Upon completion of the degree in Biology, majors will be able to:

- Demonstrate general knowledge of basic biological principles.
- Demonstrate a working knowledge of the foundational concepts of biology, including cellular, organismic, ecological, and evolutionary biology.
- Apply biological principles to their experimental design, and to the analysis.
- Develop skill in practical work, experiments, equipments and laboratory use along with collection and interpretation of biological materials and data
- Make them aware of natural resources and environment and the importance of conserving it.
- Upon completion of a Botany degree, students will become outstanding plant biologist, evolutionary biologist, and excellent phylogeneticists, plant ecologists, agronomists and teachers of various level.

The syllabus (BSc- BOTANY) is as per given by VNSGU, the course outcome of the,

First year B Sc.(Botany) is,

The course provides thorough knowledge about basic Botany primitive plant groups. Which make the students aware of applications of different plants in various industries; This also highlights the potential of these studies to become an entrepreneur to get acquainted with the subject in live form and visits to nature

S. Y. B. Sc (Botany) is,

The syllabus provide thorough knowledge about Botany various highly evolved plant groups and their community structure and also study the different metabolic process for synthesis of food material. The course also provides internal structure, which will be observed for Botany further studies as well as to study the developmental pattern of plant and equipped the students with skills related to laboratory as well as field based studies

T. Y. B. Sc. (Botany) is,

The syllabus Interpret the performance characteristics of Botany & life cycles of various lower plants. Which develop the mind from the cellular to molecular level. The course also offers to analyze the evolution with genetical characteristics for future aspects, Evaluate the performance of various lines of evolution with respect to live and fossil forms. Secondly the syllabus is also develop the skills to become entrepreneurship for small scale start-up, Apply optimization, numerical methods, statistical methods to solve problems, to study the different metabolic process for Botany. The syllabus makes the students aware about conservation and sustainable use of plants Design different post-harvest methods to crop over diseases. It also aware about conservation and sustainable use of plants, study the techniques of multiplication technique.

BOTANY DEPARTMENT M.Sc. BOTANY Syllabus Outcome

The syllabus of MSc Botany is devised in four semester having 16 papers

The major outcome of the syllabus is as follow

- 1. The learning outcome is an advanced academic education to broaden the knowledge in comparison t that obtained in Bachelor degree programme. The acquired knowledge provides professional qualification for work in biological laboratories and research centres.
- 2. After completion of course the students will understand the general characters of fungi, economic importance and life cycle of various groups of fungi. The students will understand the symbiotic and saprotrophic roles of fungi in agriculture and role of fungi as bio-control agents and Mycorrhizal fungi as biofertilizer.
- **3.** After completing the course the students will learn the identification, symptoms, disease cycle and management of different diseases caused by fungi, bacteria, viruses, etc. The students will understand the microbial interaction, growth and culture of microbes, antimicrobial chemotherapy and environmental microbiology.
- 4. The cyto-genetics and plant breeding paper would help the students to know the role of chromosomes and chromosomal rearrangements in generation of variations. They will also be familiar with methods used to change the traits of a plant to create the desired genotype/phenotype.
- 5. By understanding the concepts of ecological principles and environmental issues, the student will be able to develop attitude, value system and ethics towards environment related issues.
- 6. After studying bryophytes paper students will be able to classify bryophytes and distinguish these from other groups of plants. They will also be able to understand origin and evolution of sporophyte in bryophytes.
- 7. After studying the pteridophyte paper students will be able to classify pteridophytes and gymnosperms. They will also be able to describe heterospory, origin of seed habit and evolutionary trends in stele and spore producing organs.
- 8. The students are expected to have better understanding of origin of agriculture. They will also be able to identify the plant sources of medicines, spices, oil, fibres, dyes, gum and timbers.
- 9. The students will be able to understand the physiology and basic metabolism of plants. They will able to answer the questions regarding water transport,

absorption, mineral nutrition, photosynthesis, respiration and nitrogen metabolism.

- 10. The students will be able to understand the different systems of classification of angiosperms. They will also be able to identify the plant sources of medicines, spices, oil, fibres, dyes, gum and timbers.
- 11. The students will be able to understand the physiological advances in response of plants to water, salt and temperature stress. They will also be acquainted with advances in photosynthesis and respiration.
- 12. The student will be able to appreciate the value of biodiversity. They will also develop the skills necessary to work efficiently in areas of *in-situ* and *ex-situ* conservation.
- 13. The students will be able to understand the basic concepts of plant growth and development. They can be able to describe the structure and development of reproductive structures and the process of reproduction in plants.
- 14. The students will gain in-depth knowledge of plant cell and tissue culture techniques, In vitro haploid production, plant breeding, synthetic seeds and secondary metabolite production.
- 15. The students will understand various mechanisms involved during pathogenesis and disease epidemiology, plant disease forecasting and transmission and spread of plant pathogens. The students will learn the applications of biotechnological techniques in plant pathology after completing the course.
- 16. Student will develop the skills necessary to work efficiently in areas like conservation, EIA, environment management, monitoring and education and also gets an objective, scientific and realistic approach to conservation science.

Undergraduate students upon graduation in chemistry:

- Students can understand major concepts, theoretical principles and experimental findings in chemistry.
- Students can able to work effectively in diverse teams in both classroom and laboratory.
- Laboratory Skills: Upon completion of a degree, students can develop thinking scientifically in the performance, design, interpretation and documentation of laboratory experiments, at an entry-level position in chemical industry or a chemistry graduate program.
- Quantitative Skills: Upon completion of a chemistry degree, students can analyse organic and inorganic compounds quantitatively. They can find the amount and percentage purity of compounds.
- Qualitative Skills: Upon completion of a chemistry degree, students can analyse
 organic and inorganic compounds qualitatively. They can separate the organic
 compounds and identify it. Similarly, they can find the cations and anions from
 mixture of inorganic compounds.

Course outcome in chemistry B. Sc. Chemistry First Year (SEM I)

Paper – I Inorganic and Physical Chemistry

Inorganic chemistry:

Enable the students to understand:-

- Basics to study crystal properties of crystalline compounds. This includes difference between crystalline and amorphous state, types of crystals lattice planes, Miller indices, Bravais indices, type of cubic systems, Bragg's equation (X-ray diffraction) etc.
- Noble gases are the one part of the periodic table which is not that much reactive which can be easily utilized in understanding the behavior of the inert gases. Moreover students will learn the chemistry of Vanadium compounds. Vanadium Pentoxide is widely used in industries as a catalyst for production of Sulfuric Acid.

Physical Chemistry

Enable the students to understand:-

- Chemical kinetics and its scope, rate of reaction, factors affecting rate of reaction, Classification of chemical reaction, Order of reaction
- Study of S block elements like diagonal relationship, solvation and complexation, and tendencies including their function in biosystems.

Paper – II Organic Chemistry

Enable the students to understand:-

- Determination of Empirical formula, Molecular formula and Structural formula of organic compounds using different methods like Titration methods and Explosion methods.
- Industrial preparation, properties and uses of Napthalene, Anthracene and Phenanthene.
- Stereochemistry of organic compounds including optical isomerism and geometrical isomerism.
- Many of the daily used materials are organic compounds and majority of them are hydrocarbons therefore this topic makes the concept regarding their formation.
- Heterocyclic compounds are found in most of synthetic as well as natural medicines. This part of curriculum includes synthesis and study of Pyridine, Pyrrol, furan and Thiophene.

Laboratory Course:

Inorganic Chemistry

Identification of Two radicals by Semi-micro qualitative analysistechnique.(Including interfering radicals)

Quantitative analysis by Acid-Base Titration method, and Preparation of standard solutions.

B. Sc. Chemistry First Year (SEM II)

Paper – I Inorganic and Physical Chemistry

Enable the students to understand:-

- Conductance and ionic equilibria. Second law of thermodynamics, Carnot cycle and its efficiency, Entorpy concepts
- Crystal Fields theory, splitting of d-orbitals in complexes different geometry.
- Extraction and purification of Sliver using different techniques.
- Study of chemical bonding using Molecular orbital theory.
- Classification of physical properties, Surface tension, drop number method, parachor, Viscosity , determination of viscosity Ostwald viscometer method viscosity.

Paper – II Organic Chemistry

Enable the students to understand:-

- Nomenclature, method of preparation, properties and uses of the alkenes, dienes and alkynes
- Chemistry of Natural Oils and fats, and Industrial oils
- Classification of carbohydrates. Conversion of glucose to fructose and fructose to glucose.
- To make student understand different organic compounds with respect to the functional group and become eligible to call the name of the organic compounds scientifically.

Laboratory Course:

Organic Qualitative analysis of given unknown compound which includes tests like Detection of Elements, Functional group tests and confirmatory tests.

Quantitative analysis of compounds by Titration method.

B. Sc. Chemistry Second Year (SEM III)

Paper-III Inorganic Chemistry

Enable the students to understand:-

- Chemistry of Elements of first transition series (i.e. d-block elements)
- Electronic Configuration of atom ; L-S coupling
- Different methods of purification of water for potable and industrial purposes.
- Difference between Soft and hard water.
- Desalination of sea water by reverse osmosis and electro dialysis.
- Paper Chromatography is a technique by which qualitative separation of mixture of compound is possible because of their different Rf values. This topic includes Classification of chromatography according to mobile phase and stationary phase. Different types of paper chromatography.
- Quantum Mechanics: Schrodinger equation, wave function and probability function, well behaved wave function, Particle in one dimensional box and its importance, different types of Operators.

Paper-IV Organic Chemistry

Students will be able to understand following things in organic chemistry after studying B. Sc. Sem III.

- Name Reaction with Mechanism
- Elimination Reaction: Alpha elimination, Beta-elimination, E2 mechanism, E1 mechanism, stereo chemistry, Generation of carbenes and ketenes.

- Heterocyclic compounds are found in most of synthetic as well as natural medicines. This part of curriculum includes synthesis and reactions of Benzopyrrole, Benzofuran, Benzothiophene, Quinoline and Isoquinoline.
- Polycyclic Aromatic Hydrocarbons: Classification and nomenclature of Polycyclic Aromatic Hydrocarbons. Occurrence and synthesis of some Polycyclic Aromatic Hydrocarbons.
- Different synthetic applications of compound that contains Reactive Methylene Group.
- Method of structure elucidation of sugar: Glucose and fructose.

Paper-V Physical Chemistry

Students will be able to understand following things in physical chemistry after studying B. Sc. Sem III.

- Collision theory of reaction rate, Energy of activation including determination, effect of catalysis on energy of activation.
- Basics of photochemistry that includes Grothus Draper's Law, Lambert Beer's Law, Einstein's Law of photochemical equivalence.
- Fluorescence, Phosphorescence and Factor affecting Fluorescence, Phosphorescence.
- Electro chemistry which includes conductance, electrolysis Migration of ions, Transport number of ions and its determination by moving boundary method.
- In current era spectroscopic methods are widely used to elucidate structure of compounds. These techniques are most popular among chemists. These topics include various basic spectroscopic methods like pure rotational spectra, Vibrational and Vibrational-Rotational spectra, Raman spectra.

Laboratory Course:

- Quantitative analysis of metal ions by Gravimetric and Volumetric method.
- Organic Qualitative analysis of given unknown compound which includes tests like Detection of Elements, Functional group tests and confirmatory tests.
- Adsorption of acetic acid on Charcoal, Chemical Kinetics of Ester hydrolysis, saponification of Ethyl acetate by NaOH, quantitative analysis of acid by coductometric titration and quantitative analysis of unknown mixture of liquids by Viscosity measurement.

B. Sc. Chemistry Second Year (SEM IV)

Paper-III Inorganic Chemistry

Enable the students to understand:-

- Occurrence, Extraction by solvent and ion exchange, Properties of Lanthanide and Actinide Elements
- Importance of hydrogen bonding, and Effect of hydrogen bonding in various fields.
- Ion-exchange chromatography and Role of metal complexes in Biological systems.

Paper-IV Organic Chemistry

• Chemistry of Diazonium Salts

- Preparation, physical properties and chemical reactions of Nitrogen containing functional groups and their application in drug synthesis
- Structure and nomenclature of Carboxylic acid and its derivatives
- classification, analytical and synthetic evidences to prove the structure of Ascorbic acid and Adrenaline
- Preparation and reaction of some sulfur containing compounds
- UV and visible spectroscopy

Paper-V Physical Chemistry

- Partition co-efficient, explanation of solvent extraction process.
- Derivation of Clapeyron and Clapeyron- Clausius equation and Application of Clapeyron Clausius equation
- Principle, Types of conductometric titrations
- Theories of acid-base indicators. Oswald and Quinonoid theories, choice of indicators

Generic Elective Course

Enable the students to understand Industry related topics:-

- Cement, Preparation and use of KMnO4, K2CrO4, TiO2, Bleaching powder and White lead
- Natural and Synthetic fertilizers, Industrial fuels, Glass, Alloy and Manufacture of Fermentation products

Laboratory Course:

- Identification of Four radicals by Semi-micro qualitative analysis technique.(Including interfering radicals)
- Quantitative analysis of organic compounds by different Estimation techniques
- Synthesis of some organic compounds
- quantitative analysis of acid mixture by pH metry and Conductometry, Determination of heat of solution, Surface tension, partition coefficient, determination of relative strength of Acids.

B. Sc. Chemistry Third Year (SEM V)

Paper – VI Inorganic Chemistry

- Quantum Mechanics: particles in three dimensional box, Schrodinger's wave equation in polar coordinates
- Boron Hydride: Boron hydride and its classification
- Thermodynamic and Kinetic Aspects of metal complexes
- Bonding in Transition Metal Complexes, Metal Carbonyls
- Types of corrosion, electro-chemical theory of corrosion and Protection methods

Paper – VII Organic Chemistry

- Different types of mechanism for formation and Hydrolysis of Esterification and amides
- Structural determinations of Pyriodoxine and Thyroxine and their synthesis
- Structural determination of Alkaloids
- Carbohydrates: disaccharide and polysaccharide
- classification, synthesis and uses of some Synthetic Drugs
- Different techniques for synthesis and analysis of peptides

Paper – VIII Physical Chemistry

- Open system thermodynamics, the third law of thermodynamics
- Basics of electrodes, clasification of electrochemical cell and thermodynamics,
- Different mass spectrograph and Particle accelerators

Paper – IX Industrial Chemistry

- Manufacturing process of some chemicals with flowsheet.
- Synthesis of perfumes and explosives by nitration method.
- Synthesis of some compounds by amination and importance of amination in industry.
- Methods of sulphonation

Paper – X Analytical Chemistry

- Definition and explanation of various analytical terms
- Quantitative analysis which includes Gravimetric analysis, Acid-base titration and complexometric titration.

Paper – XI General Chemistry

- IR spectroscopy for determination of structure of compounds
- Inorganic and organic qualitative analysis
- Laboratory hygiene and safety
- Standardization of solution

Laboratory Course:

- Identification of Six radicals by Semi-micro qualitative analysis technique.(Including interfering radicals)
- Quantitative analysis of organic various compounds by different Estimation techniques
- Chromatographic separation of amino acid mixture by ascending paper chromatography
- Determination of angel of rotation using polarimeter, to study buffer capacity using pH meter, Quantitative analysis of different salts by Conductometry, determination of relative strength of Acids using potentiometer.

B. Sc. Chemistry Third Year (SEM VI)

Paper – VI Inorganic Chemistry

• Importance of symmetry, Symmetry elements and Symmetry operations, Classification of molecules in to point groups.

- Inorganic Reaction Mechanism and Hybridization
- classification, Structure and bonding of some organometallic compounds

Paper – VII Organic Chemistry

- Molecular Rearrangements, Catalysis and Green Chemistry
- Classification and general methods to determine the structure of Terpenoids
- Chemistry of different types of polymers
- Synthesis and structure determination of some Plant Pigments
- Synthesis and uses of Synthetic dyes

Paper – VIII Physical Chemistry

- Phase equilibria of one component system and of two component system
- BINARY LIQUID MIXTURES: Raoult's law, positive and negative deviations from Raoult's law, temperature composition curves for ideal and non idealbinary solutions of miscible liquids, azeotropes, partially miscible liquids
- Application of electromotive force
- Applications of nuclear chemistry

Paper – IX Industrial Chemistry

- Manufacturing process of different fermentation products
- Different manufacturing process of various types of pulps
- Natural and synthetic Insecticides and Fungicides, various types of natural and synthetic detergents
- Manufacture process of sugar from sugarcane.
- Industrial manufacturing process of various chemicals with flow diagram & their uses.

Paper – X Analytical Chemistry

- Components of spectrophotometer, Block diagram and working of single beam and double beam spectrophotometer, Causes of deviation from Beer's law
- Principles and Components of Gas Chromatography, Qualitative and quantitative analysis using Gas Chromatography, Technique of HPLC
- Quantitative measurement methods: precipitation titration and redox titration

Chemistry Paper – XI General Chemistry

- Types of Adulterants, Methods for detection of different adulterants in some common food items
- Different aspects of nano particles
- Various types Environmental pollution
- Proton Magnetic Resonance spectroscopy

Laboratory Course:

• Organic qualitative analysis of binary mixture

- Determination of amount of various metal ions by gravimetric analysis
- Determination of amount of various metal ions by volumetric titration
- Chemical kinetics, comparison of cleansing power of two detergents by measuring surface tension
- Determination of dissociation constant of weak acid by pH metry
- Determination of the amount of vanillin by conductometry
- Determination of the amount of HCl and CH₃COOH in given mixture by conductometer
- Determination of the indicator constant of Phenolphthalin by colorimeter
- Verification of Lambert-Beer's law for KMnO4 solution by colorimeter
- Determination of the specific refractivities of mixtures of two liquids

Undergraduate students upon graduation in Computer Science:

- a) Understand the fundamental concepts of Programming, Business environment and IT Applications in Business.
- b) During undergraduate course students learn various business programming languages and have to develop business projects at semester 5 and 6 which gives them opportunities as to become software programmer / developer in any reputed software companies.
- c) During the course they are taught subject like software test automation and Software Quality Assurance which nurture for career as Software Tester.
- d) Students are taught English communication during the course along with computer science which develops competent technical writing skills so as to enable the graduate to communicate business ideas to senior management and general public.
- e) During the course they are given exposure to subjects like operating system, Data structure which cultivate skill to solve problem related to system design which opens door as career of system side programmer / developer.
- f) They exposed to subject of networking, knowledge of subject helps to become proficient network engineer and network analyst.

Course outcome in Computer Science B. Sc. Computer Science First Year (SEM I)

Paper – I Fundamentals of Computer – I

Enable the students to understand:-

- History of Computer and Evaluations of Generation of computer.
- Classification of hardware and software and Basic knowledge of computer parts.
- Basics of Internet and world wide web.
- Introduction to Hyper Text Markup Language (HTML) and how to create basic page using various tags.
- Use of CSS (Cascade Sheet style) in HTML page.
- Use of DHTML and Java Script in HTML page.

Paper – II Programming in C – I

Enable the students to understand:-

- What is logical problem and capabilities of programming language to solve it.
- Logical problem solution representation by flowchart and Algorithm
- Structure of programming languages and compilation / Interpreting of it
- Fundamentals of C language: Identifiers , keywords , datatypes , declaration of variables , various types of operators.
- Control Statements: Various types of if statement , various loops like while , do..while , for , switch
- Introduction to functions: Library functions of String, Mathematical etc. User defined function declaration passing arguments and calling function.

Practical Course:

Fundamentals of Computer – I

Basic html page creation based on topics in syllabus, demonstrating use of DHTML and java script.

Programming in C – I

Writing C language programs to solve given basic logical problems based on topics in syllabus.

B. Sc. Computer Science First Year (SEM II)

Paper – I Fundamentals of Computer – II

Enable the students to understand:-

- What is Operating system and basic functions of operating system
- Various types of operating system and their capabilities and limitations

- Examples of various available operating systems and comparison among them based of various criteria.
- Concepts of Database , Table , fields and various keys
- Working with DBMS (MS Access): Creating tables, Using simple queries, applying various DML commands, creating and managing constraints and relationships. Creating forms and reports.
- How and where to apply built in functions for aggregation , String , Mathematical and Date functions.

Paper – II Programming in C - II

Enable the students to understand:-

- Concept of structure and Union, how to Define them and using them
- Concept and use of pointer , declaring pointer variables and using them as one and two dimensional array.
- Handling files through C programs: Opening and closing the files, reading from and writing to files. Reading and Writing structures in files. Access files (Read /Write) randomly.
- Concepts of command line argument, processor and its importance, Macro definition and including external c program in current program.

Laboratory Course:

Practical Course:

Fundamentals of Computer – II

Creation of Database and related tables in it and solving practical queries and creating reports and forms.

Programming in C – II

Writing C language programs to solve given basic logical problems based on topics in syllabus.

B. Sc. Computer Science Second Year (SEM III)

Paper-III Object Oriented Programming: C++

Enable the students to understand:-

- Understand concepts of Class and Objects.
- Concepts of Inheritance, Polymorphism.
- The basic concepts of Constructors/Destructors.
- Function overloading, operator overloading, virtual functions.
- Concepts of arrays, pointers, dynamic memory allocation

Paper-IV System Development using c#.Net

Students will be able to understand following things in .Net using C# after studying B. Sc. Sem III.

- Concepts of GUI and .NET Framework.
- Understand concepts of IDE and CLR.

- C#.Net Programming Language: Datatypes, Types of conversion functions, declaring variables and levels and scope of variable, decision structures various loops and functions, procedures.
- Designing User Interface : Working with forms and basic controls of .Net their properties , Events and methods. SDI and MDI applications
- Data Access through .Net application : History of Data access technologies, over view of ADO.NET model various objects of ADO.NET and programming with ADO. NET
- Exception handling : Concept of exception , overview of exception handling , structured way of exception handling and try.. catch statement.

Paper-V Relational Database Management System –I

Students will be able to understand following things in first part of Relational Database Management System after studying B. Sc. Sem III.

- Concepts of Database: Requirement of Database, various Data Models and comparison among them, DDL and DML statement and roles of Data Base Manager and Data Base Administrator.
- Concepts of Entity Relationship Management: Entity and Entity sets ,Relationships among entities , Integrity constrains- domain and referential , Entity relationship diagram and mapping with tables
- Basic concepts queries : table creation with all options , creating and adding constraints like primary key , foreign key. Query writing command with all its options.

Laboratory Course:

- **Paper-III Object Oriented Programming: C++** Writing programs of C++ to solve logical problems based on topics in syllabus.
- Paper-IV System Development using c#.Net Writing windows and console programs of .Net using C# language to solve logical problems based on topics in syllabus.
- Paper-V Relational Database Management System –I Write code for creating logically related tables and solve various practical queries covering topics in in syllabus.

B. Sc. Computer Science Second Year (SEM IV) Paper-III Data Structure using C++

Enable the students to understand:-

• Concepts of Primitive and non-primitive Data structure and its types.

- Concepts of stack, queue and types of queues : Algorithm for operation and real world applications.
- Implementation of Link-list and related applications : Types of link list and algorithms to perform various basic operations on it.
- Concept of polish notation: Types of mathematical expression representation. Converting expression from one type to other using various algorithms
- Work with searching and sorting techniques: algorithms for various searching and sorting linear data and comparison among them.

Paper-IV Web Development using C#.Net

Enable the students to understand:-

- Concepts of web application and server side scripting language and introduction of ASP .NET and comparison with other server side languages.
- Various types of controls and detail understanding of Server controls.
- Basic concepts of client server communication, concept of postback role of Request and response object
- Understand of doing interaction with data base using ADO .NET technology.
- Basic web application configurations in web config file.

Paper-V Relational Database Management System - II

Enable the students to understand:-

- Concepts of PL/SQL: What is procedure SQL language and necessity and advantages of PL/SQL language.
- Concepts of block , functions, procedures and triggers. How and where to write functions , procedures and trigger.
- Basic concepts of cursors and their types and creating and fetching data using explicit cursor
- Understand Exception importance of handling it and various function of Exception handling.
- Understand concepts of package, its advantages and creation.

Generic Elective Course

E-Commerce and Cyber Security

Enable the students to understand contemporary subject E-Commerce subject topics:-

- Understand concepts of e-commerce framework.
- Understand concepts of types of online transactions.
- Understand the basic concepts of security issues pertaining to e-commerce.
- Understand various possible cyber crimes and its related laws.

Laboratory Course:

Paper-III Data Structure using C++

• Writing programs of C++ to solve algorithms of Data structure topics covered in syllabus.

Paper-IV Web Development using C#.Net

Writing Web based programs of .Net using C# language to solve logical problems based on topics in syllabus.

Paper-V Relational Database Management System –I

Writing programs for practical problems which cover topics of oracle PL/SQL like block , procedure , functions and trigger.

B. Sc. Computer Science Third Year (SEM V)

Paper – VI Software Engineering – I

Enable the students to understand:-

- Software and its various types. Problems related to software development.
- Understand various components of software process model and their working.
- Understand the importance of requirement analysis.
- Understand various approaches of system design.

Paper – VII Computer Networking –I

Enable the students to understand:-

- To able to identify various network types and their benefits and limitations.
- To able to identify various networking devices and their functions
- To able to understand network activities at various OSI layers.
- To able to understand network related threats and security mechanism.

Paper – VIII Computer Graphics

Enable the students to understand:-

- To provide basic concepts of computer graphics and its applications
- Implementation of basic geometric shapes practically in computer using various algorithms
- Understand the geometry of shapes transformations like translation, scaling and rotation
- Understand to check point inside polygon and various algorithm for polygon filling
- To understand graphic shadings and file formats

Paper – IX Java Programming – I

Enable the students to understand:-

- Properties of java and comparison it with c++. How java has become plateform independent.
- Various keywords , identifier , operators and data types of java.

- Various control statements , loops.
- Implementation of concept of OOP like class , object , inheritance , constructor , interface.
- Concept of package, its advantages and way of creation and scope of variable in package.
- Handling Exception in Java.

Paper – X Fundamental of PHP

Enable the students to understand

- Open source website development..
- Various inbuilt features of PHP and in-built functions.
- Fundamentals of dynamic website development.
- Using database like MySQL.

Paper – XI Operating System – I

- Students should be able to understand various types & structures of operating systems and their applications.
- Students should be able to understand Device management and File Management related functions of modern operating systems.
- Students should be able to understand algorithmic implementation of above mentioned functions of operating system

Laboratory Course:

- Paper- VIII Computer Graphics Writing programs based on various algorithms of computer Graphics
- **Paper-IX Java programming** Writing programs based on logical problems covering topics of syllabus

• Paper-X Fundamentals of PHP

Writing web based programs based on logical and business application problems covering topics of syllabus

• Major Project

Students have to do a project based on real world business definition taking any of programming language which can give solution to project definition.

Paper – VI Software Engineering – I I

Enable the students to understand:-

- Various programming practices and pros and cons of each and various ways of code verification
- Various types of software testing their principles and guidelines and types of testing
- Various software Management activities like effort estimation , scheduling monitoring etc.
- Risk Management in software development and various approaches for it.

Paper – VII Computer Networking –II

Enable the students to understand:-

- Working of various protocols of TCP/IP
- Structure of web, web related protocols and email services
- Fundamentals of wireless networks and specifically cellular network and Bluetooth.

Paper – VIII Computer Graphics

Enable the students to understand:-

- Concepts of testing and testing practices.
- Test automation process and its various stages.
- Testing tools and its functionalities.
- Writing and tracking test cases.

Paper – IX Java Programming – II

Enable the students to understand:-

- Object oriented programming and its implementation in java.
- Various inbuilt java concepts like threads
- The GUInterface and concepts of APPLET.
- various components and their properties.
- Concept of swing controls and comparison with traditional AWT controls
- Data Base connectivity through JDBC

Paper – X Fundamental of PHP

Enable the students to understand

- Fundamentals of mobile app technology.
- Various inbuilt features of android.
- The android design essentials.
- Android user interface design basics.

Paper – XI Operating System – I

- Students should be able to understand concepts of Memory management and various algorithm for it
- Students should be able to understand concepts of process management and co ordination among process and scheduling algorithm
- Students should be able to understand structure process management in Unix

Laboratory Course:

- Paper-IX Java programming Writing programs based on logical problems covering topics of syllabus
- Paper-X Fundamentals of Mobile Computing

Writing Android based programs to create apps on logical and business application for android mobile which covers topics of syllabus.

• Major Project

Students have to do a project based on real world business definition taking any of programming language which can give solution to project definition.

Students who successfully complete the mathematics major will be able to:

- Demonstrate an understanding of the foundations and history of mathematics
- Communicate mathematics in both oral and written form with precision and clarity.
- Solve problems in the advanced areas of numerical analysis, linear algebra, real analysis, and statistics.
- Develop and maintain problem-solving skills.
- Read, write, understand mathematical proofs and construct mathematical proofs as appropriate.
- Reason with the apply mathematical concepts, principles and methods; analyse and evaluate problems (both theoretical and practical) and plan strategies for their solution.

F.Y. B.Sc. Maths (Sem-I)

Paper-101 - Trigonometry

Trigonometric functions, Euler's expressions, Hyperbolic functions for real arguments, Circular and Hyperbolic functions of complex variables and their identities, Logarithm of complex quantities.

Paper-102 - Differential Calculus.

Calculation of mth derivatives of some stemplard functions, Leibnitz theorem and its applications, Rolle's, Lagrange's and carechy theorem, Maclaurin & Taylor series expansions, Curvature and radius of curvature. F.V. B.SC. Maths (sem - II)

Paper - 201 - Theory of Matrices.

Introduction of Matrix, Rank of a Matrix, Method of diagonalization, Eigen values & Eigen vectors of a Matrix, Cagley-Hamilton theorem.

Paper-202 - Integral calculus and Dissential Equation.

Reduction formula for indegration, Lenth of curve, Linear differnial equation of first order, Bernoulli, Lagrange and clairant's equation, Linear differial equation general solutions. S.Y. B.Sc. Maths -sem-3

Paper-301 - Advanced Calculus -I Limits and continuity of a function, Taylor's theorem, Maclaurin's expansions, neetor point function, Green, Gauss and stoke's theorem.

Paper-302 . Mumerical Analysis

Ensors and their computations, Numerical solutions of Algebraic and Transcendental equations, Forward-Backward and central differences and symbolic relation, Newton's Forward and Backward Formula & Crauss formula. Paper - 303 - Differential Equations Linear Differential equations, Second order Differential equations, Partial Differential equation and their solutions, Partial Differential Equations of first order and mon-linear

S.Y. B.SC Maths sem-4

Paper - 401 - Advanced Calculus - IL

Maxima - Minima Functions for extreme point Double and Triple integrals, Beta - Gramma functions, Laplace Transforms, Inverse of Laplace Transform.

Paper-402 - Numerical Analysis - IL

Lagrange's interpolation, Divided Differences, and Newton's cremeral interpolation formula, Numerical Differentiation: 1st and end order derivatives, Numerical Integration, Solution of Ordinary Differential Equations.

Paper-403 - Introduction to Abstract Algebra. Fundamental theorem of Arithmetic, Properties of a Group, Subgroups, Cyclic Group, Definition Ring, Integral Domain, and Boolean Ring. T.Y. B.Sc.

Maths (sem - 7)

Paper- 501 - Group Theory

Divisors, Prime Number, Congruence relation, Fintie group and their tubles, Lagrange, Euler & Fermat's theorem, cyclic group, mormal subgroup, Homomorphism & isomorphism.

Paper-502 - Linear Algebra. I Nector space, subspace, span at a set, Linearly dependent & independent riector, Dimension and basis of a vector space.

Paper-503 - Real Analysis -I Countable and uncountable set, sequence of real mumber, limit, convergent and divergent seguence, Bounded - monotome sequence, limit superior and inferior, Couchy segmence.

Paper - 504 - Real Analysis. I Definition and Example of Matric space, Limit, convergence and couchy sequence in matric space, Open ball in R¹, open set. Paper-505 - Graph Theory.

Graphs, Operations on graphs, Subgraphs, Walk, Paths, Circuits, Connected-disconnectedcomponents - Euler - Hamiltonian graphs, Thees, Centre, Radius and Diameter of a Tree, Rooted & Binary trees.

Paper- 506 - Number Theory - I

Division Algorithm, G.C. a of two integers, Diophantime equation, Pythagorean theorem ton the innationality of NZ, Sieve of Enatosthemes, infinitude of primes, upper bound for the Primes, divisibility tests of g and 11.

ID - Operation Research - I

Graphical Solution of LPP, dual Problem, Basic concept of basic - non basic - degenerate non degenerate of LPP, slack and surplus variable, Two phase simplex and Big - M method. T.Y. B.S.C Maths (sem. ST)

Paper- 601 - Ring Theory Detinition and examples of Ring, Integral domain and field. Ring homomorphism & isomorphism, Ideals and Quatient rings, G.C.D at two elements in a ring, Unique factorization theorem in a Euclidean.

Paper-602 - Linear Algebra. I Linear Transformation, Range of Kernel, Rank mullity theorem, Matrix associated with Linear transformation, Inner product space, Couchy - Schwarz's inequality, Orthogonal vector

Paper-603 - Real Analysis- Th

Convergence and divergence of series, conditional and absolute convergence, Tests of absolute convergence, sets of measure zero, Riemann integral, Fundamenta and mean value theorem of integral calculus.

Paper - 604 - Real Analysis - IV clougure and closed set, dense set, connected-Bounded - Totally bounded set, complete matric space, Picard's fixed point theorem, compact matric space, Heine - Borel Property. Paper-605 - Discrete Mothermatics

Binarry relation, Partially Ordered and Totally ordered set, Hasse Diagram, Lattices as algebraic system, Boolean Algebra as an algebraic system, Karmangh Map., Mc Cluskey algorithm.

Paper-606 - Number theory-IL

chimese Remainder theorem, Fermat Little-Pseudo-primes - Wilson's theorem., The Mobius inversion formula, introduction of Euler's phi-function.

ID - Operation Research - I

Assignment Problem, the Hungarian method, Transportation Problem, MODI method, Unbalanced transportation Problem, competitive games, Two person zero-sum game, competitive of mx2 and 2xm games using graphical method.

B.Sc. Gem-I. Course Outcome:-PHYSICS Paper - I. In this poper students will deal with moment of Inertia, and its applications. There is also some concepts of Thermodynamics related to First law of thermodynamics. Another unit is here to discuss about the elastic properties of natter. Paper (II) In this paper student will study vector's applications. Also Electrostatics related to Gaussistheorem will be discussed. In optics portion, students will study about the condinal points of a lens system. b. Sc. Sem I Course Outcome. Paper (I) In this paper, we will study about oscillation and comes, the light, X-rays, X-ray diffection. In properties of prattien, we will deal with bending properties of beam. Paper-(II) In this poper, we will study pragnetism, and nagnetic properties of naterials. In electronics we will study filters. In digital electronics, we will learn number systems. In optics we will study interference, Frend biprism and Hewton's ring.

B.Se. SemIT Course Outcome. Paper(III) MYSILS In this paper first we discuss charged particle metion in In thermodynamiss we will study manuell's equations and its applications in thermodynamics. Paper (IV) In this paper firstly we study Quantum rechanical Concepts related with dual nature. In office we will discuss plane transmission grating Then after polorization and its applications. Paper (I) In this poper we will study about various Bridge circuits, Network theorems, and Biasing basics in transistor. B.S.C. Sem(IV) Course Outcome Reper(III) In this paper we firstly discuss radionetry and photometry. Then after there is some concepts related to salid state physics scalated to Crystallive state of matter. Paper (IV) In this paper, we discuss concepts of Quantum Mechanics and Different types of aberrations in lens. Papers (2) First port of pothis poper is dedicated to different types of Galhanometers and their basics. In second part we will study the BJT amplifiery and FET amplifiers as well.

Government Science College, Chikhli Course Outcome – Zoology

Government Science College, Chikhli follows the syllabus prescribed by Veer Narmad South Gujarat University (VNSGU). The syllabus of First Year Zoology is as follows.

Semester 1

Zoology Paper I (Z 101) This paper aims to familiarize the students with a) Scope and branches of zoology b) Taxonomy c) Histology d) Animal Type (Mammal) e) Genetics

Practical I(Based on Paper I)

The practical sessions aim to enable students to identify and classify animals of different phylum and to understand different internal systems of mammal.

The practicals also aim in enabling students to identify different tissues through permanent slides.

Zoology Paper II (Z 102) This paper aims to familiarize the students with a) Cytology b) Immunology c) Parasitology d) Evolution e) Ethology

Practical II (Based on Paper II) The practical sessions aim to enable students to understand the following through charts, models and demonstrations:

a) Different types of Microscopy

b) Life cycle of Ascaris

c) Blood Group

d) Homologous, Analogous and Vestigial Organs

- e) Nesting Behaviour
- f) Cell Organelles

Semester 2

Zoology paper I (Z 201)

This paper aims to familiarize the students witha) Morphology and all systems of Earthwormb) Digestive and Reproductive system of Humanc) Human disease and Applied Zoologyd) Biotechnology

Practical I (Based on Paper I) The practical sessions aim to enable students to understand the following through charts, models and demonstrations: a) Morphology and other systems of Earthworm

- b) Different types of Reproductive systems
- c) Human Diseases
- d) Poultry Appliances

Zoology paper II (Z 202)

This paper aims to familiarize the students with

- a) Life Cycle and Pathogenicity of Taenia solium
- b) Biological Chemistry
- c) Wildlife Biology including Wildlife Protection Act
- d) Fisheries
- e) Adaptation

Practical II (Based on Paper II)

The practical sessions aim to enable students to understand the following through charts, models and demonstrations:

- a) Life Cycle of Taenia solium
- b) Feedback control and regulation of Hormones
- c) National Parks and Sanctuaries of Gujarat
- d) Ecological Adaptations
- e) Fisheries

Government Science College, Chikhli Course Outcome – English

Government Science College, Chikhli follows the syllabus prescribed by Veer Narmad South Gujarat University (VNSGU). The college being exclusive to Science, only Foundation Course (English) is taught. The university has designed two Foundation Courses in English for each year:

1) Language through Literature

2) Written and Communication Skills.

The teacher concerned can choose one of these papers on their discretion and fulfill the aims of the course for the year (divided into 2 semesters) appropriately.

Language Through Literature

This paper tries to familiarize students with a varied assemblage of prose and poetry in English and through critical readings enhance and broaden their perceptions and opinion on life. And through literature, students are encouraged to identify, recognize and internalize elements of English language like Grammar and Communication and thereby enabling them to utilize English in their day to day life as well as for their future endeavours.

Written and Communication Skills

This paper introduces students to lucid prose and poetry in English. Through critical and imaginative discussions on literature the paper envisions to further familiarise the students with grammatical and communicative skills and enhance their fluency of English.

The following is the course outcome for the year 2018-19 in English

SEMESTER 1 & 2 - LANGUAGE THROUGH LITERATURE. TEXT—VISIONARY GLEAM (ORIENT BLACKSWAN)

SEMESTER 1

Unit 1. Prose. 1- An Astrologer's Day. - 2- Our Urgent Need for Self- Esteem. - 3- The Gift of the Magi.

Unit 2. Poetry. 9-A Red, Red Rose.-12-Upon Westminster Bridge.

Unit 3. Communication Skills. A- Dialogue Writing. B- Paragraph Writing.

Unit 4. Grammar. Prepositions, Synonyms (nearest), Antonyms (nearest), and Prefix- Suffix. (Based on textual grammar only.)

SEMESTER 2

Unit 1. Prose. 4- Karma. - 6- Youth and the Tasks Ahead. - 8- The Eyes are not Here.

Unit 2. Poetry. 13-An Old Woman.-14- Success is Counted Sweetest.

Unit 3. Communication Skills. A-Comprehension- B- Formal letters. (Request by students to the principal)

Unit 4. Grammar. Articles, Question tags, Active passive voice.

SEMESTER 3 & 4 - Written and Spoken Communication Skills. TEXT- Images (Orient Blackswan)

SEMESTER 3. Unit 1-Prose- 1, 2, 3. Unit 2-Poetry- 1, 2, 3. Unit 3-CommunicationSkills 1, 2.

SEMESTER 4. Unit 1-Prose------1,2,3. Unit 2-Poetry------1,2, 3. Unit 3- Communication Skills 1, 2.

SEMESTER 5 & 6: PAPER—LANGUAGE THROUGH LITERATURE. TEXT----LITERARY PINNACLES (ORIENT BLACKSWAN)

SEM 5

UNIT 1. PROSE. 2- How Wealth Accumulates and Men Decay. 3 A Retrieved Reformation. 5- On the Rule of the Road.

UNIT 2. POETRY. 9- All the World's a Stage. 10- La Belle Dame sans Merci. 12- How Do I Love Thee? UNIT 3. SKILLS. 1- Questionnaire 2- Essay writing on current issues.

UNIT 4. GRAMMAR, COMMUNICATION SKILLS AND SOFT SKILLS. 1- Transformation of Sentences.

SEM 6.

UNIT 1. PROSE. 6- The Pleasures of Ignorance. 7- The Selfish Giant. 8- The Diamond Necklace. UNIT 2. POETRY. 13- Afterwards. 14- The Ballad of Father Gilligan. 16- A Psalm of Life.

UNIT 3. SKILLS. 1- Application with CV. 2- Comprehension.

UNIT 4. Grammar. 1- Conjunction. 2- Degrees.