SANT GADGE MAHARAJ MAHAVIDYALAYA HINGNA DIST. NAGPUR
PROGRAMME OUTCOMES

NAME OF THE PROGRAMME: BACHELOR OF SCIENCE

3 YEARS DEGREE COURSE

COMPULSORY ENGLISH: FIRST 2 SEMESTERS

Program Outcome:

1. Being a skill based subject, the four skills of language viz. Listening, Speaking, Reading and Writing need to be developed in the students.
2. The students will have the ability to read, understand, analyze and interpret the stories, essays and poems of the English language from the text.
3. They should be able to write correctly and clearly with the knowledge of using punctuation marks in writing essays and constructing paragraphs.
4. The students should be able to do intensive as well as extensive reading.
5. Language learning should develop their imagination
6. Learner's vocabulary is improved.
7. Being a skill based subject, the four skills of language viz. Listening, Speaking, Reading and Writing should be developed in the students.
8. The students will have the ability to read, understand, analyze and interpret the stories, essays and poems of the English language from the text.
9. They should be able write correctly and clearly with the knowledge of using punctuation marks in writing essays and constructing paragraphs.
10. The students should be able to do intensive as well as extensive reading.
11. Language learning should develop their imagination
12. It should improve the students' vocabulary.
13. It should develop their comprehensive and composition skills.
14. Language learning should inspire the students' to communicate in English.

Program Specific Outcome:

1. The students will apply the four skills of Listening, Speaking, Reading and Writing in their day to day life.
2. They will apply their critical thinking whilst reading and writing.
3. Better oral and communicative skills will help them to use grammatically correct sentences to acquire a good command over English Language.
4. The students will apply the four skills of Listening, Speaking, Reading and Writing in their day to day life.
5. They will apply their critical thinking whilst reading and writing.
6. Better oral and communicative skills will help them to use grammatically correct sentences to acquire a good command over English.

Course Outcome:

1. The students will be adept in using the four skills of language; Listening, Speaking Reading and Writing effectively.
2. Enriched with linguistic skills, the students will begin to use English in a better and enhanced way.
3. They will be able to make use of the English language in their professional lives.

4. The students will also gain proficiency in language so as to enable them to face and use English easily in a global scenario.
5. The critical thinking ability of the students will be developed.

6. Good exposure to writing skills will enhance their creative ability, which in turn will enable them to write better essays, paragraphs, reports etc.
7. Exposing them to prose and poetry in the text will develop in them a taste for reading and appreciation for poetry.
8. Poetry will refine the aesthetic and finer sensibilities enabling them to become better human beings.
9. Language learning will help students enrich their vocabulary.

COMPULSORY ENGLISH (LANG.)	**SEMESTER I**	1. Students will be learn to use the four skills of language; Listening, Speaking Reading and Writing effectively. 2. Students will learn proper and correct usage of sentences of English. 3. They will learn more new words which will enrich their vocabulary. 4. Poetry will develop their sense of appreciation for rhythm and rhyme. 5. They will be inspired to read books.
	SEMESTER II	1. They will be able to make use of the English language in a professional way. 2. Learner will gain proficiency in language so as to enable them to face and use English easily in a global scenario. 3. The critical thinking ability of the students will be developed. 4. Good exposure to writing skills will enhance their creative ability. 5. Poetry will refine the aesthetic and finer sensibilities enabling them to become better human beings. Language learning will help students to enrich their vocabulary and refine their linguistic ability.

English being a skill based subject which is an integration the four skills of Listening, Speaking, Reading and Writing (LSRW).
Teaching in B.Sc. Sem I & Sem II is done in accordance with the prescribed syllabus of RTMNU. The given textbook comprises of Unit I - Prose, Unit II – Poetry. In addition Unit III is

Comprehension, Unit IV – Grammar and Unit V – Vocabulary. These are the five areas in which students are tested.

Department of Chemistry

Concept Applicability: The under-graduate Course is intended to involve application of scientific concepts in real life as well as to take decisions at simple as well as complex situations.

Science (Chemistry) Knowledge: B.Sc. graduates studies possesses inclusive knowledge of science over a variety of grounds, with inside and out learning associated with inorganic Chemistry, Organic Chemistry and Physical Chemistry, while exhibiting scientific enquiry.

Methods communication: A science graduate is likely to communicate the methods of science and current scientific knowledge to the research and development by further examination.

Skill Development: Undergraduate Chemistry Course is intended to develop the skill as well as the ability to understand the principles and suitable methods of research, study and design, to work out problems in science.

Professional characteristics: Undergraduate chemistry programme is proposed to know, analyze and communicate the value of the proficient, analytical expert, educators, researchers, employers, employees.

Environment and sustainability: To know the value and impact of the specialized chemistry solutions in public and environmental background, and exhibit the knowledge of, and require for sustainable development.

Programme Specified Outcomes	
PSOs1	**Concept Applicability**: The under-graduate Course is intended to involve application of scientific concepts in real life as well as to take decisions at simple as well as complex situations.
PSOs2	**Science (Chemistry) Knowledge:** B.Sc. graduates studies possesses inclusive knowledge of science over a variety of grounds, with inside and out learning associated with inorganic Chemistry, Organic Chemistry and Physical Chemistry, while exhibiting scientific enquiry.
PSOs3	**Methods communication:** A science graduate is likely to communicate the methods of science and current scientific knowledge to the research and development by further examination.
PSOs4	**Skill Development:** Undergraduate Chemistry Course is intended to develop the skill as well as the ability to understand the principles and suitable methods of research, study and design, to work out problems in science.
PSOs5	**Professional characteristics:** Undergraduate chemistry programme is proposed to know characteristics, analyze and communicate the value of the proficient, analytical expert, educators, researchers, employers, employees.
PSOs6	**Environment and sustainability:** To know the value and impact of the specialized chemistry solutions in public and environmental background, and exhibit the knowledge of, and require for sustainable development.

Program Matrix

Name of the programme: B.Sc Subject: Chemistry

Session: 2018-19

(Low Correlation 1-L, Mid Correlation 2-M, High Correlation 3-H)

	Course Outcome	Program Outcome							
		PSOs Specified						PSOs Independent	
		1	2	3	4	5	6	1	2
	Course Name								
CH-101	**Course Name : Inorganic Chemistry**								
	➢ Be able to understand the applicability of concept of atomic structure: Matter Waves, uncertainty principle. Wave equation, significance of Ψ and Ψ2, Quantum numbers, shapes of s, p, and d orbitals, rule of maximum multiplicity. Electronic Configuration of elements and ions.	H	H	M	L	M	-	-	-
	➢ To enables students to learn the conception of covalent bond, periodic table and its properties, S-block and P-block elements and chemistry of hydrides, oxides and oxy-acids.	H	M	H	H	M	H	-	-
CH-102	**Course Name : Physical Chemistry**								
	➢ Be able to understand basic concepts of thermodynamically aspects, definitions, some common thermodynamic terms, first and second thermodynamic laws, and thermo chemistry.	H	L	M	M	H	M	-	-
	➢ To enables students to learn the conception of Postulates of kinetic theory of gases, various gas laws from kinetic gas equations, Difference ideal and real gases.	H	M	L	M	H	M	-	-
	➢ Be able to understand basic concepts of structure of liquids, Difference between liquid crystals, solid and liquids. Properties of liquid, Concept of viscosity, surface tension, methods of determination of surface tension and viscosity.	H	M	H	L	M	H	-	-
	➢ To ensure students understands basic concepts of surface chemistry and catalysis, Introduction, Factors affecting adsorption of Gases by Solids, Difference between physical and chemical adsorptions, Introduction, Positive and negative catalysis. General characteristics of catalyst. Promoters & Inhibitors.	H	M	H	H	M	L	-	-
CH-103	**Laboratory Course**								
	➢ To ensure students understands practical techniques and methods of Practical- I (Inorganic Chemistry): Semi micro Qualitative Analysis	H	M	H	L	M	M	-	-
	➢ Practical- II (Physical Chemistry) To determine the heat of solution of potassium nitrate calorimetrically, To determine the heat of ionization of acetic acid calorimetrically, viscosity of unknown liquid by Ostwald viscometer, the percentage composition of given binary mixture (Ethanol-water) by viscosity method. surface tension of a given liquid by drop number method (Stalagmometer method), To compare cleansing power of two samples of detergent.	H	L	M	M	H	L	L	-

	➢ To determine refractive index, specific and molar refraction of given liquids by Abbe's refractometer, To study the adsorption of oxalic acid on activated charcoal and verify the Freundlich adsorption isotherm.	H	H	M	L	M	H	-	-
CH-201	**Course Name: Organic Chemistry**								
	➢ To ensure students to understands basic concepts of organic reactions Structure and Bonding: Hybridization,Bond lengths, bond angles and bond energies.	H	M	H	M	L	M	-	-
	➢ Mechanism of Organic Reactions: Homolytic & heterolytic bond fission Electrophiles & nucleophiles, Reactive intermediates viz carbocations, carbanions, free radicals, carbenes.	H	M	M	H	H	M	-	-
	➢ Be able to understand the applicability of Stereochemistry of Organic Compounds Concept of isomerism. Types of isomerism with suitable examples. Optical isomerism-elements of symmetry, molecular chirality, enantiomers, stereogenic centre, Geometrical isomerism, Conformational isomerism: Conformational analysis.	M	H	H	H	M	M	-	-
	➢ To ensure students understands basic concepts of Alkanes: IUPAC nomenclature of branched and unbranched alkanes. Alkyl group, methods of formation, chemical reactions of alkanes: halogenation, nitration, sulphonation, isomerization, cyclization, aromatization, pyrolysis, cracking and oxidation. Cycloalkanes: Nomenclature. Baeyer's strain theory and its limitations. Ring strain in small rings cyclopropane and cyclobutane. Theory of stainless rings. Conformational analysis of cyclohexane, axial and equatorial bonds. **Alkenes:**Nomenclature of alkenes, methods of formation (ethylene & propylene) dehydrogenation of alkane, dehydrohalogenation of alkyl halides, dehydration of alcohol, dehalogenation of dihalides. Chemical reactions of alkenes (ethylene and propylene) - hydroboration, oxidation $KMnO_4$, HIO_4, Epoxidation, Ozonolysis, Hydroxylation, Polymerization, Substitution in allylic position of alkenes.	M	H	M	H	M	L	-	-
	➢ To understand the concept, applicability and reactions of Dienes **:** Nomenclature and classification of dienes. Methods of formation of 1, 3 - butadiene. Chemical reactions of butadiene - 1, 2 and 1, 4 additions, Diels-Alder reaction. **Alkynes:** Nomenclature, structure and bonding in Alkynes. Methods of formation of acetylene from calcium carbide, dehydrohalogenation of dihalides. Chemical reaction hydroboration, oxidation, metal ammonia reduction & polymerization. Oxyacetylene flame. Acidity of alkynes. B) Aromatic compounds and Aromaticity: Nomenclature of Benzene derivatives. Structure of benzene - Molecular formula and Kekule structure, Resonance structure, MO picture. Huckel rule – aromaticity, aromatic ions.Aromatic electrophillic substitution mechanism with energy profile diagram	M	H	M	H	M	L	-	-
CH – 202	➢ **Course Name: Physical Chemistry**								
	➢ To able to understand the concept of Second law of thermodynamics : Need for second law of thermodynamics, statements of second law of thermodynamics, Carnot's cycle and its efficiency, Carnot theorem, thermodynamic scale of temperature, concept of entropy, entropy change in reversible and irreversible processes, entropy change of the universe, entropy change for an ideal gas with change in P, V & T, entropy change during physical change, physical significance of entropy, entropy as criteria of spontaneity & equilibrium of a process. (B)Free energy functions: Work function (A) and Gibb's	H	M	L	H	H	H		

	free energy (G), Variation of work function with T and V, variation of Gibb's free energy with T and P. A and G as criteria for spontaneity and equilibrium of a process. Gibb's – Helmholtz equation & its applications. Chemical equilibrium: Law off mass action, law of chemical equilibrium, relationship between k_p and k_c. Van't-Hoffs reaction isotherm, relation between standard free energy change & equilibrium constant, effect of temperature on equilibrium constant , integrated form of Van't Hoff equation. ➢ Be able to understand the principles of Phase rule: Statement and meaning of the terms: Phase, component and degree of freedom, Derivation of Gibb's Phase rule. Applications of phase rule to one component system i) water system, ii) Sulphur system. Lead silver system, Pattinson's process for desilverization of lead. (B) Liquid-Liquid mixtures: Raoults law of ideal solutions, ideal liquid mixtures, Henry's law, non-ideal systems, azeotropes. Partial miscible liquids, lower & upper consolute temperature, effect of impurity on consolute temperature, Nernst distribution law, conditions for the validity of Nernst distribution law (Association and dissociation). ➢ To understand the concepts and applicability of Nuclear chemistry Composition of Nucleus, Mass defects, Nuclear binding energy, Average binding energy per nucleon, explanation of nuclear stability on the basis of graph between average binding energy per nucleon and atomic mass number. Nuclear reactions: Fission and fusion. Nuclear models: Shell model and Liquid drop model, comparison between them. Applications of radioisotopes in medicine, agriculture, carbon dating and structure determination. Molecular structure: Dipole moment, polar and non-polar covalent bond, Electrical polarization of molecules, Orientation of dipoles in an electric field. Determination of dipole moment. Application of dipole moment to %age ionic character, Geometry of molecules, study of geometrical isomers and substituted benzene molecules. ➢ Be able to understand the rate of reaction, factors affecting the rate of a reaction (concentration. temperature, pressure, solvent, light and catalyst). Order and molecularity of reaction. Reactions of zero order. Pseudo unimolecular reactions. Methods of determination of order of reaction: Integration method, differential method, graphical method, half life period and isolation method. Theories of chemical kinetics: concepts of activation energy. Arrhenius equation, Effect of temperature on rate of reaction. Collision theory of bimolecular reactions (hard sphere model). Transition state theory (equilibrium hypothesis). Expression for rate constant based on equilibrium constant and thermodynamic aspects. Lindeman's theory of unimolecular reactions.	M H H	H M L	L M M	M L M	M H M	M L M		
CH-203	➢ **Course Name: Laboratory Course**								
	➢ To enable students to learn Qualitative Analysis: Element detection (N, Cl , Br, F & S),Identification of functional groups (-COOH, Phenolic –OH,_-CHO, Aromatic -NH2, -CONH2) ,determination of M.P & B.P. Preparation: i) Hydrolysis : Preparation of Benzoic acid from Benzamide ,Preparation of Benzoic acid from Benzaldehyde , Bromination of Phenol. ➢ To determine the integral heat of solution of a salt at two concentrations, solubility of benzoic acid at different temperatures and to determine heat of solution of benzoic acid. To construct the phase diagram of three component system (Acetic acid-chloroform-water). To determine the critical solution temperature, distribution coefficient of Iodine between Water and Carbon tetrachloride/Kerosene, molecular state of benzoic acid in benzene by distribution method., rate constant of hydrolysis of methyl acetate in presence of acid and specific reaction rate of hydrolysis of ethyl acetate catalyzed by NaOH.	H L	M M	M M	L M	L H	M L	-	-
CH – 301	➢ **Inorganic Chemistry**								

	➢ To understand the basic concepts of Valence Shell Electron pair repulsion (VSEPR) Theory: Structure with respect to H_2O, NH_3, NH_4^+ ClF_3, SF_4, ICl_4^-.Preparation, properties and structure of Interhalogen compounds. Polyhalides (Structure of I_3^-, I_5^-, ICl_4^-) MO theory: LCAO approximation, wave equation for molecular orbitals. Difference between bonding and anti bonding MO in terms of energy and electron density distribution curves, order of energy levels in MO. Molecular Orbital diagrams for homonuclear diatomic molecules of elements (with Z = 1 to 9). Concepts of nonbonding MO in HF molecule. Coulson's MO diagram of CO and NO diatomic molecule.	H	M	M	M	M	L	-	-
	➢ Be able to understand the Chemistry of elements of first transition series: Characteristic properties of the elements of first transition series with reference to their: Electronic configuration, Atomic and ionic radii, Ionization potential, Variable oxidation states, Magnetic properties, Colour, Complex formation tendency and catalytic activity. Chemistry of elements of second and third transition series: Electronic configuration of 4d and 5d transition series.	H	M	L	M	L	M	-	-
	➢ Be able to understand the statistical Errors in Chemical Analysis: i) Random and Systematic errors, Explanation of terms: Accuracy and Precision, Uncertainty, Absolute and Relative errors, Mean, Median, Average and Standard deviations, Significant figures, numerical problems. ii) Statistical Test of Data: Q-test, 2.5d and 4d Rules for rejection of data. Non-aqueous solvents: Classification of solvents and characteristic reactions(acid base, redox & precipitation reactions) in Non-aqueous solvents with reference to i)Liquid Ammonia and ii) Liquid Sulphur dioxide.	M	M	M	L	L	L	-	-
	➢ Chemistry of Lanthanides and actinides: Position in periodic table, electronic configuration, Oxidation states, Atomic and ionic radii, Lanthanide contraction and its consequences, Complex forming tendency. Occurrence and separation of lanthanides (ion exchange and solvent extraction). Actinide contraction.	H	M	M	L	M	M	-	-
CH-302	**Course name: Organic Chemistry**								
	➢ Be able to understand the reation mechanism and Orientation: Activating (–OH, $–NH_2$) & deactivating (–Cl, $–NO_2$ –COOH) substituent's, their orientation and directive influence on further electrophilic substitution. Alkyl halides: Nomenclature, classification, methods of formation, chemical reactions. Mechanism of nucleophilic substitution reactions of alkyl halides SN^1 and SN^2 with energy profile diagrams. Polyhalogen compounds: Chloroform and carbon tetrachloride – formation and chemical reactions. Nuclear and side chain halogen derivatives of benzene (Aryl halides): Chlorobenzene and benzyl chloride preparation and reactions. Relative reactivity of alkyl halides vs aryl halides. Synthesis and uses of DDT and BHC.	H	M	L	M	L	L	-	-
	➢ To understand the reactions and applications of Alcohols: Classification and nomenclature, Dihydric alcohols: Nomenclature, methods of formation, chemical reactions of vicinal glycols, oxidative cleavage ($Pb(Oac)_4$ and HIO_4) and Pinacol – pinacolone rearrangement with mechanism. Trihydric alcohols : Nomenclature and methods of formation of Glycerol from (i) Propene and (ii) Hydrolysis of oils and fats, chemical reactions of glycerol with oxalic acid at two different temperatures, HI, HNO_3, dehydration. Phenols: Nomenclature, structure and bonding. Preparation of phenols from cumene, chlorobenzene (Dows and Raschig process) and diazonium salts. Physical properties and acidic character, Resonance stabilization of phenoxide ion, Reactions of phenols, Electrophilic aromatic substitution, acetylation and carboxylation, Claisen rearrangement, Gatterman synthesis, Reaction Mechanism of i) Fries Rearrangement,ii) Reimer-Tiemann reaction.	H	M	H	M	L	M	-	-
	➢ To understand the topic aldehydes and ketones: Nomenclature, structure of the carbonyl group, synthesis of aldehydes and ketones with particular reference to the synthesis of aldehydes from acid chlorides and ketones from nitriles. Mechanism of nucleophilic additions to carbonyl group with particular emphasis on Benzoin, aldol, Perkin and Knoevenagel condensation. Wittig reaction, Mannich reaction, oxidation of aldehydes (by $KMnO_4$,Tollen's reagent and Fehlings solution), Baeyer-Villiger oxidation of Ketones, Cannizaro reaction, (with mechanism) ,MPV, Clemmensen, Wolf-Kishner, LiAlH4 and NaBH4 reductions.	H	M	L	L	M	L	-	-

	➢ Be able to understand the topic Carboxylic Acids: Nomenclature, structure & bonding. Physical properties, acidity of carboxylic acids, effect of substituent's on acid strengths , preparation of carboxylic acids, Reactions of carboxylic acids, Hell-Volhard-Zelinsky reactions. Reduction of carboxylic acids, Mechanism of decarboxylation with soda lime. Methods of formation and chemical reactions of unsaturated monocarboxylic acids. Dicarboxylic acids: Methods of formation of succinic acid from ethylene dibromide and Phthalic acid from o-xylene. Effect of heat and dehydrating agents.. Carboxylic acid derivatives: Structure & nomenclature of acid chlorides, esters, amides and acid anhydrides. Preparation of carboxylic acid derivatives, Chemical reactions, Mechanism of esterification.	H	M	L	L	M	L	-	-
CH- 303	**Course name: Laboratory Course Inorganic and organic chemistry**								
	➢ To understand the method and applicability of volumetric analysis preparation of standard solution by weighing is compulsory Estimation of Fe(II) by dichromate using internal indicator,Determination of acetic acid in commercial vinegar using NaOH, Determination of alkali content in antacid tablet using HCl, Determination of Zn by complex metric titration with EDTA, Determination of total Hardness of water (permanent and Temporary) by EDTA Organic Chemistry Complete analysis of simple organic compound involving following steps Preliminary examination, Detection of elements, Detection of functional group, Determination of M.P. / B.P., Preparation of derivative and its M.P./B.P.	L	M	L	M	L	M	-	-
CH – 401	➢ Course Name: **Inorganic Chemistry**								
	➢ To ensure to understand the concepts of Coordination compounds: simple salts, double salts and coordination compounds. Werner's Coordination theory and its experimental verification. Sidgwicks electronic interpretation, EAN rule with examples, Chelates: Classification and their application, Valence Bond Theory of transition metal complexes.	L	M	L	L	M	M	-	-
	➢ To understand the basic concepts and applicability of Isomerism in coordination compounds: Structural isomerism and Stereoisomerism in coordination compounds .Oxidation and reduction: Concept of oxidation and reduction. Balancing of redox reactions by Electron method numerical. EMF series and its applications. Use of redox potential data: Analysis of Redox cycle, redox stability in water, Latimer diagram of Chlorine and Oxygen, Construction and explanation of Frost diagram.	M	L	M	L	M	M	-	-
	➢ To understand the Principles and applications of photometery: Beer-Lamberts Law, derivation and deviation. Types of colorimeter and spectrophotometer with simple schematic diagrams. Application of colorimeter and spectrophotometer in quantitative analysis with reference to estimation of Cu(II) as Cu- ammonia complex. Separation Techniques: Chromatography: Classification, Principle, Technique and Application of Paper and Column Chromatography.Ion- Exchange: Types of ion exchange resins, Equilibria and ion exchange capacity, Application in separation of binary mixtures. Solvent Extraction: Principle and Classification, Factors influencing extraction and application in chemistry.	L	M	M	L	M	L	-	-
	➢ Be able to understand the applicability of Inorganic Polymers: Silicones: Introduction, Nomenclature, preparation, properties and uses, General introduction to Silicon oils, Silicone Elastomers and Silicon Resins. Phosphonitrilic halide polymers: Introduction, Preparation, properties and uses.	M	L	L	M	L	L	-	-
CH – 402	➢ **Course name: Physical Chemistry**								

	➢ Be able to understand the basic concepts of Solid State:Solids and their classification, Difference between crystalline and amorphous solids, classification of crystalline solids. Laws of crystallography: Law of constancy of interfacial angles, Law of rationality of indices, Law of symmetry, elements of a crystal. Space lattice, Unit cell, Bravais lattices, crystal systems, identification of crystal planes, interplanner distance in cubic systems, X-ray diffraction by crystal, derivation of Braggs' equation. Determination of crystal structure of NaCl, KCI and CsCl.	M	H	L	L	L	L	-	-
	➢ Be able to understand the principles and applicability of Electrochemistry Conductance in metals (electronic) & in electrolyte solutions (ionic conductance), specific, equivalent and molar conductance, measurement of electrolytic conductance, variation of equivalent, specific & molar conductance with dilution, Kohlrausch's law, Arrhenius theory of electrolyte dissociation & its limitation, Ostwald's dilution law, Debye-Huckel theory (elementary treatment).Relaxation effect, Electrophoretic effect, Onsagar equation.Transport number, determination of transport number by Hittorfs method & moving boundary method, factors affecting transport number of ions, relation between ionic conductance & transport number. Applications of Kohlrausch's law & conductance measurements: determination of equivalent conductance at infinite dilution for weak electrolytes, determination of degree of dissociation, determination of solubility and solubility product of sparingly soluble salts. Conductometric titrations.	H	L	M	L	M	M	-	-
	➢ To enable students to learn the conception of Spectroscopy: Rotational Spectroscopy: Rotational spectra of diatomic molecules, Energy levels of rigid rotor. Selection rule for transition between energy levels. Expression for wave number of spectral lines and rotational quantum number. Intensity of spectral lines. Types of molecules showing rotational spectra. Application of rotational spectra for determination of moment of inertia and bond length. Introduction to non-rigid rotor. Vibrational Spectra: Vibrational energy levels of simple harmonic oscillator, selection rules. Types of molecules showing vibrational spectra. Vibrational energy level of anharmonic oscillator, selection rule, idea of overtones. Vibrational – Rotational spectra. P,Q and R branches of the vibrational – rotational spectra.	L	M	L	L	M	L	-	-
	➢ To enable students to learn the basic concepts and applicability of quantum chemistry, Failure of classical mechanics, Explanation of Black body radiation, Photoelectric effect, and heat capacity of solids on the basis of classical mechanics. Bohr's model of Hydrogen atom, spectrum of hydrogen atom, Plank's quantum theory. De Broglie's hypothesis (Derivation and experimental proof). Heisenberg's uncertainty principle. Introduction to wave functions (Ψ), Schrodinger wave equation. Eigen values and Eigen functions, well behaved wave functions. Interpretation of wave function (Ψ) and its square (Ψ2), Normalized and orthogonal wave functions. Postulates of quantum mechanics, Derivation of Schrodinger wave equation from postulates of quantum mechanics. Application of Schrodinger wave equation for a particle in one dimensional box and three dimensional box.	M	L	M	L	L	M	L	-
CH-403	➢ **Course name: Laboratory Course**								
	➢ To enable students the practical techniques and Preparation of following complexes and Comments on its VBT structure, magnetic properties and colors $[Cu(NH_3)_4(H_2O)_2]SO_4$,$[Ni(NH_3)_6]SO_4$, Trans $[Co(NH_3)_4Cl_2]Cl$, $K_3[Fe(C_2O_4)_3].H_2O$. Chromatographic separation of binary mixtures(at least Two) containing Cu(II), Co(II) and Ni(II) ions by paper chromatography and determination of Rf values.	H	M	L	L	M	L	-	-
	➢ To construct various crystal lattices. To determine the strength of the given acid (HCl or CH3COOH) conducto metrically using standard alkali (NaOH) solution,the strength of strong acid and a week acid in a given mixture conductometrically	H	L	M	M	L	M	L	-

	against a standard alkali solution, the solubility and solubility product of a sparingly soluble salt conductometrically, the ionization constant of weak acid conductometrically, heat of solution of solid calcium chloride and calculate lattice energy of calcium chloride from its enthalpy change data using Born-Haber cycle. the molar volume of ethanol at room temperature in dilute aqueous solution, the equilibrium constant of the reaction, $KI + I_2 == KI_3$ by distribution method.								
CH- 501	➢ **Organic Chemistry**								
	➢ To enable students to understand concepts of Organic compounds of Nitrogen: Preparation of nitroalkanes and nitrobenzene, chemical reactions of nitroalkanes. Mechanism of nucleophilic substitution in nitrobenzene and their reduction in acidic, neutral and alkaline media. Amines : Structure and nomenclature of amines, Physical properties, stereochemistry of amines, separation of mixture of 1°, 2° and 3° amines, structural features affecting basicity of amines, preparation of alkyl &aryl amines, reductive amination of aldehydic and ketonic compounds, Gabriel phthalimide reaction, Hofmann bromamide reaction, Reactions of amines, Preparation and synthetic transformations of aryl diazonium salts.	H	M	L	M	L	M	-	-
	➢ To understand the topic Heterocyclic compounds Molecular orbital picture and aromaticity of furan, thiophene, pyrrole and pyridine. Methods of synthesis of pyridine. Mechanism of electrophilic and nucleophilic substitution reaction of pyridine. Chemical reaction of pyridine. Structure of pyridine. Comparison of basicity of pyrrole and pyridine. Preparation and reactions of Indole, Quinoline and Isoquinoline with Fischer Indole synthesis, Skraup synthesis and Bischler Napieralski synthesis.	H	L	M	L	L	L	-	-
	➢ To enable students to understand Quantitative Analysis, Estimation of carbon, hydrogen, nitrogen, sulphur and halogens. Organometallic compounds: Organomagnesium compound: Grignard reagent formation, chemical reactions and structure. Organozinc and Organolithium compounds: Formation and chemical reactions.	H	M	L	M	L	L	-	-
	➢ Be able to understand the concept and practical applicability of Spectroscopy, Electromagnetic spectrum: Absorption spectra, Ultraviolet absorption spectroscopy, Absorption laws, molar absorptivity, Presentation and analysis of UV spectra, Types of electronic transitions, Effect of conjugation, concept of chromophores and auxochromes, Bathochromic, hypsochromic, hyperchromic and hypochromic shifts. UV spectra of conjugated dienes and enones. Infrared (IR) absorption spectroscopy: Molecular vibrations, Hook's law, Selection rules, Intensity and position of IR bands, measurement of IR spectrum. Fingerprint region, characteristic absorptions of various functional groups and application of IR spectra.	H	M	M	L	L	M	M	-
CH- 502	**Physical Chemistry**								
	➢ To enable students to understand the concept of Electrochemistry, Galvanic cells, irreversible & reversible cells, emf of cell & its measurement, relation between electrical energy and chemical energy, Types of reversible electrodes : metal-metal ion electrode, gas electrode, metal insoluble salt-anion electrode, redox electrodes, amalgam electrode, Nernst equation,, liquid-junction potential, salt bridge & its functions. Applications of emf measurements in: (i) pH- determination using hydrogen electrode, quinhydrone electrode & glass electrode (ii) Potentiometric titration.	H	M	M	M	L	L	-	-

	➢ Be able to understand the principles and application of quantum chemistry and molecular orbital theory, Schrodinger wave equation for H-atom, separation in to three equations (without derivation), quantum numbers and their importance,. Hydrogen like wave functions, radial wave functions and angular wave functions. Concept of orbital, shapes of orbital. Radial probability distribution curves for 1s, 2s, 2p, 3p and 3d orbitals. Born-Oppenheimer approximation, Criteria for forming M. O. from A. O., LCAO-MO method for H^{2+} ion, Physical pictures of bonding and antibonding wave functions. Calculation of energy from wave functions. Comparison of bonding and antibonding molecular orbitals. Introduction to M. O. theory for H_2 molecule. Introduction to Valance bond theory for H_2 molecule. Similarities and differences of valence bond and molecular orbital models.	H	M	L	L	L	M	-	-
	➢ To understand the topic of Photochemistry and Raman Spectroscopy Interaction of radiation with matter, difference between thermal and photochemical reactions, Laws of photochemistry. Jablonski diagram depicting various processes, quantum yield, determination of quantum yield of reactions, reasons for low and high quantum yields. Photosynthesis of HBr from H2 and Br2 and photosynthesis of HCI from H2 and Cl2) Photosensitization reactions. Raman Effect, explanation of Rayleigh's lines, Stoke's lines and antistoke's lines, Experimental set up of Raman spectrometer , Advantages of Raman spectroscopy over Infra red spectroscopy.	H	L	L	M	M	H	-	-
	➢ To enable students to understand conception of Colligative properties and Macromolecules: Methods of expressing concentration of solutions, Raoults law, Relative lowering of vapour pressure, determination of molecular mass from relative lowering of vapour pressure. Osmosis and osmotic pressure of solution. Measurement of osmotic pressure by Barkeley and Hartley method. Determination of molecular mass from osmotic pressure. Elevation of boiling point of solvent, determination of molecular mass from elevation of boiling point. Depression of freezing point of the solvent. Determination of molecular mass from depression of freezing point. Van't Hoff factor, degree of dissociation and association of solute. classification of polymers, determination of molar masses of macromolecules: viscometry, Osmometry and light scattering method. Kinetics of polymerization, addition and condensation polymerization.	H	L	M	L	L	M	-	-
CH-503	➢ **Laboratory Course**								
	➢ To ensure to understand the methods for Estimations of Glucose Amide, Nitro group, Carboxylic group, Saponification of oil. ➢ To determine the strength of given acid (HCL or CH3COOH) potentiometrically using standard alkali solution , the dissociation constant of weak acid potentiometrically by titrating it against alkali, potentiometrically ferrous ammonium sulphate against potassium dichromate and calculate redox potential of Fe^{2+}/Fe^{3+} system, Beer-Lambert law using calorimeter and concentration of given solution, molecular mass of a non-volatile solute by Rast method, the molecular weight of polymer by Viscometric method, specific rotation of a given optically active compound and the concentration of an unknown solution polarimetrically, the rate of acid catalysed iodination of acetone.	H	M	M	L	L	M	-	-
CH – 601	➢ **Inorganic Chemistry**								

	➢ Be able to understand the concepts of Metal ligand bonding in Transition Metal Complexes and Electronic spectra of Transition Metal Complexes: Limitations of Valence bond theory, Crystal field theory: Splitting of d-orbital in octahedral, tetrahedral and square planar complexes. Factors affecting the Magnitude of 10 Dq. Concept of Crystal field Stabilization Energy of octahedral and tetrahedral complexes. High spin low spin complexes on the basis of Δ o and pairing energy in octahedral complexes. Jahn-Teller Effect, Conditions of distortion with respect to CFT configuration. Selection Rules.Electronic spectrum of $[Ti(H_2O)_6]^{3+}$ and $[Cu(H_2O)_6]^{2+}$ complex ions with respect to position of the band, intensity of the band, symmetry of the band and bandwidth.	H	H	M	L	L	L	-	-
	➢ To enable students to understand the conceptions of Magnetic Properties and Thermodynamic, Kinetic aspect of Transition Metal Complexes, Method of determination of Magnetic Susceptibility by Gouy's Method. Spin only formula and orbital contribution to magnetic moment. Magnetic properties of Octahedral and Tetrahedral complexes with respect to CFT. Thermodynamic and Kinetic stability of metal complexes, their relation. Stepwise stability and overall stability constant and their relationship, Factors affecting the Stability of complexes.	M	H	M	L	M	H	-	-
	➢ Be able to understand the Definition, Nomenclature and Classification of Organometallic compounds and **Metal carbonyls**. Preparation properties and application of Alkyl and Aryls of Li and Al. A brief account of metal ethylenic complexes. Homogeneous Hydrogenation (Wilkinson's Catalyst reaction). Structure and bonding in mononuclear carbonyls- $Ni(CO)_4$, $Fe(CO)_5$ and $Cr(CO)_6$ with respect to back л-bonding.	H	M	H	M	L	M	-	-
	➢ To enable students to understand the principles and applicability of Bioinorganic Chemistry, Essential and Trace elements in biological processes, Metalloporphyrins with special reference to structure and role of Haemoglobin and Myoglobin in transport of Oxygen. Biological role of Na^+ and K^+ and Ca^{2+} metal ions. Sodium and potassium pump. Hypo and hyper calcimia. Calcium triggering and calcium pump. Hard and Soft Acids and Bases: Classification of Acids and Bases as Hard and Soft. Pearson's HSAB Concept and its applications. Symbiosis, Antagonism.	H	M	L	M	M	L	-	-
CH- 602	➢ **Organic Chemistry**								
	➢ To ensure students to understand the principle and applications of Nuclear Magnetic Resonance (NMR) spectroscopy. Proton Magnetic Resonance spectroscopy. Nuclear shielding and deshielding, chemical shift, Spin-spin splitting and Coupling constant. Areas of signals. Interpretation of NMR spectra of organic molecules. Problem pertaining to the structure elucidation of simple organic molecules by NMR technique.	H	H	M	M	M	L	-	-
	➢ Be able to understand the basic principles of organic enolates acidity of α- hydrogens, reactivity of methylene group. Malonic ester preparation and reaction- acetoacetic ester - synthesis by Claisen condensation reactions, Keto-enol tautomerism of acetoacetic ester, Preparation of acetic acid, succinic acid, crotonic acid and heterocyclic compounds. Carbohydrates: Definition, classification and reaction of glucose. Mechanism of osazone formation. Determination of structure of glucose. Determination of ring size of monosaccharides. Epimerisation, mutarotation, conversion of glucose into fructose and vice-versa. Chain lengthening and shortening of aldoses. .Introduction to structures of maltose, sucrose, lactose, starch, cellulose, ribose and deoxyribose.	H	M	M	L	L	M	-	-
	➢ To enable students to understand the basic concepts of structure and stereochemistry of amino acids. Acids base behavior, isoelectric point and electrophoresis. Structure and nomenclature of peptides and protein. Classification of proteins. Protein								

	denaturation. Nucleic acids Introduction, constituents of nucleic acids. Ribonucleosides and Ribonucleotides. Double helical structure of DNA. Natural fats, edible and industrial oils of vegetable origin, Glycerides, hydrogenation of unsaturated oils, Definition of Saponification value, Iodine value, Acid value, Soaps, Synthetic detergents, Alkyl and aryl sulfonates.	H	H	M	M	L	M	-	-
	➢ Be able to understand the principles of Synthetic dyes classification of Dyes based on chemical constitution. Synthesis and uses of Congo red, Crystal violet, Phenolphthalein and Alizarin dye. Synthetic drugs Definition, Classification, Preparation, properties and uses of: Aspirin, aracetamol, Dettol, Chloroquine, Phenobarbitone, Chloramphenicol, Chloramine T. Synthetic polymers addition or chain growth polymerization, free radical. Vinyl polymerization, Ionic vinyl polymerization, Ziegler - Natta polymerization .Condensation or step growth polymerization. Polyesters, polyamides.	H	M	L	M	M	L	-	-
CH-603	➢ **Laboratory Course**								
	➢ To understand Estimation of Ba^{2+} as $BaSO_4$, Ni^{2+} as Ni-DMG **by Gravimetric Analysis .**Colorimetery Colorimetric or spectrophotometric estimation of copper (II) in commercial copper sulphate sample as ammonia complex. Jobs method of determination of composition of Fe- SSA complex**,.**Mole Ratio Method of determination of composition of Fe- SSA complex. ➢ Separation of an organic mixture containing two solid components using NaOH /NaHCO3 for separatio , identification of the components and preparation of suitable derivatives.	H	M	H	H	M	L	-	-

Department of Botany

Programme Specific Outcome

1. Know the characteristics, systematics, morphology, structure and life cycle pattern of Viruses, Mycoplasma, Bacteria, Cyanobacteria, Algae, Fungi, Lichens, Bryophytes and Pteridophytes.
2. Understand the diversity, systematics and biology of seed plants.
3. Understand the nature and basic concepts of cell biology, genetics, anatomy, morphology, Biochemistry, Physiology, Taxonomy and ecology.
4. Analyze the interrelationships among prokaryotic and eukaryotic organisms5. Study of organization and function of the gene, genome, cell, tissue, organ and organ-system including development, reproduction, ecological and physiological adaptations and behavior of different forms of life.
6. Understand the importance of plants, their diversity and its conservation.
7. Achieve pure and applied botanical knowledge.
8. Perform procedures as per laboratory standards in the areas of Biochemistry, Physiology, Biotechnology, Taxonomy, Economic Botany and Ecology
9. Promote stewardship responsibility, entreprenership skill, research and career opportunities

Programme Outcomes

B.Sc. Semester-I	**Paper –I** **(Viruses, Prokaryotes & Algae)**	1. To study in depth about Viruses, Prokaryotes & Algae. 2. To gain knowledge about microbial diversity. 3. To Know the General characteristics, systematics, morphology, Ultramicroscopic cell structure and life cycle pattern of Viruses, Mycoplasma, Bacteria, Cyanobacteria and Algae. 4. To Understand the useful and harmful activities of Viruses, Mycoplasma, Bacteria, Cyanobacteria and Algae. 5. Learn about the General characteristics, Classification (Fritsch 1954) of Algae.
	PAPER-II **(Fungi, Lichen, Plant-Pathology&Bryophyta)**	1. To give information about Fungi, Lichen, Plant Pathology&Bryophyta and their life cycle. 2. Know the General characteristics, Classification of Fungi & Bryophyta. 3. To make them Understand the Life history of *Albugo, Mucor, Puccinia, Cercospora, Riccia, Anthoceros*, *Funaria*. 4. To explore host, pathogen, symptoms, Causes and Control of Leaf curl of Papaya, Citrus canker and Red rot of Sugarcane 5. To Understand the types, Reproduction in Lichens. 6. Know about the Economic importance of Fungi,

		Lichen and Bryophyta
PRACTICAL PAPER I & II		**Students should understand,** 1. Study of Bacterial forms, *Nostoc, Oedogonium, Chara, Vaucheria, Ectocarpus*. 2. Study of *Albugo, Mucor, Puccinia, Cercospora*, Lichen, Plant pathology, *Riccia, Anthoceros* and *Funaria*. 3. Botanical Excursions

B.Sc. Semester-II	**PAPER-I (Pteridophyta& Gymnosperm)**	1. Know about the Classification system General characters, Economic importance, alternation of generation of Pteridophyta and Gymnosperms. 2. To make them know the life history of *Rhynia, Selaginella, Equisetum, Cycas, Pinus,* and *Cycadeoidea*. 3. To study the concepts of apogamy, Apospory, Stelar System in pteridophytes, Seed habits and Heterospory.
	PAPER-II (Palaeobotany & Morphology of Angiosperms)	1. Study of geological time scale, fossilization, types of fossils and fossil plants. 2. Understand the fossil genera Glossopteris representing fossil groups. 3. To Understand the Root, Stem and Leaf Morphology of Angiosperms. 4. To be familiar with types Inflorescence and details of typical flower including various parts. 5. To provide information about classification and types of fruits.
PRACTICAL PAPER I & II		1. To learn about the structure and reproduction of certain selected species of Pteridophytes and Gymnosperms. 2. To Study Fossils, types forms, and modification of Root, Stem, Leaf, Inflorescence, Flowers and Fruits. 3. Study Tour and visit paleobotanical site and

	museum

B.Sc. Semester-III	**PAPER-I (Angiosperm Taxonomy)**	1. To study Origin and Phylogeny of Angiosperm & Fossil Angiosperms 2. Comprehend the concepts of plant taxonomy and classification of Angiosperms. 3. To give knowledge about Phytochemistry cytology and evolutionary relationship among taxonomic groups. 4. To understand the comparative account of selected angiosperms families and its economic value.
	PAPER-II (Cell Biology, Plant Breeding & Evolution)	1. Cell biology give knowledge about structure of typical plant cell, cell organelles & their structure, chemistry and functions. 2. To study chromosome organization and cell division(Mitosis and Meiosis) in plants and their significance. 3. To understand the various techniques in plant breeding, biostatistics and theory of evolution
PRACTICAL PAPER I & II		1. Study of Angiospermic Families- Malvaceae, Brassicaceae, Fabaceae (Papilionoideae, Caesalpinioideae, Mimosoideae), Asteraceae, Asclepiadaceae, Euphorbiaceae and Poaceae. 2. Study of fossil Angiosperms micropreparation and specimens: *Sahanianthus, Enigmocarpon* 3. To study Cell division- mitosis & meiosis in plant material. 4. To calculate Mean, Mode, Median, standard error, the student's t-value. 5. Botanical Excursion

	PAPER-I (Angiosperm	1. Understand the various components of root & stem and its primary and secondary growth.

B.Sc. Semester-IV	**Anatomy& Embroyology)**	2. Types of vascular bundles- dicots and monocots in dicot and monocot plants; Secondary growth and anomalous secondary growth in *Bignonia* and *Dracaena* stem. 3. Anatomy of leaf: Dicot (Nerium), monocot (Maize). 4. Learn about double fertilization and their significance. Be enlightened about the mechanism of pollination and basic structure and development of the embryo.
	PAPER-II (Genetics & Molecular Biology)	1. Knowledge about Mendelism, genes interaction, linkages, crossing over, chromosome variation 2. To understand the biochemical nature of nucleic acids, their role in living systems. 3. To understand the process of gene expression synthesis, genetic code and operon concept.
PRACTICAL PAPER I & II		1. To Study simple tissue, complex tissue and secretary tissue, types of vascular bundles, internal structure of dicot and monocot root -*Sunflower, Maize*., internal structure of dicot and monocot stem -*Sunflower, Maize*, internal structure of secondary growth and anomalous secondary growth - *Bignonia* and *Dracaena* stem, internal structure of leaves- *Nerium, Maize*. 2. To Study of types of ovules, anther structure, pollen grains, adaptations for pollination 3. To calculate the percent pollen germination in the given anthers. 4. To prove the Mendel's law of segregation and independent assortment with the help of coloured beads. 5. To workout the type of gene interaction in the given cross. 6. Visit to Research Laboratories, Industries, Nurseries, Field visit.

Department of Botany

Programme Outcomes

B.Sc. Semester-V	**PAPER-I Biochemistry & Plant Physiology-I**	1. To give knowledge about Biochemistry & Plant Physiology-I 2. Study of Carbohydrates, Lipids and Amino acids and basics of Enzymology. 3. To study Plant-water relations and mineral nutrition. 4. Study the process of respiration and photosynthesis in higher plants 5. Know the nitrogen metabolism and its importance.
	PAPER-II Plant Ecology I	1. To study of basics of ecology and environmental factors 2. To provide knowledge about natural resources and their importance in sustainable development. 3. Know the importance of ecosystem-components, Food chain, Food web, Ecological pyramids. 4. Understand plant communities, Climatic & Phytogeographic regions of India.
PRACTICAL PAPER I & II		1. To understand by performing some physiological and ecological experiments. 2. To study the effect of some chemical on permeability of membranes, the ascent of sap in suitable plant material, to separate chlorophyll pigment by paper chromatography, 3. 3. To determine the RQ of given plant material, to perform microchemical tests for determination of reducing and non-reducing sugars, starch, cellulose, oils and proteins, to study the effect of light intensity and quality, CO2 concentration and temperature on rate of photosynthesis by suitable method, to determine osmotic potential of the cell sap by plasmolytic method, to study the activity of enzyme amylase, catalase and peroxidase. 4. To determine frequency, density, abundance of the community by quadrate method, to determine the homogeneity of vegetation by Raunkiers frequency diagram, to determine the water holding capacity of the given soil samples, to determine the water rising capacity of the given soil samples, to determine the soil moisture of the given samples. 5. Botanical Excursion and quadrate study of different habitat..

Department of Botany

Programme Outcomes

B.Sc. Semester-VI	**PAPER-I Plant Physiology- II & Biotechnology**	1. Know the scope of plant physiology & biotechnology. 2. To understand Growth Concept, Phytochromes, biological clock, plant growth regulators and plant movements. 3. Understand the concept of Photoperiodism and vernalization, 4. To learn Seed dormancy and plant defence mechanism. 5. Understand the basics of genetic engineering and tissue culture techniques and its application.
	PAPER-II (Plant Ecology- II, Techniques & Utilization of Plants)	1. Understand the Plant succession, Morphological, Anatomical & Physiological adaptations. 2. Learn about Environmental Pollution, management, natural and resources. 3. Learn skill on working Principles, types and application of: microscopy, centrifugation, electrophoresis, spectroscopy, chromatography, pH meter. 4. Knowledge about utilization of plants and ethno botany to enable the student about utility in life.
PRACTICAL PAPER I & II		1. Learn about the ecological adaptations and human interference in environment as analysis of water samples provides great concern towards environmental audit. 2. To determine seed viability, the effect of various plant growth regulators on the growth and development of plants. 3. To study the morphological and anatomical characteristics hydrophyte and xerophytes, the morphological characteristics of cladode, phylloclade, phyllode and pneumatophores. 4. To determine the DO, salinity (chlorides),transparency, pH and temperature of water samples different sources. 5. To study the dust holding capacity of leaves, the percent leaf-area injury of different leaf samples collected around polluted sites. 6. Botanical excursion and visit to different ecosystem of the nature.

Department of Zoology

Program Specific Outcome (PSO)

A wide comprehension of creature variety, including logical arrangement and transformative connections of significant phyla/gatherings of creatures is the prime goal. The underlying and useful connections at various degrees of natural association (e.g., atomic , cell , tissue-, organ-, living beings , populace , and species-level associations) regarding significant phyla/gatherings of creatures is conceptualized to comprehend the life and its pervasiveness.

To contemplate the cooperations of natural, compound, and actual highlights of climate or the living space (e.g., earthly, freshwater, marine, have) among living beings is likewise stressed upon. To get mindful of the creature development n advancement, digestion and proliferation of previous living things is prevalently included.

A most recent rudimentary comprehension of genetics and legacy; molecular ideas; miniature methods; biotechnical techniques; immunological cooperations; bio-insights and bio- informatics identified with the living structures and their movement isn't forgotten about.

Further, the understudies are made mindful of the use of zoology in various aspects of humankind climate under the pennant of financial zoology, for example, seri-culture, api-culture, lac- culture, aquaculture, Industrial microbiology, rDNA technology, drugs and vaccines of diverse nature/inception and obviously a deliberate exertion of preparation of the related career openings.

Course Outcome (CO): Zoology (Semester wise)

Semester 01

Paper – I: Life and Diversity of Animals-Nonchordates (Protozoa to Annelida)

Paper - II: Environment Biology Viable - I (Based on Paper I and II)

The prime goal of paper I and Paper II is to give key information on creature (without string), variety and to give a genuinely necessary natural mindfulness and preservation senses among the understudies.

1. To make understudies acquainted with the non-chordate (without string) creatures that encompasses us beginning from protozoans to annelid gathering of creatures;

2. To contact their life patterns of key creatures and developmental viewpoints including the associating creatures between two phyla/gatherings;

3. To comprehend the climate in various circles like atmos-, litho-and hydro-circle; also, nature in cooperation with creatures and obviously conservational parts of both;

4. To actually/experimentally make the understudies ready to distinguish the non chordate/spineless creatures and order them up to the class level with the premise of efficient and to remark upon them;

5. To make for all intents and purposes mindful of assessing the creature associations with natural boundaries and their fundamental appraisal methodology, for example, pH, oxygen interest and microscopic fish includes in waters;

6. To open understudies to the different examination labs/ - foundations or creature culture focuses/historical centers/social effort focuses if any in and around city per two semesters.

Course Outcome (CO): Zoology (Semester-wise)

Semester 02

Paper - III : Life and Diversity of Animals-Non-chordates (Arthropoda to Hemichordata)

Paper - IV : Cell Biology

Functional - II (Based on Paper III and IV)

The prime target of paper III and Paper IV is to give central information on leftover creatures (without line), variety and to give a fundamental expertise of the primary and useful unit of life, the cell.

1. To make understudies acquainted with the non-chordate (without line) creatures that encompasses us beginning from arthropods to hemichordate gathering of creatures;

2. To contact their life patterns of key creatures and transformative viewpoints including the associating creatures between two phyla/gatherings;

3. To comprehend the structure of living cell and its organelles according to structure and work in huge kinds of cells, for example, prokaryotic-and eukaryotic-; plant-and creature cell;

4. To know the cell pattern of proliferation, cell-divisions (mitosis and meiosis), - maturing and passing with a rudimentary presentation of malignant growth and its causative specialists;

5. To in fact/experimentally make te understudies ready to recognize the non-chordate/spineless creatures and arrange them up to the class level with the premise of efficient and to remark upon them;

6. To have hands on experience/utilization of pH-meter, magnifying lens and micrometer, gauging balance, arrangement making, recoloring and mounting of materials in down to earth meetings;

7. To open understudies to the different exploration labs/ - organizations or creature culture focuses/exhibition halls/social effort focuses if any in and around city per two semesters.

Course Outcome (CO): Zoology (Semester-wise)
Semester 03
Paper - V : Life and Diversity of Animals-Chordates (Protochordata to Amphibia)
Paper - VI : Genetics
Useful - III (Based on Paper V and VI)

The prime goal of paper V and Paper VI is to furnish major information on creature with line variety and to give a fundamental arrangement of teachings of hereditary qualities and its segments.

1. To make understudies acquainted with the chordate (with string) creatures that encompasses us beginning from protochordates to land and water proficient gathering of creatures;

2. To connect with their life patterns of key creatures and transformative viewpoints including the interfacing creatures between two phyla/gatherings;

3. To comprehend the cycle of advancement of creatures; gametogenesis; treatment; embryogenesis uniquely in frog including blastula, gastrulation, etc;

4.To give the fundamental information on hereditary qualities and Mendelian-, cell and extracellular-legacy, linkage and traverse ideas of hereditary code and chromosomal-considers, - deviations, - anomalies and including applied parts of hereditary qualities, for example, DNA fingerprinting, karyotyping utilized for recognizing hereditary issues/disorder and advising for public mindfulness is likewise made mindful to understudies;

5. To actually/experimentally make the understudies ready to recognize the chordate/vertebrates and group them up to the class level with the premise of methodical and to remark upon them;

6. To have thought for all intents and purposes about the cross breeds and their proportion in hereditary qualities, karyotype examines of different conditions, populace hereditary harmony with extra recoloring and mounting of materials for slide arrangements;

Course Outcome (CO): Zoology (Semester-wise)
Semester 04
Paper - VII: Life and Diversity of Animals-Chordates (Reptilia, Aves and Mammals)
Paper - VIII: Molecular Biology and Immunology
Commonsense - IV (Based on Paper VII and VIII)

The prime goal of paper VII and Paper VIII is to give essential information on excess creatures (with line) variety and to furnish with a fundamental ability of sub-atomic science and immunology and procedures required to teach the examination interest/tendency.

1. To make understudies acquainted with the chordate (with line) creatures that encompasses us counting reptiles, feathered creatures and vertebrates;

2. To contact their life patterns of key creatures and developmental angles including the associating creatures between two phyla/gatherings;

3.To comprehend the cycle of improvement of creatures; undeveloped layer improvement; embryogenesis particularly in hen/fowl, mammalian placental structure n capacities and moreover undeveloped cell idea;

4.To have the rudimentary information on sub-atomic idea in science including DNA, RNA and recombination, replications and protein blend, the essential regular marvels happening inside the cell and immunological parts of human antigens and antibodies and the resistant reactions through T cells, B cells, cytokines and insusceptible problems;

5. To actually/experimentally make understudies ready to recognize the chordate/vertebrates and order them up to the class level with the premise of deliberate and to remark upon them including the bones and the incipient organism formative phases of frog and fowl and the ability of the safe organs and associations of antigen and immune response in vitro in pragmatic meetings.

Course Outcome (CO): Zoology (Semester-wise)
Semester 05
Paper - IX:General Mammalian Physiology I
Paper - X: Applied Zoology I (Aquaculture and Economic Entomology)
Practical - V (Based on Paper IX and X)

The prime target of paper IX and Paper X is to give essential information on near physiology of various frameworks in the living body and to give a thought of applied parts of zoology.

1. To cause them to investigate the overall human physiology, for example, assimilation, breath, course and the catalyst and hormones associated with these cycles;

2.To make understudies think about the applied parts of zoology by examining the different culture practices, for example, Seri-, programming interface , lac-, pisci-, prawn-, pearl-culture and hardware n measures associated with them;

3.To cause them to comprehend the monetary hugeness, support and the hindrances and illnesses identified with these practices and their administration and control through synthetics or natural pointers;

4. To make them for all intents and purposes realize how the practices are done, understudies are taken to the training locales close by; tentatively assessing nutrients, groceries in tha tests,
the catalyst exercises, platelets meaning distinguishing illnesses, recognizing different vermin and their control;

5.To open understudies to the different examination labs/ - foundations or creature culture focuses/historical centers/social effort focuses if any in and around city per two semesters.

Course Outcome (CO): Zoology (Semester-wise)
Semester 06
Paper - XI : General Mammalian Physiology II
Paper - XII : Applied Zoology II (Biotechniques, Microtechnique, Biotechnology, Bioinformatics and Biostatistics)
Down to earth - VI (Based on Paper XI and XII)

The prime goal of paper XI and Paper XII is to give principal information on near physiology of residual frameworks in the living body and to give a thought of applied methods used to lift eagerness towards advanced education and examination in zoology.

1.To cause them to investigate the overall human physiology, for example, neuron coordination,
exrretion, endocrinology and generation to comprehend a human body in a superior manner;

2. To make understudies think about the another serious applied parts of zoology by reading the miniature strategy for area cutting, twofold recoloring and planning of lasting slides for study and examination purposes, diverse partition cycles, for example, chromatography and electrophoresis, assessing various particles of need through colorimeter or spectrophotometer and customary or fundamental bio-factual, bio-specialized and
Bio-educational devices for advance investigations and exploration philosophies, definitively this paper springs up an examination personality in the understudies;

3. To make further intrigue into research, understudies are essentially presented to the extraordinary
essential bio-factual, bio-specialized and bio-enlightening instruments utilized in the present exploration situation, for example, information taking care of, investigation, information base hunts with the assistance of different progressed conventions and apparatuses accessible on world wide web.

4. To open understudies to the different exploration labs/ - establishments or creature culture
focuses/galleries/social effort focuses if any in and around circumstances.