BACHELOR OF SCIENCE
COURSE OUTCOMES
F.Y.B.Sc

SEMESTER I		
PHYSICS		
SYLLABUS	**OBJECTIVES**	**OUTCOME**
Classical Physics	To develop analytical abilities towards real world problems. To familiarize with current and recent scientific technological developments.To enrich knowledge through problem solving, hands on training, study visits, projects etc.	Understand Newton's laws and apply them in calculations of the motion of simple systems. Use free body diagrams to analyze the forces on the objects. Understand the concepts of Friction, Elasticity and Fluid Mechanics and be able to perform calculations using them. Understand the concepts of lens system and interference. Apply the laws of thermodynamics to formulate necessary to analyze at thermodynamic process. Demonstrate quantitative problem solving skills in all the topics covered.
Modern Physics	To develop analytical abilities towards real world problems. To familiarize with current and recent scientific technological developments.To enrich knowledge through problem solving, hands on training, study visits, projects etc.	Understand nuclear properties and nuclear behavior. Understand the types of isotopes and their applications. Demonstrate quantum mechanical problem solving skills in all the topics covered.
Practical	To develop analytical abilities towards real world problems. To familiarize with current and recent scientific technological developments.To enrich knowledge through problem solving, hands on training, study visits, projects etc.	To demonstrate their practical skills. To understand and practice the skills while doing Physics practical. To correlate the theory concepts through practical. Understand the concepts of errors and their estimation.
BOTANY		
Paper – I Plant diversity 1 Unit I - Algae, Unit II - Fungi Unit III - Bryophyte	To acquire knowledge about life cycle pattern of organisms also to study the evolutionary pattern, special characters and economic importance.	Will understand the identification mark of the organism and will be able to identify organism on the basis of classification system. Learner also acquires knowledge about industrial agricultural and medicinal uses of the plants coming under these categories.

Paper – II Form and function 1 Unit I - Cell biology Unit II - Ecology Unit III - Genetics	To acquire knowledge about structure and functions of various cell organelles, ecosystem of organism, various laws of nature and hereditary characters.	Will understand structure and physiological function of various cell organelles, their ecosystem and expression of genetic characters in an individual.

ZOOLOGY

Wonders of Animal World, Biodiversity and its Conservation	1. To take learners through a captivating journey of hoarded wealth of marvellous animal world. 2. To orient learners about rich heritage of Biodiversity of India and make them understand significance of its conservation. 3. To teach learners about innovative and novel work of scientists/philosopher/entrepreneurs 4. in the field of biological sciences.	1. Curiosity will be ignited in the mind of learners, to know more about the facinating world of animals which would enhance their interest and love for the subject of zoology. 2. Learners would appreciate treasure of biodiversity, it's importance and hence would contribute their best for it's conservation.
Instrumentation and Animal Biotechnology	1. To make learners aware of risks involved in handling of different hazardous chemicals, sensitive (electrical/electronic) instruments and infectious biological specimens especially during practical sessions in the laboratory and to train them to avoid mishap. To acquaint learners to the modern developments and concepts of Zoology highlighting their applications aiming for the benefit of human being. 2. To provide all learners a complete insight about the structure and train them with operational skills of different instruments required in Zoology	1. Learners would work safely in the laboratory and avoid occurrence of accidents (mishaps) which will boost their scholastic performance and economy in use of materials/chemicals during practical sessions. 2. Learners would understand recent advances in the subject and their applications for the betterment of mankind; and that the young minds would be tuned to think out of the box. Students will be skilled to select and operate suitable instruments for the studies of different components of Zoology of this course and also of higher classes including research

CHEMISTRY

Paper I General Chemistry 1. Chemical Thermodynamics 2. Chemical Calculations 3. Atomic structure	1. Principles of thermodynamics and the feasibility of reactions 2. Position of equilibrium in common chemical reactions	1. Apply the principles of thermodynamics and predict the feasibility of reactions 2. Predict the position of

4. Periodic Table and periodicity 5. Classification and Nomenclature of Organic Compounds 6. Bonding and Structure of organic compounds 7. Fundamentals of organic reaction mechanism Paper II General Chemistry 1. Chemical Kinetics 2. Liquid State 3. Comparative chemistry of Main Group Elements 4. Stereochemistry I	3. Behavior of liquids and their properties. 4. Principles of periodicity of properties of elements 5. Properties of main group elements 6. Classification and nomenclature of common organic compounds. 7. Bonding and structure of organic compounds. 8. Mechanisms of common organic reactions 9. Stereochemical outcomes of common organic reactions	equilibrium in common chemical reactions 3. Predict the behavior of liquids and their properties. 4. Apply the principles of periodicity of properties of elements 5. Compare and predict the properties of main group elements 6. Classify and name common organic compounds. 7. Predict bonding and structure of organic compounds. 8. Draw mechanisms of common organic reactions 9. Predict stereochemical outcomes of common organic reactions.
Practical 1. Preparation of solutions 2. Commercial analysis 3. Titration using double indicator 4. Gravimetric analysis 5. Purification of any two organic compounds by recrystallization 6. Chromatography 7. Chemical Kinetics 8. Inorganic qualitative analysis 9. Redox titration 10. Characterization of organic compound	1. Prepareation and standardiseation of solutions 2. Titrations using suitable indicators 3. Impurities of commercial acid samples 4. Purification of a mixture of organic compounds 5. Chromatography for separation 6. Thermodynamic parameters like rate constants and enthalpy of dissolution 7. Buffers of different concentrations and find their pH using pH meter 8. Concentrations of solutions using colorimeter 9. Cations and anions in a binary salt mixture using semimicro inorganic qualitative analysis. 10. Characterisation of organic compounds	1. Prepare and standardise solutions 2. Titrate solutions using suitable indicators 3. Determine purities of commercial acid samples 4. Purify a mixture of organic compounds 5. Use chromatography for separation 6. Determine thermodynamic parameters like rate constants and enthalpy of dissolution 7. Prepare buffers of different concentrations and find their pH using pH meter 8. Determine concentrations of solutions using colorimeter 9. Identify cations and anions in a binary salt mixture using semimicro inorganic qualitative analysis. 10. Characterise and identify organic copounds

MATHEMATICS

Maths -1(CALCULUS-I) Unit 1: Real Number system Unit II: Sequences Unit III: Limits &Continuity	1. Students should know about the properties and all theorems related to Real numbers 2. To know about sequences, their convergence by applying different methods and	1. Students will get an insight of Real number system and will get a clear idea of real numbers and real valued functions 2. Students should be able

	theorems 3. To know about different functions, their graphs, limits andcontinuous functions	to give direct proofs, induction proofs and indirect proofs like method of contradiction or contrapositiveproofs 3. Students should be able to analyse convergence of any sequence 4. Students will know the applicationof sequences 5. Students are able to sketch graphs of real valued functions using calculus 6. Students shall be able to use concept of continuity in real world problems
Maths II (AlgebraI) Unit I : Integers &divisibility. Unit II Functions & Equivalence Relation Unit III : Polynomials	1. To understand the concept of the Well-Ordering property of non-negative integers and the first principle of induction as a consequence. 2. To know the Binomial theorem as a consequence of the first principle of induction and be able to evaluate the binomial coefficients. 3. To understand definition of divisibility and be able to give proof for division algorithm using the Well Ordering property. 4. To understand concept of g.c.d and the theorem of existence and uniqueness of g.c.d . 5. To be able to apply the Euclidean algorithm to calculate the g.c.d. 6. To understand the primes as an infinite set. 7. To understand concept of congruence's., with applications- Euler's phi function, Fermat's theorem, Wilson's theorem and other applications 8. To understand the concept of functions and different types of functions. 9. To understand the equivalence	1. Students will be able to understandthe concept of the Well-Ordering property of non-negative integers and the firstprinciple of induction as a consequence 2. Students will be able to evaluate the binomial coefficients and deduce some results using the Binomial theorem. 3. Students will be able to solve problems using definition of divisibility and are able to perform division using the division algorithm. 4. Students will be able to valuate the g.c.d. of two integers using the Euclideanlgorithm. 5. Students will be able to solve problems involving Euclids lemma for primes. They are able to visualize the set of primes as aninfinite set with progressively larger gaps between two consecutive primes. 6. Students will be able to solve problems involving congruence's.

	between portions of a set and equivalence relation defined on a set. 10. To understand Congruence as an equivalence relation .and the congruence classes as a consequence. 11. To understand the definition of polynomials, concept of degree of apolynomial, division algorithm for polynomials. 12. To understand evaluation of gcd of two polynomals using the Euclidean algorithm. 13. To understand roots of a polynomial and relation between coefficients and roots of a polynomial. 14. To understand the statement of the Fundamental theorem of Algebra. 15. To understand necessary condition for a rational number to be a root of a polynomial with integer co-efficient.	7. Students will be able to compute the direct image, inverse image of functions. 8. They will be able to find out the inverse of bijective functions. 9. Students will be able to determine the equivalence classes of a set corresponding to an equivalence relation. 10. Students will be able to add and multiply two polynomials and also determine the degree of a polynomial. 11. Students will be able to evaluate the gcd of two polynomials using the Euclidean algorithm Students will be able to use the relation between roots of a polynomial and coefficients of a polynomial

FOUNDATION COURSE

UNIT-I Overview of the Indian society and Indian culture. UNIT-II Disparity Part 1 with respect to stratification and inequality due to caste, class and estate system and the problem of handicapped. UNIT-III Disparity part 2 casteism, communalism, linguism and regionalism. UNIT-IV The Indian Constitution Preamble, features and fundamental duties. UNIT-V Local self-government Urban and rural.	1. The students are expected to understand the nature of diversity in the Indian society along with rural Urban and tribal characteristics. 2. Students are expected to learn the nature of stratification and inequality existing in the Indian society. 3. The students learn about various issues dividing society into certain categories. 4. Students learn about basic concepts of the Indian Constitution and its significance. 5. Student learn about the functioning of the local self-government in the rural and urban area.	1. Students are made to understand the religious, linguistic and cultural diversity of the Indian society and its characteristics. 2. Students are able to describe the nature of inequality and its causes and consequences on the society. 3. Students are made to understand the nature of inequality caused due to these problems and find the solution. 4. Students are able to understand the nature of preamble, features of the constitution and significance of fundamental duties. 5. Students are able to understand working of the local self-government like

		municipal corporation, Z.P. Gram Panchayat etc.

SEMESTER II

PHYSICS

Mathematical Physics	To develop analytical abilities towards real world problems. To familiarize with current and recent scientific technological developments. To enrich knowledge through problem solving, hands on training, study visits, projects etc.	Understand the basic mathematical concepts and applications of them in physical situations.
Modern Physics	To develop analytical abilities towards real world problems. To familiarize with current and recent scientific technological developments. To enrich knowledge through problem solving, hands on training, study visits, projects etc.	Demonstrate quantitative problem solving skills in all the topics covered.
Practical	To develop analytical abilities towards real world problems. To familiarize with current and recent scientific technological developments. To enrich knowledge through problem solving, hands on training, study visits, projects etc.	To understand and practice the skills while doing physics practical. To understand the use of apparatus and their use without fear. To correlate the theory concepts through practical. Understand the concepts of errors and their estimation.

BOTANY

Paper – I Plant diversity 1 Unit I - Pteridophyta Unit II - Gymnopserms Unit III - Angiosperms	To acquire knowledge about life cycle pattern, evolutionary pattern, special characters and economic importance of organisms under this category. To study various structural and functional adaptations in animals.	Will understand the identification mark of the organism and are able to identify organism on the basis of classification system. Learner will also acquire knowledge about industrial agricultural and medicinal uses of the plants coming under these categories and their structural and functional adaptations.
Paper – II Form and function 1 Unit I - Anatomy, Unit II - Physiology, Unit III - Medicinal Botany	To acquire knowledge about histology of various parts of organism, their role in physiological processes and chemical content of plants and their medicinal properties.	Will get updated with internal structure and physiological role of organisms, primary and secondary metabolites, their medicinal properties and traditional ayurvedic medicines.

ZOOLOGY

Ecology and Wildlife Management	1. To facilitate the learning of population ecology, its dynamics and regulatory factors important for its	1. This unit would allow learners to study about nature of animal population, specific factors affecting its

	sustenance. 2. To impart knowledge of different components of ecosystem and educate about essentials of coexistence of human beings with all other living organisms. 3. To enlighten learners about the current status of wild life conservation in India in the light of guidelines from different relevant governing agencies vis-à-vis with adversity of poaching and biopiracy.	growth and its impact on the population of other life form. 2. Learners will grasp the concept of interdependence and interaction of physical, chemical and biological factors in the environment and will lead to better understanding about implications of loss of fauna specifically on human being, erupting spur of desire for conservation of all flora and fauna. 3. Learners would be inspired to choose career options in the field of wild life conservation, research, photography and ecotourism.
Nutrition, Public Health and Hygiene	1. Learners understand the importance of balanced diet and essential nutrients of food at different stages of life 2. To impart knowledge about source, quantum and need for conservation of fast depleting water resource and essentials of maintaining proper sanitation, hygiene and optimizing use of electronic gadgets. 3. To educate learners about causes, symptoms and impact of stress related disorders and infectious diseases	1. Healthy dietary habits would be inculcated in the life style of learners in order to prevent risk of developing health hazards in younger generation due to faulty eating habits. 2. Promoting optimum conservation of water, encouragement for aintaining adequate personal hygiene, optimum use of electronic gadgets, avoiding addiction, thus facilitating achievement of the goal of healthy young India in true sense. 3. Learners will be able to promptly recognize stress related problems at initial stages and would be able to adopt relevant solutions which would lead to psychologically strong mind set promoting positive attitude important for

CHEMISTRY

Paper I General Chemistry 1. Gaseous state 2. Chemical Equilibrium and thermodynamic parameters 3. Concept of Qualitative Analysis Acid Base Theories 4. Chemistry of Aliphatic Hydrocarbons Paper II General Chemistry 1. Ionic equilibria, Molecular Spectroscopy Solid State Chemistry 2. Chemical bond and Reactivity Oxidation Reduction Chemistry 3. Stereochemistry II: Cycloalkanes and Conformational Analysis 4. Aromatic hydrocarbons	1. Principles of thermodynamics and the feasibility of reactions 2. Position of equilibrium in common chemical reactions 3. Behavior of liquids and their properties. 4. Principles of periodicity of properties of elements 5. Properties of main group elements 6. Classification and nomenclature of common organic compounds. 7. Bonding and structure of organic compounds. 8. Mechanisms of common organic reactions 9. Stereochemical outcomes of common organic reactions	1. Apply the principles of thermodynamics and predict the feasibility of reactions 2. Predict the position of equilibrium in common chemical reactions 3. Predict the behavior of liquids and their properties. 4. Apply the principles of periodicity of properties of elements 5. Compare and predict the properties of main group elements 6. Classify and name common organic compounds. 7. Predict bonding and structure of organic compounds. 8. Draw mechanisms of common organic reactions 9. Predict stereochemical outcomes of common organic reactions.
Practical 1. Preparation of solutions 2. Commercial analysis 3. Titration using double indicator 4. Gravimetric analysis 5. Purification of any two organic compounds by recrystallization 6. Chromatography 7. Chemical Kinetics 8. Inorganic qualitative analysis 9. Redox titration 10. Characterization of organic compound	1. Prepareation and standardiseation of solutions 2. Titrations using suitable indicators 3. Impurities of commercial acid samples 4. Purification of a mixture of organic compounds 5. Chromatography for separation 6. Thermodynamic parameters like rate constants and enthalpy of dissolution 7. Buffers of different concentrations and find their pH using pH meter 8. Concentrations of solutions using colorimeter 9. Cations and anions in a binary salt mixture using semimicro inorganic qualitative analysis. 10. Characterisation of organic compounds	1. Prepare and standardise solutions 2. Titrate solutions using suitable indicators 3. Determine purities of commercial acid samples 4. Purify a mixture of organic compounds 5. Use chromatography for separation 6. Determine thermodynamic parameters like rate constants and enthalpy of dissolution 7. Prepare buffers of different concentrations and find their pH using pH meter 8. Determine concentrations of solutions using colorimeter 9. Identify cations and anions in a binary salt mixture using semimicro inorganic qualitative analysis. 10. Characterise and identify organic copounds

	MATHEMATICS	
Maths 1 (Calculus II) Unit1: Series Unit II: Continuous functions &Differentiation Unit III: Applications of differentiation	1. To study about series and convergence of Series by using different tests. 2. To study about derivative of a function, necessary condition for differentiation, nth derivatives. 3. To study application of derivatives in various fields, for example: to find Maxima and minima of a function, mean value theorems etc.	1. Student will be able to determine convergence of a series and able to apply the concept in various branches of science. 2. Student will be able to use concept of differentiation completely and shall be able to apply derivatives in various field of sciences
Maths II (Linear Algebra) Unit 1: System of Linear Equations& Matrices Unit II: Vector spaces Unit III: Basis & Linear transformations	1. To understand the matrix form of representation of a system of linear equations whose solution sets are geometrically represented as points, lines, & planes in two and three dimensions. 2. To understand matrix algebra and the Gaussian elimination technique for bringing a matrix into its row echelon form and hence develop a technique to solve a system of linear equations. 3. To know the concept of Vector Spaces and Subspaces and their examples. 4. To understand linearly dependent and independent vectors in a Vector Space. 5. To understand concept of basis of a vector space. 6. To determine basis of finite dimensional vector spaces. 7. To understand dimension of a finite dimensional Vector Space and Subspaces. 8. To understand concept of extension of a basis of a Subspace to the basis of corresponding Vector Space. 9. To understand linear transformation as a function between two finite	1. Students will be able to understand the matrix form of representation of a system of linear equations whose solution sets are geometrically represented as points, lines, & planes in two and three dimensions. 2. Students will be able to understand matrix algebra and the Gaussian elimination technique for bringing a matrix into its row echelon form and hence develop a technique to solve a system of linear equations. 3. Students will be able to know the concept of Vector Spaces and Subspaces and their examples. 4. Students will be able to understand linearly dependent and independent vectors in a Vector Space. Students will be able to understand concept of basis of a vector space. 5. Students will be able to determine basis of finite dimensional vector spaces. 6. Students will be able to understand dimension of a finite dimensional Vector

	dimensional Vector Spaces	Space and Subspaces.
		7. Students will be able to understand concept of extension of a basis of a Subspace to the basis of corresponding Vector Space.
		8. Students will be able to evaluate the Kernel and Image of a linear transformation.
		9. Students will be able to determine matrix of a linear transformation with respect to bases of domain and co-domain Vector Spaces.

FOUNDATION COURSE

UNIT-I Globalisation, Liberalisation and privatisation. UNIT-II Human rights and fundamental rights. UNIT-III Environmental Problems. UNIT-IV Stress and conflict, aggression and violence. UNIT-V Management of stress and conflict.	1. By the end of this unit students are expected to understand the basic concepts of globalisation, liberalisation and privatization and its impact on agriculture and industry. 2. Students are expected to understand the origin, evolution and significance of basic human values along with fundamental rights given in the Indian constitution. 3. The students learn various issues regarding the environment such as pollution, ecology, sustainable development etc. 4. Students learn various causes of stress and conflict, aggression and violence in the society. 5. Students are expected to understand strategies to manage stress and conflict.	1. Students are able to understand the meaning of basic concepts related to globalisation and its impact on the Indian economy. 2. Students are made to understand the significance of basic human life and fundamental rights in the modern society. 3. Students are able to understand nature of environmental problems and their duty towards protection of the environment. 4. Students are able to explain the causes of stress, conflict, aggression and violence. 5. Students able to understand various techniques like Yoga, meditation, etc. as the tools to manage stress.

BACHELOR OF SCIENCE
COURSE OUTCOMES

S.Y.B.Sc

SEMESTER III		
PHYSICS		
Mechanics and Thermodynamics	To develop analytical abilities towards real world problems. To familiarize with current & recent scientific and technological developments. To enrich knowledge through problem solving, hand-on activities, study visits, projectsetc.	Understand the concepts of Mechanics & Properties of Matter and to apply them to problems. Comprehend the basic concepts of thermodynamics & its applications in physical situations. Learn about situations in low temperatures. Demonstrate tentative problem solving skills in above areas.
Vector Calculus & Analog Electrodynamics	Same as above	Understand the basic concepts of Mathematical Physics and their applications in physical situations. Understand the basic laws of Electrodynamics and be able to perform calculations using them. Understand the basic transistor biasing, operational amplifiers and their applications. Understand the basic concept of oscillators and be able to perform calculations using them. Demonstrate quantitative problem solving skill in all the topics covered.
Applied Physics – I	Same as above	Students will be exposed to contextual real life problems. Students will appreciate the role of Physics in Interdisciplinary Areas related to Material Physics, Biophysics, and Acoustics etc. The learner will understand the scope of the subject in Industry & Research. Experimental learning opportunities will be faster. Will prompt creative thinking and spirit of inquiry.
Applied Physics – I	Same as above	Students will be exposed to contextual real life problems. Students will appreciate the role of Physics in Interdisciplinary Areas related to Material Physics,

		Biophysics, and Acoustics etc. The learner will understand the scope of the subject in Industry & Research. Experimental learning opportunities will be faster. Will prompt creative thinking and spirit of inquiry.
Practical	Same as above	Understand and practice skills while performing experiments. Understand the use of apparatus and handle them without fear and hesitation. Correlate Physics theory with practical application. Understand the concept of errors and their estimation.

ZOOLOGY

Fundamentals of Genetics, Chromosomes and Heredity, Nucleic acids	1. To introduce basic terms of genetics. To study Mendelian principles of inheritance and other forms and pattern of inheritance. 2. To familiarize the learners with the structure, types and classification of chromosomes. To introduce the concept of sex determination and its types, sex influenced and sex limited genes. 3. To introduce the learner to the classical experiments proving DNA as the genetic material. To make the learner understand the structure of nucleic acids and the concept of central dogma of molecular biology. To familiarize the learner with the concept of gene expression	1. Learner shall comprehend and apply the principles of inheritance to study heredity. Learner will understand the concept of multiple alleles, linkage and crossing over. 2. Learner will comprehend the structure of chromosomes and its types. Learner shall understand the mechanisms of sex determination. Learner would be able to correlate the disorders linked to a particular sex chromosome. 3. Learner will understand the importance of nucleic acids as genetic material. The learner shall comprehend and appreciate the regulation of gene expressions.
Study of Nutrition and Excretion, Respiration and circulation, Control and coordination, Locomotion and Reproduction	1. To introduce the concepts of physiology of nutrition, excretion and osmoregulation. To expose the learners to various nutritional apparatus, excretory and osmoregulatory structures in different classes of organisms. 2. To introduce the concepts of physiology of respiration and¬ circulation. To expose the learner to various respiratory and circulatory structures in different classes of organisms. 3. To introduce the concepts of	1. Learner would understand the increasing complexity of¬ nutritional, excretory and osmoregulatory physiology in evolutionary hierarchy. 2. Learner would be able to correlate the habit and habitat with¬ nutritional, excretory and osmoregulatory structures. Comparative study of Nutritional Apparatus (structure and function). 3. Learner would understand

	physiology of control and coordination and locomotion and reproduction. To expose the learner to various locomotory and reproductive structures in different classes of organisms	the increasing complexity of respiratory¬ and circulatory physiology in evolutionary hierarchy. Learner would be able to correlate the habit and habitat with respiratory and circulatory structures. Comparative study of Respiratory organs (structure and function). 4. Learner would understand the process of control and coordination¬ by nervous and endocrine regulation. Learner would be fascinated by various locomotory structures found in the animal kingdom. Learner would be acquainted with various reproductive strategies present in animals
Ethology, Parasitology, Economic Zoology	1. To equip learners with a sound knowledge of how animals interact with one another and their environment. To enable the learners to understand different behavioural patterns. 2. To acquaint learners with the concepts of parasitism, their relationship with environment. To make learners aware about the modes of transmission of parasites. To disseminate information on economic aspects of zoology like apiculture, vermiculture, dairy science. To encourage young learners for selfemployment.	1. Learners would gain an insight into different types of animal behaviour and their role in biological adaptations. 2. Learners would be sensitized to the feelings instrumental in social behavior. 3. Learners would understand the general epidemiological aspects of parasites that affect humans and apply simple preventive measures for the same. Learners would comprehend the life cycle of specific parasites, the symptoms of the disease and its treatment. 4. Learners would gain knowledge on animals useful to mankind and the means to make the most of it. Learners would learn the modern techniques in animal husbandry. Learners would be pursuing entrepreneurship as careers

CHEMISTRY

Paper I General Chemistry 1. Chemical Thermodynamics-II 2. Electrochemistry 3. Chemical Bonding	1. Thermodynamic parameters and their applications 2. Principles of electrochemistry 3. Principles of theories of bonding to different systems	1. Enumerate and define the various thermodynamic parameters and explain their applications 2. Apply the principles of

4. Reactions and reactivity of halogenated hydrocarbons
5. Alcohols, phenols and epoxides

Paper II General Chemistry
1. Chemical Kinetics-II
2. Solutions
3. Chemistry of Boron compounds
4. Chemistry of Silicon and Germanium
5. Chemistry of Nitrogen family
6. Carbonyl Compounds

Paper III Basics of Analytical Chemistry
1. Introduction to Analytical Chemistry and Statistical
2. Treatment of analytical data-I
3. Classical Methods of Analysis
4. Instrumental Methods-I

4. Reactivity of functionalised compounds like halides, alcohols, phenols, epoxides, carbonyl derivatives, carboxylic acids, sulphonic acids, amines, diazonium salts, organometallics and heterocyclics.
5. Principles of chemical kinetics
6. Thermodynamic principles to solution chemistry
7. Chemistry of main group elements and transition metals
8. Structure and bonding in coordination compounds
9. Principles of solid state to determine structures of crystals
10. Mechanisms involved in catalysis
11. Behaviour of ions in aqueous medium
12. Preparation of sample for analysis and selection of a suitable method like titrimetry, gravimetry, or instrumental for analysis
13. Principles, construction and working of instruments
14. Basis of separation techniques and use in techniques such as electrophoresis, chromatography etc.
15. Statistical methods to analytical data and Nature and extent of errors

electrochemistry to ionic solutions
3. Describe and apply principles of theories of bonding to different systems
4. Explain and predict reactions and reactivity of functionalised compounds like halides, alcohols, phenols, epoxides, carbonyl derivatives, carboxylic acids, sulphonic acids, amines, diazonium salts, organometallics and heterocyclics.
5. Apply the principles of chemical kinetics and predict the effect of various factors on reaction rates.
6. Apply thermodynamic principles to solution chemistry
7. Describe chemistry of main group elements and transition metals
8. Explain structure and bondingin coordination compounds
9. Apply principles of solid state to determine structures of crystals
10. Describe mechanisms involved in catalysis
11. Explain behaviour of ions in aqueous medium
12. Identify and prepare a sample for analysis and select a suitable method like titrimetry, gravimetry, or instrumental for analysis
13. Describe the principles, construction and working of instruments
14. Describe the basis of separation techniques and use them in techniques such as electrophoresis, chromatography etc.
15. Apply statistical methods to analytical data and determine nature and extent of errors
16. Select a method of analysis
17. Decide how to identify a sample and prepare it for

		analysis
		18. Select a procedure for analysis
		19. Identify sources of possible errors in the results obtained.
Practical 1. To verify Ostwald's dilution law for weak acid conductometrically 2. To determine dissociation constant of weak acid conductometrically. 3. To determine the critical solution temperature (CST) of phenol - Water System. 4. To determine the energy of activation of acid catalyzed hydrolysis of methyl acetate. 5. To investigate the reaction between $K_2S_2O_8$ and KI with equal initial concentrations of the reactants 6. To determine solubility of sparingly soluble salts (any two) conductometrically. 7. Identification of cations in a given mixture and analytically separating them [From a mixture containing not more than two of the following: Pb(II), Ba(II), Ca(II), Sr (II), Cu(II), Cd(II), Mg(II), Zn(II), Fe(II), Fe(III), Ni(II), Co(II) Al(III), Cr(III)] 8. Crystallisation of potassium iodate and to estimate its purity before and after the separation. 9. Estimation of total hardness 10. Investigation of the reaction between copper sulphate and sodium hydroxide (Standard EDTA solution to be provided to the learner). 11. Short organic preparation and their purification. 12. Gravimetric estimation 13. Colorimetric determination 14. Determination of buffer capacity of acid buffer and basic buffer.	1. Instrumental methods to determine thermodynamic parameters 2. Identification of cations and anions from a binary salt mixture 3. Crystallisation for purification 4. Synthesis and purify organic compounds 5. Synthesis of complex compounds 6. Analysis of a bifunctional organic compound 7. Instrumental methods for analysis 8. Paper chromatography for separation of cations	1. Use instrumental methods to determine thermodynamic parameters 2. Identify cations and anions from a binary salt mixture 3. Use crystallisation for purification 4. Synthesise and purify organic compounds 5. Synthesise complex compounds 6. Analyse a bifunctional organic compound 7. Use instrumental methods for analysis 8. Use paper chromatography for separation of cations

15. Estimation of Aspirin Gravimetric estimation of barium ions using K_2CrO_4 as precipitant		

MATHEMATICS

MATHS I (CalculusIII) Unit I: Functions of several variables Unit II: Differentiation Unit III Applications	1. To study functions defined inn-Dimension scalar and vector functions, their properties 2. To study differentiation of vector and scalar functions 3. To study Mean value theorems, and other applications of Vector and scalar functions	1. Students should be able to understand concept of 2-Dimensional curve and 3- D curve, Vector andscalar field 2. Students should be able to find derivatives of multivariable functions
Maths II (Algebra III) Unit I: Linear Transformations andMatrices Unit II: Determinants Unit III: Inner ProductSpaces	1. To understand the rank – nullity theorem for linear transformations between finite dimensional Vector Spaces. 2. To understand linear isomorphism and know about isomorphic Vector Spaces. 3. To understand elementary matrices and its use to solve a matrix equation. 4. To understand the solution of a homogeneous linear system and solution of a non-homogeneous linear system in terms of matrices. 5. To understand the need of determinants for determining the nature of the solution set of two and three dimensional linear systems. 6. To understand determinants of two by two and three by three square matrices as area and volume generated by corresponding row /column vectors. 7. To understand the properties of determinants. 8. To understand inner product spaces. To understand Cauchy Schwarz inequality, triangle inequality and Pythagoras theorem for vectors in anormed vector space where the norm is	1. Students will be able to understand the rank –nullity theorem for linear transformations between finite dimensional Vector Spaces. 2. Students will be able to understand linear Isomorphism and will be able to show isomorphism between isomorphic Vector Spaces. 3. Students will be able to use elementarymatrices to solve a matrix equation. 4. Students will be able to find the solution ofa homogeneous linear system and solution of a non-homogeneous linear system using matrices. 5. To understand the need of determinants for determining the nature of the solution set of two and three dimensional linear systems 6. To understand determinants of two by twoand three by three square matrices as area and volume generated by corresponding row /column vectors. 7. To understand the properties of determinants. Students will be able to understand

	obtained from the definition of inner product on that Vector Space. 9. To understand orthogonality of vectors of a normed Vector space and projection of Vectors about a line. 10. To understand orthogonal complements and the Gram Schmidt Orthogonalization process to obtain an orthogonal basis.	inner product inner product function. Students will be able to verify Cauchy Schwarz inequality, triangle inequality and Pythagoras theorem for vectors in a normed vector space where the norm is obtained from the definition of inner product on that Vector Space. 8. Students will be able to check orthogonality of vectors of a normed Vector space and determine projection of Vectors about a line. 9. Students will be able to determine orthogonal complements and obtain an orthogonal basis froma given basis using the Gram Schmidt Orthogonalization process.
Maths III (DISCRETE MATHEMATICS) Unit I: Permutations and RecurrenceRelation Unit II: PreliminaryCounting Unit III: Advanced Counting	1. To study recurrence relation and to study permutation as a function 2. To study counting principles	Students will be able to apply counting principles in solving mathematical problems
FOUNDATION COURSE		
1. Human Rights Violations 2. Environmental Concern 3. Science and Technology 4. Soft skills for effective personal communication 5. Project Work	1. By the end of this module, students are aquainted and thorough with rights, liabilities and social context of various vulnerable groups in India such asSCs, STs, Women, Minorities etc. 2. Students should be able to understand Disasters, various kinds and methods of Disaster management 3. Students learn about development of science, relvance of science and	1. Students are introduced to basic reasons of Human Right Violations and their resistance, legally and constitutionally. 2. Students are able to analyse situations which bring forth disasters and how to effectively manage them 3. Students are able to appreciatethe application of science and develop a scientific temper. 4. Students are expected to be

	technology in society and how to combat superstitions using scientific knowledge.	have understanding of basic level communication skills
	4. Students understand basic concepts of communication and soft skill.	5. Students get hands on experience to many issues which they are learning in class rooms.
	5. Students have to do a project on poster presentation, PPT presentation or street play on any contemporary issues. They can do any other community outreach programme or even an interview with a famous scientist or a visit to a museum, science laboratory, orphanage old age home etc	

SEMESTER IV

PHYSICS

Optics & DigitalElectronics	To develop analytical abilities towards real world problems. To familiarize with current & recent scientific and technological developments. To enrich knowledge through problem solving, hand-on activities, study visits, projectsetc.	Understand the Diffraction & Polarization processesand their applications in physical situations. Understand the applications of Interference in designing and working of interferometers. Understand the resolving power of different optical instruments. Understand the working of digital circuits. Use of IC555 timer for various timing applications. Demonstrate quantitative problem skills in all the topics covered.
Quantum Mechanics	Same as above	Understand the postulates of Quantum Mechanics and its importance in explaining significant phenomena in Physics. Demonstrate quantitative problem solving skills in all the topics covered.
Geophysics, Microprocessors & RadiationPhysics	Same as above	Understand the structure of earth and the effects of earth's magnetic field onreal life situations. Understanding the working of Microprocessor and Basic Assembly Language Programming. Understand the basics of RadiationScience and the application of the same in

		communication.
Geophysics, Microprocessors & RadiationPhysics	Same as above	Understand the structure of earth and the effects of earth's magnetic field on real life situations. Understanding the working of Microprocessor and BasicAssembly Language Programming. Understand the basics of RadiationScience and the application of the same in communication.
Practical	Same as above	Understand &practice skills while performing experiments. Understand theuse of apparatus and handle them without fear and hesitation. Correlate Physics theory concepts to practical application. Understand the theory of errors and their estimation.

ZOOLOGY

Origin and Evolution of Life, Population and Evolutionary Genetics, Scientific Attitude, Methodology, Scientific Writing and Ethics in Scientific Research	1. To impart scientific knowledge about how life originated and evolved on our planet. 2. To develop knowledge and understanding of genetic variability within a population and how the change in the gene pool leads to evolution of species. 3. To inculcate scientific temperament in the learner	1. Learner will ponder and critically view the different theories of evolution. Learner will gain insight about origin of life. 2. Learner would understand the forces that cause evolutionary changes in natural populations. Learner would comprehend the mechanisms of speciation. Learner will be able to distinguish between microevolution, macroevolution and megaevolution. 3. The learner shall develop qualities such as critical thinking and analysis. The learner will imbibe the skills of scientific communication and he/she will understand the ethical aspects of research
Cell Biology	1. To study the structural and functional organization of cell with an emphasis on nucleus, plasma membrane and cytoskeleton. 2. To acquaint the learner with ultrastructure of cell organelles and their functions.	1. Learner would acquire insight of transport mechanisms for the maintenance and composition of cell. 2. Learner would appreciate the intricacy of endomembrane system.

	3. To give learner insight into the structure of biomolecules,¬ and their role in sustenance of life	3. The learner will realize the importance of biomolecules and¬ their clinical significance
Comparative Embryology, Aspects of Human Reproduction, Pollution and its effect on organisms	1. To acquaint the learner with key concepts of embryology. 2. To acquaint the learners with different aspects of human reproduction. 3. To provide a panoramic view of impact of human activities leading to pollution and its implications	1. Learner will be able to understand and compare the different pre- embryonic stages. Learners will able to understand human reproductive physiology. The learners will be sensitized about the adverse effects of pollution and measures to control it

CHEMISTRY

Paper I General Chemistry 1. Electrochemistry-II 2. Comparative Chemistry of the transition metals 3. Coordination Chemistry 4. Carboxylic Acids and their Derivatives 5. Sulphonic acids: [4L] Paper II General Chemistry 1. Solid State 2. Catalysis 3. Ions in aqeous medium 4. Uses and Environmental Chemistry of volatile Oxides and oxo-acids 5. Nitrogen containing compounds and heterocyclic compounds Paper III Basics of Analytical Chemistry 1. Separation Techniques in Analytical Chemistry 2. Instrumental Methods-II 3. Statistical treatment of analytical data --II	1. Thermodynamic parameters and their applications 2. Principles of electrochemistry 3. Principles of theories of bonding to different systems 4. Reactivity of functionalised compounds like halides, alcohols, phenols, epoxides, carbonyl derivatives, carboxylic acids, sulphonic acids, amines, diazonium salts, organometallics and heterocyclics. 5. Principles of chemical kinetics 6. Thermodynamic principles to solution chemistry 7. Chemistry of main group elements and transition metals 8. Structure and bonding in coordination compounds 9. Principles of solid state to determine structures of crystals 10. Mechanisms involved in catalysis 11. Behaviour of ions in aqueous medium 12. Preparation of sample for analysis and selection of a suitable method like titrimetry, gravimetry, or instrumental for analysis 13. Principles, construction and working of instruments 14. Basis of separation techniques and use in techniques such as electrophoresis, chromatography etc. 15. Statistical methods to analytical data and Nature and extent of	1. Enumerate and define the various thermodynamic parameters and explain their applications 2. Apply the principles of electrochemistry to ionic solutions 3. Describe and apply principles of theories of bonding to different systems 4. Explain and predict reactions and reactivity of functionalised compounds like halides, alcohols, phenols, epoxides, carbonyl derivatives, carboxylic acids, sulphonic acids, amines, diazonium salts, organometallics and heterocyclics. 5. Apply the principles of chemical kinetics and predict the effect of various factors on reaction rates. 6. Apply thermodynamic principles to solution chemistry 7. Describe chemistry of main group elements and transition metals 8. Explain structure and bondingin coordination compounds 9. Apply principles of solid state to determine structures of crystals 10. Describe mechanisms involved in catalysis 11. Explain behaviour of ions in

	errors	aqueous medium
		12. Identify and prepare a sample for analysis and select a suitable method like titrimetry, gravimetry, or instrumental for analysis
		13. Describe the principles, construction and working of instruments
		14. Describe the basis of separation techniques and use them in techniques such as electrophoresis, chromatography etc.
		15. Apply statistical methods to analytical data and determine nature and extent of errors
		16. Select a method of analysis
		17. Decide how to identify a sample and prepare it for analysis
		18. Select a procedure for analysis
		19. Identify sources of possible errors in the results obtained.
Practical 1. To determine standard EMF and the standard free energy change of Daniel cell potentiometrically. To determine the amount of HCl in the given sample potentiometrically. 2. Compare the strengths of HCl and H_2SO_4 by studying kinetics of acid hydrolysis of methyl acetate. 3. Inorganic preparation – Nickel dimethyl glyoxime using microscale method. 4. Complex cation – *Tris* (ethylene diamine) nickel (II) thiosulphate. 5. Complex anion – Sodium Hexanitrocobaltate (III) The aim of this experiment is to understand the preparation of a soluble cation (sodium) and a large anion hexanitrocobaltate(III) and its use to precipitate a large cation (potassium)	1. Instrumental methods to determine thermodynamic parameters 2. Identification of cations and anions from a binary salt mixture 3. Crystallisation for purification 4. Synthesis and purify organic compounds 5. Synthesis of complex compounds 6. Analysis of a bifunctional organic compound 7. Instrumental methods for analysis 8. Paper chromatography for separation of cations	1. Use instrumental methods to determine thermodynamic parameters 2. Identify cations and anions from a binary salt mixture 3. Use crystallisation for purification 4. Synthesise and purify organic compounds 5. Synthesise complex compounds 6. Analyse a bifunctional organic compound 7. Use instrumental methods for analysis 8. Use paper chromatography for separation of cations

6. Inorganic salt – Calcium or magnesium oxalate using PFHS technique 7. Qualitative Analysis of bi-functional organic compounds on the basis of 8. Tools of Analytical Chemistry-II Paper chromatography 9. Conductometric titration: 10. Potentiometry 11. Gravimetric estimation		

MATHEMATICS

Maths I (Calculus-IV) Unit I: Riemann Integration Unit II: Indefinite Integrals and Improper Integrals Unit III: Beta and Gamma Functions And Applications	1. To study how the concept of partition is used for Integration 2. To study Fundamental theorem of Calculus and its application 3. To study improper integrals, their test of convergence, Special functions	1. Students should be able to understand concept of Riemann Integration 2. Students should be able to determine length of the curve, area and volume of surfaces Students will be able to use improper integrals in their problem solving
Maths II ALGEBRA IV Unit I Groups and Subgroups Unit II Cyclic Groups and Cyclic subgroups Unit III Lagrange's Theorem and Group Homomorphism	1. To understand groups, subgroups, abelian and non abelian groups and their examples. 2. To understand geometry of the dihedral groups of order 3 and 4. 3. To understand the concept of order of an element of a group finite and infinite groups, generator of cyclic groups, Center of a group. 4. To understand cyclic groups and cyclic subgroups. 5. To understand groups of prime order are cyclic. 6. To understand that a finite cyclic group has one and only one subgroup of an order which is a divisor of order of that cyclic group. 7. To understand and be able to check homomorphism between groups. 8. To check isomorphism between groups.	1. Students will be able to show that underlying binary operation defined on a non empty set makes it a groups or subgroup 2. Students will be able to find out whether a group is abelian or non abelian groups 3. Students will be able to give examples of different types of groups by defining a binary operation on a non-empty set. 4. Students will be able to understand geometry of the dihedral groups of order 3 and 4. 5. To understand the concept of order of an element of a group. 6. Students will be able to check whether a given group is a cyclic group or a cyclic subgroup. 7. Students will be able to understand groups of prime order are cyclic. 8. Students will be able to understand that a finite cyclic group has one and only one subgroup of an order which is a divisor of order of that cyclic group and hence determine all subgroups of a cyclic group

		9. Students will be able to check homomorphismbetween groups. 10. Students will be able to check isomorphism between groups. 11. Students will be able to determine kernel ofa homomorphism and also image of a homomorphism between groups. . 12. Students will be able to use the Lagrange's theorem for groups to determine its subgroups.
Maths III Ordinary differentialequations Unit I: First order First degree Differential equations UNIT II: Second order Linear Differential equations Unit III: Linear System of Ordinary Differential Equations	To study differential equations and their solutions and applications	Students should be able to apply First order and second order Differential equations and apply it in Physical Sciences and biological Sciences
FOUNDATION COURSE		
1. Human Rights 2. Environmental Concern 3. Science and Technology 4. Preparation for competitive examination 5. Project Work	1. By the end of this module, students are acquainted and thorough with modern socio-legal concepts like Consumer Protection, RTI, PIL etc. 2. Students are introduced to various concept environmental studies and protection like, anthropocentrism, eco centrism, bio centrism, co-feminisms etc. 3. Students understand relevance of various technologies such as laser information technology, space technology etc. and its scientific base. 4. Students are introduced to basic soft skills and information about competitive examination 5. Students have to do a project on poster presentation, PPT presentation or street play on	1. Students are introduced to basic Human Rights Protection available to a new age citizens. 2. Students are expected to develop a sophisticated approach towards environment and concern for nature. 3. Students are able to appreciate the application of science and develop a scientific temper. 4. Students are expected to be have understanding of basic level communication skills and general idea about competitive examinations which they can attempt. 5. Students get hands on experience to many issues which they are learning in class rooms.

	any contemporary issues. They can do any other community outreach programme or even an interview with a famous scientist or a visit to a museum, science laboratory, orphanage old age home etc	

BACHELOR OF SCIENCE
COURSE OUTCOMES

T.Y.B.Sc

SEMESTER V		
CHEMISTRY		
Paper I Physical Chemistry Paper II Inorganic Chemistry Paper III Organic Chemistry Paper IV Analytical Chemistry Paper V Synthetic Drugs and Dyes	1. Principles of spectroscopy to describe properties of molecules 2. Colligative properties to determine parameters of molecules 3. Theories of classical andquantummechanics 4. Importance of symmetry in Chemistry 5. Describe superconductivity 6. Chemistry of inner transition elements 7. Reactivity in metal complexes 8. Principles of organic reaction mechanism to synthesis of organic compounds 9. IUPAC names for compounds 10. Green chemistry principles 11. Spectroscopic data to elucidate structure of organic compounds 12. Quality concepts to industry 13. Titrimetry, optical methods, TGA etc for analysis of compounds	1. Apply principles of spectroscopy to describe properties of molecules 2. Use Colligative properties to determine parameters of molecules 3. Compare theories of classical and quantum mechanics 4. Explain the importance of symmetry in Chemistry 5. Describe superconductivity 6. Describe the chemistry of inner transition elements 7. Explain reactivity in metal complexes 8. Apply the principles of organic reaction mechanism to synthesis of organic compounds 9. Write IUPAC names for compounds 10. Use green chemistry principles 11. Apply spectroscopic data to elucidate structure of organic compounds 12. Apply quality concepts to industry 13. Apply titrimetry, optical methods, TGA etc for analysis of compounds
Practical	1. Colligative properties 2. Chemical Kinetics 3. Surface phenomena 4. Potentiometry Conductometry 5. Conductometry 6. pH-metry 7. Inorganic preparations 8. Percentage purity of the given water soluble salt and qualitative detection 9. Separation of Binary solid-solid mixture	1. Measure colligative properties 2. Perform instrumental methodsof analysis 3. Synthesise inorganic compounds and determine percentage purityof the given sample 4. Separate components of a binary mixture of organic compounds

	SEMESTER VI	
	CHEMISTRY	
Paper I: Physical Chemistry Paper II: Inorganic Chemistry Paper III: Organic Chemistry Paper IV: Analytical Chemistry Paper V: SyntheticDrugs and Dyes	1. Principles of spectroscopy to describe properties of molecules 2. Colligative properties to determine parameters of molecules 3. Theories of classical andquantummechanics 4. Importance of symmetry in Chemistry 5. Describe superconductivity 6. Chemistry of inner transition elements 7. Reactivity in metal complexes 8. Principles of organic reaction mechanism to synthesis of organic compounds 9. IUPAC names for compounds 10. Green chemistry principles 11. Spectroscopic data to elucidate structure of organic compounds 12. Quality concepts to industry 13. Titrimetry, optical methods, TGA etc for analysis of compounds	1. Apply principles of spectroscopy to describe properties of molecules 2. Use Colligative properties to determine parameters of molecules 3. Compare theories of classical and quantum mechanics 4. Explain the importance of symmetry in Chemistry 5. Describe superconductivity 6. Describe the chemistry of inner transition elements 7. Explain reactivity in metal complexes 8. Apply the principles of organic reaction mechanism to synthesis of organic compounds 9. Write IUPAC names for compounds 10. Use green chemistry principles 11. Apply spectroscopic data to elucidate structure of organic compounds 12. Apply quality concepts to industry 13. Apply titrimetry, optical methods, TGA etc for analysis of compounds
Practical	1. Colligative properties 2. Chemical Kinetics 3. Surface phenomena 4. Potentiometry Conductometry 5. Conductometry 6. pH-metry 7. Inorganic preparations 8. Percentage purity of the given water soluble salt and qualitative detection 9. Separation of Binary solid-solid mixture	1. Measure colligative properties 2. Perform instrumental methodsof analysis 3. Synthesise inorganic compounds and determine percentage purityof the given sample 4. Separate components of a binary mixture of organic compounds

****