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**Govt. Veer Gend Singh College, Pakhanjore**  
**Distt.-U.B. Kanker (Chhattisgarh)**

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**/Programme Outcome & Programme Specific Outcome :-**

**Department Of Botany**

**Programme outcomes:**

- The course highlighted to conserve and study the suitable development.
- Acquiring knowledge and develop the ability to work hard.
- Students are made aware of pollution problems and waste management and the importance of green environment.
- Students interact with the social activist in relation with maximum usefulness of bio – fertilizers.
- Promotion of self study which enhance the ability to observe accurately and objectively.

**Programme Specific Outcome:**

- To have knowledge about various plants groups from lower to higher group.
- Important knowledge of science has basic objective of education.
- To make the students aware about bio diversity conservation and sustainable use of plants.
- Develop skill and practical work experiment equipment and laboratory use along with collection and interpretation of biological materials and data.
- A scientific attitude to make students create open minded and curiosity.

**Department Of Chemistry**

**Programme & Programme Specific Outcomes (PO<sub>s</sub> & PSO<sub>s</sub>) of undergraduate course in chemistry**

- after studying chemistry at graduate level, students will develop and understanding of key concepts, theoretical principles, and experimental findings.
- They will be able correlate the theoretical and experimental findings that will enhance their understanding level.

- The experiments based on observation of result, enhance their observational power.
- They know the proper rules, regulation and procedures for safe handling of chemicals.
- They understand the importance of safe handling of chemicals.
- They understand the role of chemistry in biological systems and in our daily life.
- They understand the basic principle of spectroscopic techniques such as UV – visible I.R.rotationalramanNMR, <sup>13</sup>CNMR, and mass spectroscopy.
- They understand the importance of chemistry and industry, medicine, detergents, cosmetic products etc.
- They understand that chemistry is core of science.
- They understand the role of different ions such as  $Mg^{2+}$ ,  $Ca^{2+}$ ,  $Na^{+}$ ,  $K^{+}$  ions etc.in our body.
- They understand the synthesis, mechanism, and application of different compounds.
- They understand the tests and techniques of quantitative and qualitative analysis, and their application in various industrial and medicinal fields.
- They understand the properties and application of solids, liquids, gases, crystal, nanomaterial.
- They understand the importance of chemistry in infectious diseases.
- These skills make them critical thinkers and efficient problem solvers that are essential to be a potent chemist /scientist.
- They understand the importance of chemistry in society and try to be a responsible person of society.

### **Department Of Mathematics:**

#### **Programme Outcome**

:

At the graduation in science faculty with the mathematics students should have:

- Understand application of mathematics in different fields.
- Been able to think creatively to propose novel ideas in explaining facts and figures or providing new solutions to the problems.
- Acquired the knowledge with facts and figures related to mathematics, physics, and chemistry.
- Been able to work in different scientific institutions.
- Understand the basic concepts, fundamental principles and scientific theories related to various scientific phenomena and their relevance in the day – to day life.
- Analyse given data and draw the conclusion.

#### **Programme Specific Outcome :-**

Students of B.sc.with major in mathematics should:

- Expounds upon the concept of rieman integrability.
- Treat special types of rings such as Euclidean domain and principle ideal domain.
- Be able to use the facility with mathematical and computational modeling of real decision making.
- Calculate definite integral using an appropriate numerical method.
- Understand the limit of functions: use to prove properties of continuous functions and derivative of founction.
- Use the methods to design experiments, analysis and interpretation of data and synthesize the information to provide valid conclusion.
- Demonstrate when a binary algebraic structure forms group and group properties.

### **Department Of Physics:**

#### **Programme Outcome:**

- Physics deals with a wide variety of systems, certain thories are used by all physicists.
- The theories are experimentally tested and found to be adequate approximation of nature.
- It uses mathematics to organize and formulate experimental result.
- Technologies based on mathematics, like computation have made computational physics an active area of research.

#### **Programme Specific Outcome :-**

- Classical mechanics describes the motion of objects, provided they are much larger than atoms rod moving at much less than the speed oflight.
- Solid state physics develop a basis for future learning and work experience. nuclear physic develop familiarity with nuclear and particle physics, facilitating Informed decisions as students pursue research projects, Internships, carters. and graduate study.
- nuclear physic develop familiarity with nuclear and particle physics, facilitating Informed decisions as students pursue research projects, Internships, carters. and graduate study.
- Quantum mechanics develop problem solving methods thatwill Include mathematical as well as numerical computations and solutions.  
The course of Electronics will make the students to identify the electronic components and their working principles.

## Department Zoology

### **Programme outcome:**

- Students option to go for higher studies M.Sc. intergrated ms. Ph.D. and ithan do reserch work for the welfare of mankind
- Zoology help to understand the various biological cyclles of environment
- Study of zoology gives the information of hospital and paramedical fields.
- Develop positive attitude towards sustainable equipment and laboratory.

### **Programme specific outcome:**

- There are diffirent scopes in diffirents areas like sericulture diffirents as demonstrator care taker of the farm trainer for other's etc.
- In the departament of fisheries as extansion officer, care taker, induced breeder's management marketing.
- Develop skill in practical work experiments equlpments and laboratory.

### Course Outcomes

#### Department Of Botany B.Sc.-I

#### Subject-Science (Botany)

#### Paper-I

#### **BACTERIA, VIRUS, RULES, LICHENS, AND ALGAE**

- By studying this paper student learned:
- Virus is the most primitive non —cellular, non-cytoplasmic organism which is considered to be the connecting link between living and non-living.
- 2. Fungi are chlorophyll-free thallophytic of which about 2000species are used directly and Indirectly as food.
- 3. Harmful bacteria can be destroyed by bacteriophages and the virus can be used for biological control in place of chemical toxic contaminants.

#### Paper -II

#### **BRYOPHYTS, PTERIDOPHYTES, GYMNOSPERMS, AND PALAEOBOTANY.**

- By studying this paper student learned:
- .Gymnosperms are vascular plant that produce pollen grains and seeds.
- 2.palaeobotanyis the study of fossil plants A fossil plant is the remains or races a once living plant.
- 3.Bryophyts are plants that grow in moist and shady places, which are called amphibians ofthe plant world.

**B.sc.II**  
**Subject- Science (Botany)**  
**Paper —I**

**PLANT TAXONOMY, ECONOMIC, BOTANY, PLANT ANATOMY, AND EMBRYOLOGY.**

- By studying this paper student learned
- Plant taxonomy is the science that finds, Identifies describes classifies, and names plants it is one of the main branches of taxonomy. 2. Economic botany is the study of the relationship between people (individuals and cultures) and plants. This link between botany and anthropology explores the ways human use plants for food, medicines and commerce.
- Embryology is the branch of biology that studies the prenatal development of gametes fertilization and development of embryos and fetuses.

**Paper -II**

**Ecology And Plant Physiology.**

By studying this paper student learned:

- Ecology is a scientific approach to the study of the biosphere ecosystem are geared by the interrelationship between living organisms and the physical environments they inhabit (land, water, air).
- Plant physiological understanding of crop plants provides the fundamental scientific base about various aspects of metabolism, growth and development.
- plant physiology immensely important for crop improvement or technology improvement in agriculture or horticulture.

**B.sc.III**

**Subject-Science (Botany)**

**Paper -I**

**Analytical Technology, Plant Pathology, Experimental Embryology  
Elementary, Biostatistics Environmental Pollution And Conservation**

By studying this paper student learned:

- Tissue culture produce many copies of the same plant with better physiological and biological outcome.
- Environmental science gives us useful tools and ideas for understanding problems and new solutions to those problems.
- An analytic technique is a method that is used to determine the identification or concentration of a Chemical substance. Genetics, Molecular Biology, Biotechnology And Biochemistry.

By studying this paper student learned:

- Molecular biology may have a relatively short history, but its impact on the human experience is already considerable.

Medicine modern agriculture forensic science, and many other endeavors rely on

Technology developed by molecular biologist.

Biotechnology has the potential to be the most transformation at technology in Human history, it is currently revolutionizing healthcare agriculture and industrial manufacturing,

- Biochemistry is proteins are one of the classes of bio-macromolecules, that make up constituents of living things. They are amongst the most actively studied molecule in biochemistry.

### **Paper -II**

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- Plant physiology immensely important for crop improvement or technology improvement in agriculture or horticulture.

### **Department of Chemistry**

#### **Paper I**

#### **Inorganic Chemistry**

After Studying this paper students will learn:

- Bohr's theory. General idea of de Broglie, Heisenberg Uncertainty principle. Schrodinger wave equation, radial & angular wave functions. Hund's rule
- Periodic properties: Ionization energy. Electron affinity, and Electronegativity.
- Chemical bonding- : Ionic solids, Radius ratio and coordination number. Lattice defects.
- Born-Haber cycle.

Valence bond theories and Fajans rule,

Chemical bonding –II valence bond theory & its limitation, concepts of hybridization, VSEPR.

Shape of  $H_2O$ ,  $NH_3$ ,  $PCl_3$ ,  $SF_6$ , etc.

Molecular orbital diagrams.

S – block elements: general concept on group relation comparative study.

Derivatives of alkali & alkaline earth metal's.

E P-block elements: General concepts on group relationships and Gradation properties.

Chemistry of Noble gases: Chemistry of Xenon. Structure and bonding in Xenon Compounds.

- Theoretical principle in quantitative analysis basic principles.

## **Paper II** **Organic Chemistry.**

After studying this paper student will learn :

- Hybridization, electronic, displacements, dipole, moment.
- Nucleophilicity & basicity, bond cleavage.
- Generation, shape and relative stability of reaction intermediates.
- Introduction to stereochemistry: chirality, optical, and geometrical isomers.
- Nomenclature: erythro & threo, R & S E & Z. etc.
- Conformational analysis of alkanes: relative stability and energy diagrams.
- Chair, boat, & twist boat conformation.
- Chemistry of aliphatic hydrocarbons: carbon carbon, sigma bonds.
- Aromatic hydrocarbons: Huckel's rule halogenation nitration & sulphonation.

## **Paper- III** **Physical Chemistry**

After studying this paper students learn:

- Mathematical concept for chemist: logarithmic relation, linear graphs, differentiation & integration.
- Gaseous state chemistry: kinetic molecular model of a gas: postulates and kinetic gas equation collision frequency.
- Joule Thompson effect liquefaction of gases.
- Liquid state chemistry: viscosity and surface tension.
- Colloidal & surface chemistry: classification, optical, kinetic & electrical properties of colloids.
- Solid state chemistry: general laws, symmetry element
- Bragg's law rotating crystal and powder pattern methods.
- Chemical kinetics: rate of rx factors affecting, zero first and second order reaction.
- Catalysis homogeneous & heterogeneous reaction catalysis & its types.

### Lab course:

- Semi micro quantitative analysis of mixture. Acid base titration.
- Redox titration
- Iodo/Iodometric titration.
- Purification of organic compounds.
- Sublimation distillation determination of melting and boiling points .
- Quantitative analysis.
- Physical chemistry : surface tension measurement viscosity measurement .
- Chemical kinetics, colloids.

### B.Sc.II

#### Paper –I

### Inorganic Chemistry

After studying this paper students will learn:

- Chemistry of transition series elements: general characteristics , general comparative treatment of 4d and 5d elements with their 3<sup>rd</sup> period analogues.
- Oxidation & reduction: redox potential principle involved in extraction of elements
- Coordination compounds: Werner's theory, isomerization.
- Chemistry of lanthanide elements.
- Chemistry of actinides
- Acids and bases non-aqueous solvents.

### Paper –II

### Organic Chemistry

After studying this paper students will learn:

Chemistry of organic halides alkyl halides  $SN^1$ ,  $SN^2$ , AND  $SN^3$ .

- Alcohols: Preparation , properties and reaction.
- Phenols: structure & bonding, Reimer-Tiemann reaction
- Oxidation and reduction name reactions. Carboxylic acids : preparation structure and bonding
- Effect of ester name reaction.
- Carboxylic acid derivatives: acids chloride, ester, anhydride and amides
- Organic compounds of nitrogen: nitro compounds
- Amines: reaction and separation and basicity.



**Paper -III-**  
**Physical Chemistry**

After studying this paper students will learn:

- Thermodynamics -I: intensive and extensive properties system and surrounding .
- Zeroth law, first law etc
- Joule Thompson expansion inversion temperature
- Thermodynamics -II: second law of thermodynamics concepts of entropy
- Gibbs and Helmholtz free energy
- Carnot cycle & theorem chemical equilibrium :  $K_p$ ,  $K_c$  and concept.
- Ionic equilibria : pH scale , solubility product Henderson equation
- Phase equilibria: one component two component & three component system
- Nemst distribution law Henry's law photochemistry : laws of photochemistry Jablonski diagram.

**Lab course**

- Qualitative semi -micro analysis
- Volumetric analysis .
- Organic chemistry : detection of elements preparation of organic compounds.
- Physical chemistry.
- Transition temperature.
- Phase equilibria.

**B.sc.-III**  
**Paper I**  
**Inorganic Chemistry**

After studying this paper students will learn:

- Metal legend bonding in transition metal complexes: limitation of VBT and CFT.
- Thermodynamic and kinetic aspects of metal complexes.
- Magnetic properties of transition metal complexes.
- Type of magnetic behavior, d-d transition.
- Orgel diagrams.
- Organometallic chemistry.
- Catalysis by organometallic compounds.
- Bioinorganic chemistry: nitrogen fixation, Hb and Mb
- Hard and soft acid and bases (HSAB).
- Inorganic polymers.

**Paper –II**  
**Organic Chemistry**

After studying this paper students will learn:

- Classification, structure, and aromaticity of 5 – and 6 membered heterocyclic compounds
- Synthesis reaction and mechanism of substitution reaction of four pyrrole thiophene etc.
- Organometallic reagents basic concepts .
- Organomagnesium ,organic,and organolithium , compounds.
- Biomolecules: basic concepts.
- Carbohydrates: monosaccharides, disaccharides, and polysaccharides.
- DNA RNA and proteins.
- Synthetic polymer's : addition free radical condensation and polymerization.
- Synthetic Dyes: chemistry and classification of dyes.
- Infra red spectroscopy: basic principle IR absorption band their position and intensity. .
- Types are electronic transition.
- Beer- Lambert's law effect of conjugation.
- NMR Spectroscopy: basic principle shielding & deshielding .
- <sup>13</sup>C-NMR principle and application.
- Magnetic resonance imaging (MRI).

**Paper –III**  
**Physical Chemistry**

- Quantum mechanics-i black body radiations, photoelectric effect, Compton effect.
- Operator: Hamiltonian, Laplacian, angular momentum operator.
- Postulates of quantum mechanics, Schrodinger wave equation.
- Quantum mechanics -ii: LCAO approximation, formation of H<sub>2</sub> ion.
- Comparison of M.O. and V.B models.
- Hückel theory: applications to ethane, propane, etc .
- Spectroscopy: Rotational spectra: basic concepts.
- vibrational Spectra basic concept.
- Raman spectra: fundamental concept.
- Electrochemistry Electrolytic conductance: Kohlrausch's law.
- Theory of strong electrolytes.
- Migration of Ions.
- Electrochemical cell and galvanic cell: single electrode potential
- Concentration cell and corrosion.

### Lab course

- gravimetric analysis: estimation of nickel (II) using dimethylglyoxime (DMG.)
- estimation of copper as  $\text{CuSCN}$ .
- Estimation of barium as  $\text{BaSO}_4$ .
- Tetraamine copper (II) sulphate  $\{\text{Cu}(\text{NH}_3)_4\}\text{SO}_4$ .
- Preparation of organic compounds: acetylation of amines and phenols.
- Nitration of acetanilide/ nitrobenzene.
- Preparation of methyl orange.
- Analyses of carbohydrates: aldose and ketose, reducing and non-reducing sugar.
- Study of saponification of ethyl acetate.
- Determination of the strength of the given acid conductometrically using standard alkali solution.
- Absorption spectra of  $\text{KMnO}_4$  and  $\text{K}_2\text{Cr}_2\text{O}_7$  (in  $0.1\text{M H}_2\text{SO}_4$ ) and determine maximum wave lengths.

### Subject of Zoology

#### Bsc-I

course	outcome
Non-chordata	1. students will have learning about the basic taxonomy and systematics and classification of protozoa, phlebobranchia, cnidaria, platyhelminthes, annelid, arthropoda groups.  2. students are able to understand the fundamental principles of systematics in which the animals are how to classify according to their characters.
Pseudocoelomates	Pseudocoelomates parasites for their life cycles epidemiology pathology diagnosis symptoms and treatments they will also have knowledge about the basic of parasitology such as origin and evolution of parasitisms, role of vectors.
Cell biology	<b>Student will understand the structures</b> position and function of plasma membrane and all cellular organelles in detail.

### Subject of Zoology

#### Bsc-II

course	outcome
Comparative anatomy of vertebrates.	Student will have understood the structure of different systems such as integumentary skeletal digestive, respiratory, circulatory, urinogenital nervous and sensory organs in comparative way among the vertebrates.

Endocrinology	<ol style="list-style-type: none"> <li>1. These course will provides students with a deep knowlegein endocrelology</li> <li>2. These paper gives an idea about the glands which works inside the body and secrate a camicall called harmone</li> <li>3. How it is classified how it work and the regulation of these harmones are discussed here.</li> </ol>
Behavior	The behavior pettern in animal.
Evolution	Diffirents evidence and theorice of organics evolution.
Applied zoology	Economically importants animal cultural practice.

### **Bsc-III**

Ecosytem	Students will grap the concept of interdependence and intraction of physical, chemical,and biologicalfactor in environments and will lead to better understanding.
Biochemistry	<ol style="list-style-type: none"> <li>1. Students will know the metabolism of corbohydryte lipids and proteins in detail's</li> <li>2. They will also learn oxidative pholsphorytation and redox reaction.</li> </ol>
Ecology, environmental, biology,taxicology, microbiology and medical zoology	<ol style="list-style-type: none"> <li>1. Know about the mazor ecosystems of word characteristics of papulation types of papulation of their regulation conservation of natural resource.</li> <li>2. Diffirent type of chemical and biological toxicants there effect and prevention</li> <li>3. Importance of micro organism.</li> <li>4. Study of pathogenic animals diseases and their symptoms and their prevantion.</li> </ol>

### **Mathematics**

#### **B. Sc. I year**

##### **Algebra:**

This course aims to provide a first approach to the subject of Algebra, which is one of the basic pillars of modern mathematics.

- The Course on Algebra deals with advance topics on matrices, rank, eigen values.
- It deals with homogeneous and non-homogeneous system, solutions of cubic and biquadratic equations.
- Students learn to analyze and solve a linear system of equations.
- Important characteristics of matrices such as its four fundamentals subspaces, rank, determinant, eigen values and eigen vectors, different factorizations etc. to find the inverse of a matrix by Cayley-Hamilton theorem.
- Important concepts of vector spaces such as independence, basis, dimensions, orthogonally etc.

- The focus of the course will be the study of certain structures called groups, rings, fields and some related structures.

**Trigonometry**: Trigonometry is important for surveying and navigation and describing the phenomena that are periodic in nature.

- Students will learn about the De Moivre's Theorem and its applications
- Students will learn how to Derive Gregory series and Summation of series
- Students will learn about the real and imaginary parts of a circular and hyperbolic functions of a complex variable

## **Paper- II** **Calculus**

**Calculus**: The study of calculus is normally aimed at giving students the "mathematical sophistication" to relate to such more advanced work. After completing this course the learner should be able to

- Deal with some important concept of limit, continuity, differentiability of functions.
- Find the higher order derivative of the product of two functions.
- Expand a function using Taylor's and Maclaurin's series.
- Conceive the concept of asymptotes and obtain their equations.
- Learn about partial derivatives and its applications.
- Learn the area under a given curve, length of an arc of a curve when the equations are given in parametric and polar form.
- Definite Integrals and Transcendental Functions.
- Learn the area and volume by applying the techniques of double and triple integrals
- Deal with tracing of curves, reduction formulae, rectification, quadrature and volume of solids of revolution.
- Use graphical and numerical evidence to estimate limits, and to identify situations where limits fail to exist..
- Learn about first-and second order differential equations.
- Learn Rules for powers (including exponent +1) and exponentials, the six trigonometric functions and the inverse sine, tangent and secant.
- Use integration to find the area under curves and the area between curves.

**Paper-III**  
**Vector Calculus & Geometry**

**Vector Calculus:** After completing this course the learner should be able to ·

- Represent vectors analytically and geometrically, and compute dot and cross products of two, three and four vectors .
- Analyze vector functions to find derivatives, tangent lines, integrals, arc length, and curvature, · Compute limits and derivatives of functions of 2 and 3 variables, ·
- Apply derivative concepts to find tangent lines to level curves and to solve optimization problems, ·
- Evaluate double and triple integrals for area and volume, ·
- Differentiate vector fields · Determine gradient vector fields and find potential functions
- Analyse the fundamental theorem of calculus and see their relation to the fundamental theorems of calculus in calculus,
- leading to the more generalized version of Green's, Gauss, and Stokes' theorem.

**Geometry**

- Geometry is important for the students to knowledge about the concepts of lines, points, shapes, size, relative position of figures, and properties of space
- To make students understand about the equation plane using two point forms, three point form
- Laws of point that is equidistant to two given points
- Students learn that how to determine equation of Sphere, Cone, Cylinder straight line, co-axial limiting point of sphere etc.

**B. Sc. II year**  
**Paper- I**  
**Advanced Calculus**

Advanced Calculus is of utmost importance because of its huge applicability. Calculus is not restricted to mathematics and analysis, it is used pretty much everywhere - Physics, Chemistry, Economics, Biology, Engineering, Dynamic systems and so much more.

- To have full knowledge of calculus involving the fundamental tools such as continuity and differentiability of two variables.
- To understand the maximum and minimum behavior of a function of two variables.

- To understand different indeterminate form of limit.
- This course aims to introduce the notion of differentiation and integration in general, and sets, functions (and their graphs), limits and continuity of functions in particular.
- Techniques of derivatives and integration and solving various examples to grasp the idea of each technique are the main objective this course aims to deliver.
- Calculate the limit of a function at a point numerically and algebraically using appropriate techniques including L'Hospital's rule.
- Find points of discontinuity for functions and classify them.
- Understand the consequences of the intermediate value theorem for continuous functions.

### **Paper- II** **Differential Equations**

- To make them learn Power series method to solve differential equation
- Solve Ordinary partial differential equation
- Select the appropriate method for any particular problem
- Assess the reliability of the partial differential technique Ordinary differential equations
- Ordinary differential equations have important applications and are a powerful tool in the study of many problems in natural science and in technology.
- They are extensively employed in mechanics, astronomy, physics & in many problems of Chemistry and Biology.

### **Paper – III** **Mechanics**

In mechanics students study statics & dynamics and learn about Newton's Law of motion, Projectiles, Work Power and Energy. Students also learn about simple harmonic motion null lines, equilibrium of coplanar forces acting on rigid body, moments and parallel forces.

- The primary purpose of the study is to develop the capacity to predict the effect of force & motion while carrying out the creative design function of science. .
- This capacity requires more than a mere knowledge of physical & mathematical principles of mechanics.
- One of primary objectives in a mechanics course is to help the student develop the ability to visualize which is so vital to problem formulation maximum progress is made when the principles & their limitations are learned together with in the context of us application.
- Newton's Law of Mechanics makes it possible to reduce the description of motion of mass points or solid bodies to solve ordinary differential equations.

## **B. Sc. III year**

### **Paper- I**

#### **Analysis**

Real analysis is an area of analysis that studies concepts such as sequences and their limits, continuity, differentiation, integration and sequence of functions, focuses on the real numbers, often including positive and negative infinity to form the extended real line.

- Students will be able to work with variety of functions.
- Students will easily understand the relationship between the derivative and the integral.
- Enhance the knowledge of partial derivative.
- Student will learn how to work with the polynomial functions. Students get the knowledge to determine analyticity of a function.
- Subsets of a metric space, open, closed, connected, bounded, totally bounded and compact sets.
- Function on a metric space, discontinuous, continuous, or uniformly continuous
- Students will be able to understand about the events which can be independent, exhaustive & exclusive.
- They will learn the difference between discrete and continuous random variables.
- They will also get rough idea about an occurrence and outcomes.
- To understand how to solve the questions with the help of expectations and moments generating functions.

### **Paper- II**

#### **Abstract Algebra**

**Algebra:** A major objective is to introduce students to the language and precision of modern abstract algebra. This means that the course will be proof-based, in the sense that students will be expected to understand, construct, and write proofs.

- The focus of the course will be the study of certain structures called groups, rings, fields and some related structures.
- Abstract algebra gives to student a good mathematical maturity and enables to build mathematical thinking and skill.
- To educate about Ring, Field, Ideals, Modules etc and its applications
- Learn about Vector Space, Rational Canonical form , Norms etc.
- Studies of Polynomial Rings and applies polynomials to the construction and analysis of error-correcting and error-detecting codes.

### **Paper-III**

#### **Discrete Mathematics**

Discrete mathematics is very useful branch of mathematics in computer Science digital computing, Data programming, and data communication in modern cosmos.

- Simplify and evaluate basic statements including compound statements, implications, inverses, converses and contra positives using truth tables and properties of logic



- Apply the operations of sets and venn diagrams to solve applied problems using the principle of inclusion-exclusion 3. Evaluate Boolean functions and simplify expression using the properties of Boolean algebra, apply Boolean algebra to circuits and gating networks
- To impart the basic principles of Boolean algebra, logic, set theory Permutations & Combinations and graph Theory. Be able to understand logical arguments and logical constructs
- The course will extend students logical and mathematical maturity and ability to deal with abstraction and introduce most of the basic terminologies used in computer science and applications.
- Determine the domain and range of a discrete or non-discrete function, graph functions, identify one-to-one functions, perform the composition of functions, find graph the inverse of a function, and apply the properties of functions to application problems.

## DEPARTMENT OF PHYSICS

### B.Sc. Physics

#### **Program Outcomes**

- Understand the core concept of Physics subjects
- .Acquire analytical and logical skill for higher Education.
- Excel in Experimental and Theoretical Physics.
- Trained to take up jobs in allied fields.
- Confident to take up competitive exams.

#### **Course outcomes**

### B.Sc. Part I Paper I:

#### Mechanics, oscillations and properties of matters

**Mechanics:** This course provides the basic concepts related to the motion of all the objects around us in our daily life and builds a foundation of various applied field in science and technology. The course covers the study of vectors, laws of motion, momentum, energy, rotational motion, gravitation, fluids, elasticity and special relativity.

**Oscillations and rigid body motion:** This course comprises the fundamentals of harmonic oscillator model, including damped and forced oscillators and grasps the significance of terms like quality factor and damping coefficient.

**Superposition of harmonic motions:** After study this theory students wonder that our eardrums vibrate under a complex combination of harmonic vibrations and the resultant effect is given by the principle of superposition.

**Motion of charged particles in electronic and magnetic fields:** Recognize the motion of the charged particle in electromagnetic field.

**Properties of matters:** This course comprises the basics of properties of matter, i.e., how Young's modulus and rigidity modulus are defines and how they are evaluated for different shapes of practical relevance.

**Paper II**  
**electricity, magnetism and electromagnetic theory**

**Mathematical Background:** The knowledge of mathematical physics would be valuable, to understand the essential mathematical methods for solving the advanced problems in physics and to develop the ability to apply the mathematical concepts and techniques to solve the problems in theoretical and experimental physics.

**Electrostatics:** By studying the electrostatics students emphasizes its applications in the real world. One of its applications is in printers and photocopiers where static electric charges attract the ink, or toner, to the paper. Other uses include paint sprayers, air filters, and dust removal.

**Dielectrics, steady and alternating currents:** The study of dielectric properties concerns storage and dissipation of electric and magnetic energy in materials. They are important for explaining various phenomena in electronics, optics, solid-state physics, and cell biophysics.

**Magnetostatics:** Magnetostatics is the study of static magnetic fields. It is a good approximation even when the currents are not static as long as the currents do not alternate rapidly.

**Time varying fields and electromagnetic waves:** This study make us capable to understand that the electric and the magnetic fields induce each other and such laws will complete the system of Maxwell equations. The most dramatic consequence of this mutual induction will be the existence and propagation of the electromagnetic waves.

**Practical:** Basic experiments related to mechanics would perform by the students to get familiar with various measuring instruments and would learn the importance of accuracy of measurements.

**B.Sc. Part II**  
**Paper I:**  
**thermodynamics, kinetic theory and statistical physics**

**The laws of thermodynamics:** Become familiar with various thermodynamic process and work done in each of these process and have a clear understanding about Reversible and irreversible process and also working of a Carnot engine, and knowledge of calculating change in entropy for various process.

**Thermodynamic relationships:** Thermodynamic relationship is needed to relate the changes in the fundamental and derived properties in terms of the measured properties that are directly accessible from laboratory measurements.

**Kinematics of gases:** These studies are important for clarifying the capture process of particles by the diffusion mechanism. According to this theory, gas is composed of a large number of small-sized molecules compared with the distances between them.

**The statistical basis of thermodynamics:** The course makes the students able to understand the basic physics of heat and temperature and their relation with energy, work, radiation and matter. The students also learn how laws of thermodynamics are used in a heat engine to transform heat into work. The course contains the study of laws of thermodynamics, thermodynamic description of systems, thermodynamic potentials, kinetic theory of gases, theory of radiation and statistical mechanics.

**Statistics:** This includes the study of Basic postulates, application of classical distribution to ideal gases, imperfect gases, quantum statistics and black body radiation. This course helps the students to understand the dynamics of the bulk material in macroscopic as well as microscopic levels and the relation between microscopic and macroscopic systems.

**Paper II**  
**waves, acoustics and optics**

**Waves in media:** This course includes the study of superposition of harmonic oscillations, wave's motion, oscillators, sound, wave optics, interference, diffraction, polarization.

**Optical instruments:** Optical instruments are the devices which process light wave to enhance an image for a more clear view.

**Interference of light:** Calculate wavelength difference and fringe width from the interference pattern.

**Diffraction gratings:** A grating disperses light of different wavelengths to give, for any wavelength, a narrow fringe. This allows precise spectroscopy.

**Laser system:** In This course the students would gain the knowledge basic principles and their applications in science and technology.

**Practical:** Students would gain practical knowledge by performing various experiments of Optics and Radiation.

**B.Sc. Part III**  
**Paper I**  
**Relativity, Quantum mechanics, atomic, molecular and nuclear physics**

**Relativity:** Grasped the fundamentals of different types of frames of references and transformation laws; both the Galilean and the Lorentz transformation.

**Quantum theory and quantum mechanics:** Students would learn basic postulates and formulations of quantum Mechanics. This area of physics plays an important role in explaining the behavior of all physical systems in the universe. The course includes the study of a brief review of foundations of quantum mechanics, matrix formulation of quantum mechanics, symmetry in quantum mechanics and approximation methods for bound states.

**Atomic and molecular spectra:** This includes atomic and molecular spectroscopy. As per the course structure, basics concepts of spectroscopic principles, rules and techniques in spectroscopy to know about their applications, will learn by the students.

**Nuclear physics:** In this course students would know about the general properties of nuclei, nuclear forces and detectors, radioactive decay and nuclear reactions. The course magnifies the knowledge of students in prospect of various applications of nuclear physics.

**Paper II**  
**solid state physics, solid state devices and electronics**

**Crystal structure:** this will help the students to develop an understanding of the lattice, different types of crystal structures, symmetries. Using X-ray diffraction in crystals, the student would gain understanding about the interior of the substances.

**Band structure and motion of electrons:** The course includes the study of defects in crystals, magnetism, energy bands and dielectric and electrical properties of insulators. And this course have vast importance for those students, who seeking R & D opportunities in the field of theoretical condensed matter physics, material science, device fabrication, nanoscience and nanotechnology etc.

**Semiconductor devices:** This comprises of basics understanding of power amplifiers, feedback amplifiers, operational amplifiers and optoelectronic devices. These are helpful for the students to find opportunities, in research and developments. Computational physics: To provides an opportunity to the students, to learn about the fundamentals of computer applications in solving the problems in different branches of Physics and Mathematics, basics of C-programming is included in this course, which can be useful in their future career in the field of research and technology.

**Practical:** In This Course students would gain the practical knowledge by performing various experiments related to different field in physics, especially electronics.