcomes

1. Precisely define physical terms relevant to the course and knowledge of coherent sources.
2. Understand Simple harmonic oscillation and superposition principle.
3. Understand different types of waves and their velocities: Plane, Spherical, Transverse, Longitudinal.
4. Understand Concept of normal modes in transverse and longitudinal waves: their frequencies and configurations.
5. Understand Interference as superposition of waves from coherent sources derived from same parent source.
6. A better understanding experimental work related to interference

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 3rd

Subject: Quantum Mechanics **Subject Code : PHY-304**

Learning Objective

This course develops concepts in quantum mechanics such that the behavior of the physical universe can be understood from a fundamental point of view. It provides a basis for further study of quantum mechanics. Content will include: Review of the Schrodinger equation, operators, eigen-functions, compatible observables, infinite well in one and three dimensions, degeneracy; Fourier methods and momentum space; Hermiticity; scalar products of wave functions, completeness relations, matrix mechanics; harmonic oscillator in one and three dimensions; sudden approximation; central potentials, quantization of angular momentum, separation of radial and angular variables, spherical harmonics, hydrogen atom, spin.

Learning Outcomes

1. Shows an understanding of wave mechanics in three dimensions;

2. Describes the structure of the hydrogen atom and show an understanding of quantisation of angular momentum.

3. Apply techniques such as Fourier methods and ladder operators for selected problems in quantum mechanics.

4. Use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations;

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RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 4th

Subject: Mathematical Physics-IV **Subject Code : PHY-401**

Learning Objective

The emphasis of course is to equip students with the mathematical tools required in solving problems interest to physicists and expose them to fundamental computational physics skills thus enabling them to solve a wide range of physics problems. This course will aim at introducing the concepts of Fourier series, special functions, linear partial differential equations by separation of variable method.

Learning Outcomes

1. Represent a periodic function by a sum of harmonics using Fourier series and their applications in physical problems such as vibrating strings etc.
2. Obtain power series solution of differential equation of second order with variable coefficient using Frobenius method.
3. Understand properties and applications of special functions like Legendre polynomials, Bessel functions and their differential equations and apply these to various physical problems such as in quantum mechanics.
4. Learn about gamma and beta functions and their applications.
5. Solve linear partial differential equations of second order with separation of variable method.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 4th

Subject : Thermal Physics -II **Subject Code : PHY-402**

Learning Objective

This course deals with the relationship between the macroscopic properties of physical systems in equilibrium. It reviews the concepts of thermodynamics learnt at school from a more advanced perspective and develops them further. The primary goal is to understand the fundamental laws of thermodynamics and their applications to various systems and processes. In addition, it will also give exposure to students about the Kinetic theory of gases, transport phenomena involved in ideal gases, phase transitions and behaviour of real gases.

Learning Outcomes

1. Comprehend the basic concepts of thermodynamics, the first and the second law of thermodynamics.
2. Understand the concept of entropy and the associated theorems, the thermodynamic potentials and their physical interpretations.
3. Know about reversible and Irreversible processes.
4. Learn about Maxwell's relations and use them for solving many problems in Thermodynamics
5. Understand the concept and behaviour of ideal and real gases.
6. Learn the basic aspects of kinetic theory of gases, Maxwell-Boltzman distribution law, equitation of energies, mean free path of molecular collisions, viscosity, thermal conductivity, diffusion and Brownian motion.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 4th

Subject: Vibrations & Wave Optics-II **Subject code: PHY-403**

Learning Objective

To enhance students' knowledge in the areas of waves and geometrical optics this includes:

1. To familiarize the students about the concept of diffraction. Gain an understanding of its occurrence.
2. Define types of diffraction and explain Fresnel and Fraunhoffer diffraction in detail.
3. Explain single slit diffraction grating and pattern obtained.
4. Explain the multiple slit diffraction. Discuss the diffraction pattern obtained from grating.
5. Explain diffraction grating effects.

Learning Outcomes

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

1. This course provides the students a thorough fundamental knowledge with in diffraction.
2. To be able to identify and illustrate physical concepts and terminology used in optics and to be able to explain them in appropriate detail.
3. To recognize diffraction phenomenon and diffraction gratings.
4. Students are able to solve physical optics problems related to waves and diffraction phenomena.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 4th

Subject : Atomic & Nuclear Physics **Subject Code : PHY-404**

Learning Objective

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

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

One Electron Atom: Vector model of a one electron atom, Quantum states of an electron in an atom, Hydrogen atom spectrum, Spin-orbit coupling, Relativistic correction, Hydrogen fine structure, Spectroscopic terms, and Hyperfine structure. Two valance Electron Atom: Vector model for two valance electrons atom, LS coupling, Pauli Exclusion Principle, Interaction energy for LS coupling, jj coupling, interaction energy for jj coupling. Atom in Magnetic Field: Zeeman Effect, Magnetic moment of a bound electron, Magnetic interaction energy in weak field.

Nuclear Physics

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.

Learning Outcomes

1. Will able to express atomic spectra of one and two valance electron atoms.
2. Explain the change in behavior of atoms in external applied electric and magnetic field.
3. Express the basic concepts of nuclear physics.
4. Express the radioactive decays.
5. Able to express Successive Decays.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 5th

Subject : Mathematical Physics-V **Subject Code : PHY-501**

Learning Objective

The course is intended to impart the concept of generalized mathematical constructs in terms of Algebraic Structures (mainly Vector Spaces) and Tensors to have in-depth analysis of our physical system.

Learning Outcomes

1. Understand algebraic structures in n-dimension and basic properties of the linear vector spaces.
2. Represent Linear Transformations as matrices and understand basic properties of matrices.
3. Apply vector spaces and matrices in the quantum world.
4. Learn basic properties of Cartesian and general tensors with physical examples such as moment of inertia tensor, energy momentum tensor, stress tensor, strain tensor etc.
5. Learn how to express the mathematical equations for the Laws of Physics in their co-variant forms.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 5th

Subject : Electro-magnetic Theory-I **Subject Code : PHY-502**

Learning Objective

This course entitled "Electromagnetic Theory 2" is intented to make the student familiar with Maxwell's equation and their application. After this student will be able to explain why light is electromagnetic wave and how they travel in free space. And students will be able to explain how the electromagnetic wave propagation through different media. It makes the sound box to understand the wave propagation in Anisotropic media and how the wave guide propagate within a wave guide or cavity Resonator which is the subject matter of next semester.

Learning Outcomes

1. Apply Maxwell's equations to deduce wave equation, electromagnetic field energy, momentum and angular momentum density.
2. Understand electromagnetic wave propagation in unbounded media: Vacuum, dielectric medium, conducting medium, plasma.
3. Understand electromagnetic wave propagation in bounded media: reflection and transmission coefficients at plane interface in bounded media.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 5th

Subject: Statistical Physics-I **Subject code: PHY-503**

Learning Objective

This course develops concepts in classical laws of thermodynamics and their application, postulates of statistical mechanics, statistical interpretation of thermodynamics, microcanonical, canonical and grants canonical ensembles; the methods of statistical mechanics are used to develop the statistics for Bose-Einstein, Fermi-Dirac and photon gases; selected topics from low temperature physics and electrical and thermal properties of matter are discussed.

Learning Outcomes

1. Explain statistical physics and thermodynamics as logical consequences of the postulates of statistical mechanics;
2. Apply the principles of statistical mechanics to selected problems;
3. Apply techniques from statistical mechanics to a range of situations;
4. Use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanations
5. Use the tools, methodologies, language and conventions of physics to test and communicate ideas and explanation.

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RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 5th

Subject: Physics of Materials- I **Subject Code: PHY-504**

Learning Objective

1. The objective of the paper is to aware the students about the field of Condensed matter physics
2. This paper enable the students to understand about the crystal structure, interaction with X-ray, lattice vibrations, defects, electronic properties and the magnetic properties etc.
3. It also helps the students to understand various properties about crystals.
4. This paper deals with the study of structural properties of solids.

Learning Outcomes

1. Understand the physics behind structural properties of the solids.
2. Tailor the properties of solids with proper understanding.
3. Pursue the research work in the field of material science and nanotechnology.

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RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 5th

Subject : Electronics Devices: Physics and Application -I Subject Code : PHY-505

. Learning Objective

1. To develop understanding of solving complex electrical network using network theorems (Norton, thevenin's, and superposition theorem.)
2. Understand the concept of semiconductors and their energy diagrams.
3. Understanding of PN diode as rectifier.
4. Understanding of transistor and its characteristics.
5. Understanding of UNI junction transistor and its characteristics.

Learning Outcomes

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

1. Use their understanding in implementation of various electrical circuits.
2. Students may be able to implement practical circuits to understand various electrical network theorems.
3. They may be able to understand the role of semiconductors in their daily life.
4. Students may be able to fabricate their course project topic on PCB after this basic understanding of electrical network theory.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 5th

Subject: Nano Technology **Subject Code : PHY-506**

Learning Objective

The objective of the paper is to aware the students about Free electron theory, Idea of band structure, Metals, insulators and semiconductors, Density of states in bands, Variation of density of states with energy, Variation of density of states and band gap with size of crystal. Electron confinement in infinitely deep square well, confinement in two and one dimensional well, Idea of quantum well structure, Quantum dots, Quantum wires.

Learning Outcomes

1. Analyze the data obtained from the various characterization techniques
2. Explain various applications of nano particles, quantum dots, nano wires etc
3. They will study a PN diode and study its I-V characteristics.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 6th

Subject: Mathematical Physics-VI **Subject Code : PHY-601**

Learning Objective

The emphasis of course is to equip students with the mathematical tools required in solving problems interest to physicists. The main objective of this course is to familiarize students with a range of mathematical methods that are essential for solving advanced problems in theoretical physics.

Learning Outcomes

1. Use differential calculus for solving physical problems.
2. Solve ordinarily differential with the help of Laplace transform.
3. Use of Fourier transform.
4. Deal with Dirac- Delta functions
5. Use tensors in various physical laws.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 6th

Subject : Electro-magnetic Theory-II **Subject Code : PHY-602**

Learning Objective

This core course develops further the concepts learnt in the electricity and magnetism course to understand the properties of electromagnetic waves in vacuum and different media.

Learning Outcomes

1. Apply Maxwell's equations to deduce wave equation, electromagnetic field energy, momentum and angular momentum density.
2. Understand electromagnetic wave propagation in unbounded media: Vacuum, dielectric medium, conducting medium, plasma.
3. Understand electromagnetic wave propagation in bounded media: reflection and transmission coefficients at plane interface in bounded media.
4. Understand polarization of Electromagnetic Waves: Linear, Circular and Elliptical Polarization.

RPS Degree College (Balana), Mahendragarh

Department of Physics

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 6th

Subject: Statistical Physics-II **Subject code: PHY-603**

Learning Objective

Statistical Mechanics deals with the derivation of the macroscopic parameters (internal energy, pressure, specific heat etc.) of a physical system consisting of large number of particles (solid, liquid or gas) from knowledge of the underlying microscopic behavior of atoms and molecules that comprises it. The main objective of this course work is to introduce the techniques of Statistical Mechanics which has applications in various fields including Astrophysics, Semiconductors, Plasma Physics, Bio-Physics etc. and in many other directions.

Learning Outcomes

1. Understand the concepts of microstate, macrostate, phase space, thermodynamic probability and partition function.
2. Understand the use of Thermodynamic probability and Partition function forcalculation of thermodynamic variables for physical system (Ideal gas, finite level system).
3. Difference between the classical and quantumstatistics
4. Understand the properties and Laws associated with thermal radiation.
5. Apply the Fermi- Dirac distribution to model problems such as electrons in solids and white dwarf stars
6. Apply the Bose-Einstein distribution to model problems such as blackbody radiation and Helium gas.

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 6th

Subject: Physics of Materials -II **Subject Code : PHY-604**

Learning Objective

This course introduces the basic concepts and principles required to understand the various properties exhibited by condensed matter, especially solids. It enables the students to appreciate how the interesting and wonderful properties exhibited by matter depend upon its atomic and molecular constituents. The gained knowledge helps to solve problems in solid state physics using relevant mathematical tools. It also communicates the importance of solid state physics in modern society.

Learning Outcomes

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1. Explain the origin of the dielectric properties exhibited by solids and the concept of polarizability.
2. Understand the basics of phase transitions and the preliminary concept
3. Understand about the Dielectric constant and polrizability
4. Understand the conductivity in semiconductors, mobility of carriers (lattice & semiconductors (qualitative).

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 6th

Subject: Electronics Devices: Physics and Application-II Subject Code: PHY-605

Learning Objective

This course introduces the concept of semiconductor devices and their applications. It also emphasizes on understanding of amplifiers, oscillators, operational amplifier and their applications.

. Learning Outcomes

1. Two terminal devices: Rectifier diodes, Zener diode, photodiode etc
2. NPN and PNP transistors: Characteristics of different configurations, biasing, stabilization and their applications.
3. CE and two stages RC coupled transistor amplifier using h-parameter model of the transistor.
4. Designing of different types of oscillators and their stabilities.
5. Ideal and practical op-amps: Characteristics and applications.
6. In the laboratory course, the students will be able to study characteristics of various diodes and BJT. They will be able to design amplifiers, oscillators and DACs. Also different applications using Op-Amp will be designed

RPS Degree College (Balana), Mahendragarh

Department of PHYSICS

Learning Objective & Outcomes

B. Sc. (Hons.) Semester 6th

Subject : Nano Technology **Subject Code : PHY-606**

Learning Objective

1. To understand concept of nano science and nanotechnology.
2. To understand concept of XRD in nano material.
3. To understand Raman spectra and photoluminescence in nano materials.
4. To learn different synthesis of nanomaterials

Learning Outcomes

1. Will able to learn and background of nano science.
2. Understand the synthesis of nano materials and their application and its impact on environment.
3. Apply their learned knowledge to develop nano materials.