

**TELEGANA TRIBAL WELFARE RESIDENTIAL DEGREE
COLLEGE (W) SHADNAGAR**

PROGRAMME OUTCOME

COURSE OUTCOME

DEPARTMENT OF MATHEMATICS

Program Outcomes:

- Acquired the knowledge with facts and figures related to various subjects in pure sciences such as Physics, Chemistry, Mathematics, Computer Science etc.
- Understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life.
- Analyzed the given scientific data critically and systematically and the ability to draw the objective conclusions.

Program Specific Outcomes:

- Understand the theoretical concepts of physical and chemical properties of materials and the role of mathematics in dealing with them in a quantitative way.
- Mathematical, numerical techniques required to model them.
- Understand the concepts of vector spaces, group theory, probability, distributions, sampling techniques, algorithm design, data base design and web design

Course Outcomes:

SEMESTER – I

Differential & Integral Calculus

By the time students complete the course they realize wide ranging applications of the subject & they learn the following concepts

- Neighbourhood of a point (a, b)
- Continuity of a Function of two variables,
- Homogeneous Functions.
- Taylor's theorem for a function of two variables –
- Lagrange's method of undetermined multipliers.
- Curvature and Evolutes
- Determination of Envelope.
- Lengths of Plane Curves

SEMESTER – II

Differential Equations

After learning the course the students will be equipped with the various tools to solve few types differential equations that arise in several branches of science and students will analyze and solve the problems by using different methods, they will understand the following concepts...

- Differential Equations of first order and first degree– Homogeneous Differential Equations
- Linear Differential Equations –
- Exact differential equations –
- Integrating Factors –
- Change in variables –
- Total Differential Equations
- Equations Solvable for p, x, y
- Clairaut's equation.
- Solution of homogeneous linear differential equations with constant coefficients –
- Solution of non-homogeneous differential equations $P(D) y = Q(x)$ when $Q(x) = be^{ax}$, $b \sin ax/b \cos ax$, $b x^k$, $\forall e^{ax}$ – Method of undetermined coefficients.
- Method of variation of parameters –
- The Cauchy – Euler Equation –
- Legendre's Linear Equations –

SEMESTER – III

Real Analysis

After the completion of the course students will be in a position to appreciate beauty and applicability of the course, they can differentiate the continuity to solve the problems, they can able to do problems on sequences, series and following concepts....

- Limits of Sequences– Monotone Sequences and Cauchy Sequences –
- \limsup 's and \liminf 's –
- Alternating Series and Integral Tests.

- Continuous Functions –
- Properties of Continuous Functions –
- Uniform Continuity –
- Limits of Functions
- Basic Properties of the Derivatives –
- The Mean Value Theorems –
- L'Hospital Rule –
- Taylor's Theorem.
- Properties of Riemann Integral –
- Fundamental Theorem of Calculus.

SEMESTER – IV

Algebra

On successful completion of the course students will be able to recognize algebraic structures that arise in matrix algebra, linear algebra and will be able to apply the skills learnt in understanding various such subject and they gain knowledge about

- Elementary Properties of Groups & Subgroups
- Cyclic Groups – Classification of Subgroups Cyclic Groups.
- Permutation Groups
- Cayley's Theorem– Lagrange's Theorem
- Normal Subgroups and Factor Groups:
- Group Homomorphisms–
- The First Isomorphism Theorem.
- Rings theory. Integral Domains– Fields .
- Factor Rings – Prime Ideals and Maximal Ideals.
- Ring Homomorphisms:

SEMESTER – V

Linear Algebra

After completion of this course, students appreciate its interdisciplinary nature of linear algebra and learn about

- Vector Spaces and Subspaces & theorems
- Problems on Null Spaces, Column Spaces,
- Solving problems on Linearly Independent Sets;
- Bases — The Dimension of a Vector Space
- Analysis & application of Rank theorem – Change of Basis –
- Eigen values and Eigenvectors – The Characteristic Equation.
- Diagonalization
- Eigenvectors and Linear Transformations – Orthogonal Sets – The Gram – Schmidt Process.

SEMESTER – VI

Numerical Analysis

After studying this concept student can solve the problems by using different types of methods as mentioned below & develop their numerical ability.

- The Bisection Method
- The Iteration Method – The Method of False Position – Newton's Method – Muller's Method
- Interpolation and Polynomial Approximation
- Newton's formula for Interpolation –
- Gauss's central differences formulae –
- Lagrange's Interpolation Polynomial –
- Divided Differences – Newton's formula – Inverse Interpolation.
- Curve Fitting
- Trapezoidal Rule – Simpson's 1/3rd – Rule and Simpson's 3/8th
- Weddle's Rule Taylor's Series
- Euler's Methods – Runge Kutta Methods.

DEPARTMENT OF PHYSICS

Program Outcomes:

- Students will demonstrate proficiency in mathematical concepts needed for proper understanding of Physics.
- Students will acquire knowledge of Classical Mechanics, Electromagnetism, Modern Physics, Optics, Thermodynamics and Basic Electronics and to be able to apply this knowledge to analyze a variety of physical phenomena.
- Students will demonstrate their laboratory skills, enabling them to take measurements in physics lab and analyze the measurements to draw valid conclusions.
- Students will be capable of oral and written scientific communication and will prove that they can think critically and work independently.
- Developing their scientific intuition, ability and techniques to tackle problems either theoretical or experimental in nature.

Program Specific Outcomes:

- Students will demonstrate proficiency in mathematical concepts needed for proper understanding of Physics.
- Students will acquire knowledge of Classical Mechanics, Electromagnetism, Modern Physics, Optics, Thermodynamics and Basic Electronics and to be able to apply this knowledge to analyze a variety of physical phenomena.
- Students will demonstrate their laboratory skills, enabling them to take measurements in physics lab and analyze the measurements to draw valid conclusions.
- Students will be capable of oral and written scientific communication and will prove that they can think critically and work independently.
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Course Outcomes

PHYSICS LEARNING OUTCOMES

SEMESTER I

PAPER-I

MECHANICS AND OSCILLATIONS

Learning Outcomes

- It helps to solve certain two and three dimensional problems in few branches of Physics
- Physical concepts can be understood by the application of Vector Analysis.
- Students will be able to apply Newtons 'Laws of Motion in day to day life.
- They will get a gist of the science behind Rocket.
- Central Forces and their practical applications.
- Speed of light is same everywhere.
- Einstein's mass -energy relation.
- Learn about Pendulum Clock.
- Resonance and its real life examples.

SEMESTER II

PAPER-II

THERMAL PHYSICS

Learning Outcomes

- Science behind refrigerator.
- Concept of entropy.
- Energy Conservation.
- Black body radiation and its measurement.
- Learn about Classical and Quantum Particles.

SEMESTER III

PAPER-III

ELECTROMAGNETIC THEORY

- Get knowledge on electricity and magnetism.
- How electrical energy is converted to magnetic energy and viceversa.
- Difference between AC and DC.
- Learn about science behind motors and transformers.
- Construct the circuit using less number of components.

SEMESTER IV

PAPER-IV

WAVES AND OPTICS

- Science behind the musical instruments.
- Science behind formation of colours on thin films.
- Coherent Sources.
- Science behind sunglasses.

SEMESTER V

PAPER-V

MODERN PHYSICS

- About detailed study of Raman Effect.
- Model of an Atom.
- How light energy is converted into electric energy and vice versa.
- Dual Nature of Matter.
- Structure of a Nucleus.
- Disintegration of a nucleus.
- How crystals acts as three dimensional grating.

SEMESTER V

PAPER-VI

ELECTRONICS

- Types of Semiconductors.
- Diodes and Transistors.
- Number Systems and Logic Circuits.

Faculty Signatures

D Vijaya *D Vijaya*

U Anusha Bhavani *U Anusha*

B Soundharya *B Soundharya*

[Signature]
Principal
Principal

TTWR DEGREE COLLEGE (WOMEN)
Shadnagar, R.R Dist-509216

- ການສຶກສາ, ການສຶກສາ, ການສຶກສາ ການສຶກສາ.

SEMESTER VI

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Department of Commerce

B.Com	
Programme Outcome	This program could provide well trained professionals for the Industries,
	Banking Sectors, Insurance Companies, Financing companies,
	Transport Agencies, Warehousing etc., to meet the well trained
	Man power requirements. The graduates will get hand son experience in
	Various aspects acquiring skills for Marketing Manager, Selling
	Manager, Over all Administration abilities of the Company.
Programme Specific Outcome	The students should possess the knowledge, skills and attitudes during
	The end of the B.com degree course. By virtue of the training they can
	Become an Manager, Accountant, Management Accountant, cost
	Accountant, Bank Manager, Auditor ,Company Secretary, Teacher,
	Professor, Stock Agents, Government jobs etc.,
Course	Outcomes
Business	On successful completion of this subject the students acquire the
organisation and	knowledge about the various types of business organizations, office
Office	management and related.
Management.	

PrinciplesOf	Toenablethestudentstolearnprinciplesandconceptsof Accountancy.
Accountancy	
Financial	Onsuccessfulcompletionofthiscoursethestudentareenabledwith the
accounting	Knowledgeinthepracticalapplicationsof accounting.
Accounting	Accounting,andalliedaspectsofaccounting.Afterthesuccessful
	completionofthecoursethestudentsshouldhaveathrough knowledge
	ontheaccountingpracticeprevailinginpartnershipfirmsand other
	alliedaspects.
Principlesof Marketing	On successfulcompletionofthiscoursethestudentsshouldhavethe practicalknowledge and he tactics in the marketing.
BussinessLaw	Onsuccessfulcompletionofthiscourse,thestudentsshouldbe well versedinbasicprovisionsregardinglegalframeworkgoverningthe business world.
Management Accounting	Thiscourseaimstodevelopanunderstandingoftheconceptual frameworkofManagementAccounting.Afterthesuccessful completionofthecoursethestudentacquirestheknowledgein the ManagementAccountingTechniquesin businessdecisionmaking.
CostAccounting	Tokeep thestudentsconversantwiththeever–enlarging
	frontiersofCostAccountingknowledge.
Banking LawtheoryandPrac tice	Toenlightenthe students’ knowledge on Banking Regulation Acts. Afterthesuccessfulcompletionofthecoursethestudentsshouldhavea through knowledge on Indian Banking System and Acts pertaining to it.
Corporate Accounting	Thiscourseaimstoenlightenthestudentsontheaccounting procedures followedbythe Companies. ToenablethestudentstobeawareontheCorporateAccounting in conformitywiththeprovisionoftheCompanies Act.

Income-Tax	This course aims to provide an in-depth knowledge on the provisions of Income Tax. To familiarize the students with recent amendments in Income-tax.
Principles of Auditing	On successful completion of this course, the students should be well versed in the fundamental concepts of Auditing.
Entrepreneurial Development	On successful completion of this course, the students should be well versed in concepts relating to entrepreneur, knowledge in the finance institution, project report incentives and subsidies.

Department of Zoology

Program Outcomes:

Students will be able to demonstrate **in-depth knowledge and understanding** about the fundamental **Concepts, Principles** and **Processes** in the field of Zoology and its subfields (animal diversity, ecology, comparative anatomy and developmental biology of vertebrates, physiology and biochemistry, genetics and evolutionary biology, animal biotechnology, applied zoology, aquatic biology, immunology, reproductive biology and insects, vectors and diseases etc.,).

1. Demonstrate **procedural knowledge** that creates different types of **Professionals** in Zoology and allied fields (apiculture, aquarium fish keeping, medical diagnostics and sericulture etc.,).
2. Exhibit the **Skills** related to specialization areas (Entomology, Environmental Biology etc.,) in Zoology, its subfields and interdisciplinary subfields like Chemistry, Physics and Mathematics.
3. **Appreciate the complexity of life processes**, their molecular, cellular and physiological processes, their genetics, evolution, behaviour and their interrelationships with the environment.
4. **Design and conduct experiments** to test a hypothesis.
5. **Understand and interpret data** to reach a conclusion.
6. **Accept the Legal restrictions and Ethical considerations** placed for animal welfare.
7. Demonstrate **subject-related and transferable skills** (communication, problem-solving etc.,) that are relevant to Zoology-related job trades and employment opportunities.

Programme Specific Outcomes (PSOs) (Intellectual and Practical Skills):

The students will be able to:

1. Understand how animals are identified, assigned scientific names and classified.
2. Use appropriate information with a critical understanding.
3. Learn basic laboratory and analytical skills.
4. Use effective methods for modifying animal behaviour.
5. Participate in animal management programmes in an effective manner.
6. Work safely and effectively in the field, in laboratories and in animal facilities.
7. Demonstrate competence in handling and statistical analysis of data gained from experiments.

8. Learn communication and IT skills, including the collation, graphical representation of data, citing and referencing work appropriately, communicating using a range of formats.

Course Outcomes

Animal Diversity – Invertebrates & Vertebrates

- CO1. Describe general taxonomic rules on animal classification.
- CO2. Classify Phylum Protozoa to Echinodermata with taxonomic keys.
- CO3. Imparts conceptual knowledge of vertebrates, their adaptations and associations in relation to their environment.
- CO4. Classify phylum Protochordates to Mammalia.
- CO5. Complex Vertebrate interactions.

Comparative Anatomy and Developmental Biology of Vertebrates:

- CO1. Comparative knowledge of Integumentary, Digestive, Circulatory, Urinogenital, Nervous and Skeletal system of various classes of vertebrates.
- CO2. Basic concepts of developmental biology.
- CO3. Concept of hormonal regulation of reproduction.

Physiology and Biochemistry:

- CO1. Students gain fundamental knowledge of animal physiology
- CO2. Seeks to understand the mechanisms that work to keep the animal body alive and functioning.
- CO3. Interactions and interdependence of physiological and biochemical processes.
- CO4. Students are taught the detailed concepts of digestion, respiration, excretion, the functioning of nerves and muscles, cardiovascular system, endocrine system and reproductive system.
- CO5. Physiological and biochemical understanding through scientific enquiry into the nature of mechanical, physical, and biochemical functions of animals, their organs, and the cells of which they are composed.
- CO6. Students learn the concepts of endocrine systems and homeostasis.

Genetics and Evolutionary Biology:

- CO1. Division aspects of basic unit of life i.e. cell.
- CO2. Mendelian and non-Mendelian inheritance.
- CO3. Understanding of basic concepts of genetics and laws of inheritance.
- CO4. Concept behind genetic disorder, gene mutations- various causes associated with inborn errors of metabolism.
- CO5. Theories of evolution and knowledge of evolution of species
- CO6. Knowledge about eras and population genetics.
- CO7. Understanding of genetic basis of evolution, human karyotyping and speciation

Applied Zoology

- CO1. Understands concepts of fisheries, fishing tools and site selection.
- CO2. Understands about parasites and epidemiology of parasites in human and animals.
- CO3. Use of recombinant DNA technology in genetic manipulations and in a variety of industrial processes.
- CO4. Understanding of in vitro culturing of organisms and production of transgenic animals. CO5. Types of breeds in animal farming and poultry farming along with their management. CO6. Aqua culture systems, induced breeding techniques and post harvesting techniques.

Insect Vectors and Diseases

- CO1. Imparts knowledge of non-beneficial insects.
- CO2. Interaction of insect vectors with humans and spread of diseases. CO3. Management and control of vector and vector born diseases.

Apiculture:

- CO1. Knowledge about honey bee and bee rearing.
- CO2. Knowing beehives, bee keeping equipment, methods of extraction of honey and processing of honey.
- CO3. Bee enemies and diseases.
- CO4. Bee economy and entrepreneurship in apiculture

Sericulture:

- CO1. Gives knowledge of silk worm rearing.
- CO2. Mulberry cultivation.
- CO3. Pests and diseases associated with silk worm and mulberry.
- CO4. Various process involved in silk production

Aquarium Fish Keeping:

- CO1. Provides knowledge of ornamental fish breeding which is highly professional and attractive avenue for youth.
- CO2. Aquarium fish keeping, aquarium setup and accessories.
- CO3. Aquarium fishes, their food and feeding.
- CO4. Fish transportation and management.
- CO5. Maintenance of aquarium.

Public Health and Hygiene

- CO1. Knowledge about medical care, nutrition, health and major nutritional deficiency diseases.
- CO2. National Health Policy, National Rural Health Mission (NRHM) and National Urban Health Mission (NUHM).
- CO3. Concept of environment degradation, issues and health hazards like personal and mental hygiene, addiction etc.
- CO4. General concept of communicable diseases, mechanism of pathogenesis and their control measures.
- CO5. Life Style Related Non-Communicable Diseases, their causes and prevention through dietary and lifestyle modifications.
- CO6. Concept of Mental Health diseases and their management.
- CO7. Social health problems like smoking, alcoholism, drug dependence and their deaddiction.

DEPARTMENT OF CHEMISTRY

Course Outcomes:

SEMINTER - I

- **S1-CO1:** Students will learn the basic knowledge of s,p groups of Periodic table and able to differentiate between polar and non polar covalent bonding. Identify each atom in a polar bond as having a partial negative charge or a partial positive charge. Compare the relative polarity of two or more polar bonds.
- **S1-CO2:** Recall the structures, the properties, applications, and the chemical reactivity of the s & p block elements. Differentiate the different allotropes of the s & p block elements. Derive the structure of compounds of the s & p block elements.
- **S1-CO3:** Students will learn the basic knowledge of bond polarization acidity & basicity & stability of reactive intermediate of different hydrocarbons can be determined.
- **S1-CO4:** Understand physical & chemical reaction of aliphatic hydrocarbon and aromatic hydrocarbon and the aromaticity of aromatic compounds can predict by Huckel's rule.
- **S1-CO5:** From this portion students can acquire background knowledge about the Synthesis and chemical reactivity of alkanes, Mechanism of free-radical halogenation of alkanes, alkene and alkyne.
- **S1-CO7:** Students will acquire Knowledge about van der Waal's equation and critical state. Derivation of relationship between critical constants and van der Waal's constants.
- **S1-CO8:** Understands how to determine viscosity using Ostwald viscometer and acquire knowledge about Azeotrope mixtures.
- **S1-CO9:** By considering principles of solubility product & common ion effect cation can be discriminated by anions in a salt mixture.
- **S1-CO10:** From this portion students can acquire thorough background knowledge about the qualitative analysis of special elements.
- **S1-CO11:** Classify stereoisomer's based on symmetry criteria and energy criteria. S1CO10: Interpret E/ Z Configuration.
- **S1 CO12:** Predict the Conformations of simple organic molecules.
- **S1 CO13:** Learn about determination of Bragg's equation in various crystal structures & by qualitative analysis one can determine the weight of chemical substance.

SEMINTER – II

S2-CO1: To understand the physical and chemical properties of oxides Oxy- acids of p elements.

S2-CO2: Defines Structure, bonding and reactivity of Xenon–Oxides, Halides and Oxy-halides and Acquire knowledge about clathrate compounds.

S2-CO3: Explore the methods of preparation and properties of halogen compound and one can express the stereochemistry of SN1 & SN2 reactions.

S2-CO4: Explore the methods of preparation and properties of alcohols, ethers and carbonyl compounds and current applications.

S2-CO5: From this portion students can acquire thorough knowledge about the synthesis of carbonyl compounds and their reactivity.

S2-CO6: Acquire knowledge on Hittorf's method, Kohlrausch law, Arrhenius theory, Ostwald dilution law, Debye-Huckel Onsager equation and predicts its applications. Accomplish the Nernst Equation, EMF of a cell, Single electrode potential, Standard hydrogen electrode, and electrochemical series.

S2-CO7: Understand the basic principle of titrations and indicators used for different types of titrations

S2-CO8: Classify stereoisomer's based on symmetry criteria and energy criteria. Interpret R and S configuration, D/L Nomenclature.

S2-CO9: From this portion students can acquire knowledge about the EMF and Colligative properties of solution.

SEMISTER – III

S3 CO1: From this portion students can acquire knowledge on properties of f-block elements and non-aqueous solvents

S3CO2: Learn about the postulates and limitations of Werners theory, Sidwick's and VBT theory. Acquire knowledge on the IUPAC Nomenclature and solve the EAN of coordination compounds.

S3CO3: Learn to Categorise the Organometallic compounds of Li Mg Al and Metal carbonyls. Discuss its applications.

S3CO4: Understand the preparation methods and its synthetic applications in industry of carboxylic acids and carbanions.

S3CO5: Have an idea on all named reactions and mechanisms of carboxylic acids and nitro hydro compounds and focus on its industrial applications.

S3CO6: Have an extensive knowledge on Thermodynamics with reference to different Thermodynamic functions, processes, work of expansion and laws of Thermodynamics

S3CO7: Understand the applications of Thermodynamics in basic sciences for deriving

equations, in engineering science for calculating efficiency of machine and evaluation of spontaneity, Gibb's equation and Maxwell's relations.

S3CO8: Students learn about the mathematical data, accuracy, precision & error can be explained.

S3CO9: Design the Phase equilibria of one component and two component system, compound with congruent and incongruent melting point.

SEMISTER IV

S4CO1: Understand the theories of coordination compounds and stability of metal complexes.

S4CO2: Know about the Biological significance of essential elements and toxicity of heavy metals

S4CO3: Compare the property and reactivity of different class of amines and design the synthesis pathway of different organic compounds using amines

S4CO4: Classify heterocyclic compounds and compare their aromatic character and reactivity

S4CO5: Develop concept on reaction kinetics with special reference to factors influencing the rate and evaluate the merits of different theories of reaction rate.

S4CO6: Learn to analyze the consequences of light absorption with reference to various photo physical processes and photochemical reactions with normal and abnormal quantum yield.

S4CO7: Students will learn the Theory of Quantitative Analysis.

SEMISTER V

S5CO1: Know about electromagnetic radiation and understand the interaction of electromagnetic radiation with molecules - various types of molecular spectra

S5CO2: identify the usage of different spectroscopic methods to find the structures, molecular formula, proton nature, Functional group Identification, Unsaturated system, Molecular Weight, Determination of Bond Length.

S5CO3: To understand the principle of NMR spectroscopy and interpretation of spectrum
CO5: Acquire the knowledge of mass spectrometry for the analysis of given sample

S5CO4: Gain the knowledge of principle and methods of solvent extractions

S5CO5: Understand the classification of methods of chromatographic techniques, nature of adsorbents and solvent systems

S5CO6: Analyse the given compounds.

SEMISTER VI

S6CO1: Students will learn about the concepts of inorganic reaction mechanisms

S6CO2: Understand the structures of Boranes and Carboranes

S6CO3: Students Classify stereoisomer's based on symmetry criteria and energy criteria.

S6CO4: Understand the pericyclic reactions

S6CO5: Understand the Importance of polymers

S6CO6: Know about the types of Electro analytical methods.

S6CO7: Analyze the principles, types of electrodes used and applications of Potentiometry, Voltametry and Conductometry.

S6CO1: Recalling Infective and hereditary diseases.

S6CO2: Know about the terminology in medicinal chemistry and Nomenclature of Drugs.

S6CO3: Understand ADME of Drugs.

S6CO4: Acquire the knowledge of mechanism of action of drugs and factors effecting action of Enzyme and Receptors.

S6CO5: Evaluate the Synthesis and therapeutic activity of Drugs related to Chemotherapeutics, acting on metabolic disorders and acting on nervous system.

S6CO6: Analyzing the function of molecular messengers and health promoting drugs

DEPARTMENT OF COMPUTER SCIENCE

Program Outcomes

The outcomes of the 3year B.Sc. Computer Science programmer follow:

- To develop an understanding and knowledge of the basic theory of Computer Science with good foundation on theory, systems and applications.
- To foster necessary skills and analytical abilities for developing computer based solutions of real-life problems.
- To provide training in emergent computing technologies which lead to innovative solutions for industry and academia.
- To develop the necessary study skills and knowledge to pursue further post-graduate study in computer science or other related fields.
- To develop the professional skill set required for a career in an information technology-oriented business or industry.

JAVA

Upon successful completion, students will have the knowledge and skills to:

CO1: Read and understand Java-based software code of medium-to-high complexity.

CO2: Use standard and third party Java's API's when writing applications.

CO3: Understand the basic principles of creating Java applications with graphical user interface (GUI).

CO4: Understand the fundamental concepts of computer science: structure of the computational process, algorithms and complexity of computation.

CO5: Understand the basic approaches to the design of software applications.

CO6: Apply the above to design, implement, appropriately document and test a Java application of medium complexity, consisting of multiple classes.

OOPS with C++:

CO1: Understand the difference between the top-down and bottom-up approach

CO2: Describe the object oriented programming approach in connection with C++

CO3: Apply the concepts of object-oriented programming

CO4: Illustrate the process of data file manipulations using C++

CO5: Apply virtual and pure virtual function & complex programming situations.

RDBMS:

CO1: Understand the difference between the top-down and bottom-up approach

CO2: Describe the object-oriented programming approach in connection with C++

CO3: Apply the concepts of object-oriented programming

CO4: Illustrate the process of data file manipulations using C++

CO5: Apply virtual and pure virtual function & complex programming situations.

DBMS:

CO1: Understand database concepts and structures and query language

CO2: Understand the ER model and relational model

CO3: To design and build a simple database system and demonstrate competence with the fundamental tasks

CO4: involved with modelling, designing, and implementing a DBMS.

CO5: Understand Functional Dependency and Functional Decomposition.

CO6: Apply various Normalization techniques

CO7: Perform PL/SQL programming using concept of Cursor Management, Error Handling, Package and Triggers

CO8: Execute various advance SQL queries related to Transaction Processing & Locking using concept of Concurrency control.

CO9: Understand query processing and techniques involved in query optimization.

CO10: Understand the principles of storage structure and recovery management.

WEB TECHNOLOGIES:

CO1: Explain the history of the internet and related internet concepts that are vital in understanding web development.

CO2: Discuss the insights of internet programming and implement complete application over the web.

CO3: Demonstrate the important HTML tags for designing static pages and separate design From content using Cascading Style sheet.

CO4: Utilize the concept so JavaScript and Java

CO5: Use web application development software tools i.e. Ajax, PHP and XML etc. and identify the environments currently available on the market to design websites.

FIT:

CO1: The focus of the subject is on introducing skills relating to IT basics, computer applications, programming, interactive medias, Internet basics etc.

CO2: Have a basic understanding of personal computers and their operations.

CO3: Understand basic concepts and terminology of information technology.

C LANGUAGE:

CO1: Choose appropriated at a structure store present data items in real world problems.

CO2: Analyze the time and space complexities of algorithms

CO3: Design programs using a variety of data structures such as stacks, queues, hash tables, binary trees, search trees, heaps, graphs, and B-trees.

CO4: Analyze and implement various kind so searching and sorting techniques.

CO5: Write the C code for a given algorithm.

CO6: Implement Programs with pointers and arrays, perform pointer arithmetic, and use the pre-processor.

DEPARTMENT of HISTORY

PROGRAM OUTCOMES

Program outcomes for a history program typically reflect the knowledge, skills, and abilities that students are expected to acquire by the time they complete their studies.

These outcomes can vary depending on the specific goals and focus of the history program, Here are some common program outcomes:

1. Historical Knowledge:

Graduates should have a broad understanding of historical events, periods, and trends across different regions and cultures. This includes knowledge of key historical figures, movements, and developments.

2. Critical Thinking:

Students should develop the ability to analyze historical evidence critically. This involves assessing the reliability of sources, understanding historical context, and evaluating different interpretations of historical events.

3. Research Skills:

Graduates should be proficient in historical research methods, including the ability to locate and analyze primary and secondary sources. This also involves using libraries, archives, and digital resources effectively.

4. Effective Communication:

Students should be able to communicate historical ideas and arguments clearly and persuasively, both in writing and orally. This includes the ability to craft well-reasoned essays, research papers, and presentations.

5. Historical Synthesis:

Graduates should be able to synthesize information from various sources to develop a comprehensive understanding of historical events.

6. Cultural Awareness:

A history program often emphasizes the development of cultural awareness and sensitivity. Graduates should be able to understand and appreciate diverse cultures and perspectives throughout history.

7. Ethical and Moral Reasoning:

Students should develop an understanding of the ethical and moral dimensions of historical events. This includes considering the impact of historical actions on different groups of people and reflecting on the ethical responsibilities of Historians.

8. Global Perspective:

A History program may seek to instill a global perspective way to the Students, encouraging them to think beyond national boundaries and consider the interconnectedness of Historical events on global scale.

COURSE OUTCOMES

SEMESTER: I

PAPER TITLE: HISTORY OF INDIA (FROM EARLIEST TIMES TO 700 CE)

- Student will get a insight about the scope of history it focuses on the influence of geography and examines the study of the sources
- students emphasis on a comparative study of the Indus valley civilisation and the Vedic civilisation
- students Explains the circumstances for the development of new religious movements like Lokayathas, Chaharavakas, Budhisim and Jainism.
- students examine The Magadha empire and Mauryan empire are studied in contrast with emphasis on society, economy, literature and art and architecture
- student examine The Guptas Empire in detail to the background of feudalism caste system, position of women, education, and literature.

SEMESTER II

PAPER TITLE: HISTORY OF INDIA (FROM 700 CE TO 1526 CE)

- Student focuses on the emergence of regional states such as Pallavas, Chalyukas of Badhami, Rastrakutas
- Students know the importance Cholas local self-Government to comparative study of present senirio.It explains the study of society, economy, literature and art.
- Student understands the invasions of the Turkish invaders are comprehensively understood. The circumstances which led to formation of Delhi sultanate is understood. Student explains the impact of movements such as Bhatki movement and Sufi movement on the medieval Indian society.
- Student assess the regional independent kingdoms of the Kakatiyas and the Vijayanagara are dealt with and their contribution.

SEMESTER III

PAPER TITLE: HISTORY OF INDIA (1526 – 1857 CE)

- Student Focuses On impact and importance of the establishment of Mughal Dynasty in detail manner.
- Student explains importance of social and political history it explains the Development of a composite culture in medieval times.
- student understands rise of Maratas, Peshwas, and Sikhs is as a response to the Mughal establishment.
- student understands the coming of European powers and their motives are to the background of mercantilism and colonialism. A study of changes in the agrarian economy and conditions of the peasants is focussed. student understands the decline of rural cottage industries and urban handicraft is to the background of introduction of roads, communications and establishment industries.

SEMESTER: IV

PAPER TITLE: HISTORY OF INDIA (1858 – 1964 CE)

- Student explains the beginning of the colonial rule and objectives, motives.
- Students understands the Importance of press, communication and the role Christian missionaries and its impact.
- Students examine the social and religious reforms movements as a social back ground to the Indian national movement.
- Students explains the factors which led to the growth of nationalism and the formation of Indian National Congress as a part of the freedom struggle.
- Student understands the extremist phase of the Indian national movement is to the backdrop of socialist and communist parties, which voiced the peasant and workers movements.
- Students deal with the emergence of communal politics and the ideas connected to communalism.
- Students Understands the Rise of nationalism and formation of Indian National Congress.
- student examines the Socio and religious reform movements.
- students explain an Indian struggle for independence.

SEMESTER: V

PAPER TITLE: WORLD HISTORY (1453-1964CE)

- Explains the beginning of modern age in Europe. It helps the students to understand the transition from feudalism to modern capitalism. Focuses on Renaissance and reformation movements and its impact.
- Helps the students to get an idea of the emergence of nation states by breaking away from despotic rule. Major revolutions in Europe are critically examined. : It helps the students to have a comprehensive understanding of industrial Revolutionary and its impact on the new world.
- Student will understand an idea of the reactionary and revolutionary forces. The era of conflict explained.
- Student examines the significant movements like unification of Italy and Germany. Students explain the Factors which led to the outbreak of World I and the consequences.
- Student examine the importance of League of Nations is analysed to the background of its achievements and failures Fascism, Nazism and emerging militarism resulting in deterrent factors and mistrust resultant world disturbances. The causes for the second world war which lie in the geopolitical conditions and the emerging new world economic order.
- Student understanding important of peace harmony through United State Organization

SEMESTER: VI

PAPER TITLE: HISTORY OF TELANGANA (Earliest times - 2014 CE)

- Student focuses on regional history of Telangana region from pre-history times. With a Specific emphasis on society and economy, religion, language and Literature, art and Architecture.
- The early history of dynasties such as Satavahanas, Ishvakhas, Vishnukundins and Chalyukasa of Bhadami is explained.
- Early history of the Kakatiyas and post Kakatiya period is understood while assessing their contribution to regional history.
- The formation of Golconda and the contribution of Qutub-shahis in the Telangana region understood and art and architecture of during the Qutub shahis.

- Students Examine An idea of the foundations of modern Hyderabad with the History of Asafjahi Dynasty. The changes in agriculture, irrigation and modern industries.
- Students Examine The social and cultural awakening of Telangana region which Becomes a platform for political awakening by a study of movements and activities in the region. (Andhra Mahasabha, Communist Movements, Delist Movements, Ittehad-UlMuslimeen and Women Movements).
- students will understand Anti-Feudal and Anti-Nizam movements combined with Peasants struggles which results in the Telangana arms struggle. The formation of Andhra Pradesh in 1956 resulting the merger of Telangana region with coastal Andhra is analytically dealt.
- students understand Post formation of Andhra Pradesh the discrimination, dissent, and protest which are a result of formation of Andhra Pradesh. The Telangana Praia Samiti and the demand for a separate Telangana state are examined at two Different levels.
- Student will give an idea of the historical background of Telangana region.
- Student explains the historical circumstances in which a demand for separate state emerges.
- Student explains the importance of regional parties and their impact on public awakening and intellectual response.

DEPARTMENT OF ECONOMICS



“There are unlimited wants but there are limited means”

“It is economics which uses limited means effectively.”

Course outcomes

- Learning outcomes of Economics COURSE PAPERS:
- SEMESTER-I Micro Economics-
- It enables students to define and explain the basic concepts of Micro Economic theory.
- To obtain and interpret elasticity's, calculate price, income change of consumer equilibrium, production and various market structure.
- Semester-II MACRO ECONOMICS
- It gives information about National Income, calculation methods of National income and concepts related to National income.
- It brings awareness on Macroeconomic aspects like Money, Foreign Exchange, Inflation, Unemployment, Economic growth and foreign trade.
- SEMESTER-III STATISTICS FOR ECONOMICS-
- To formulate complete, concise and correct representation of selected data.
- To enable them to apply laws of probability to concrete problems.
- Semester -3 SEC PAPER-RURAL DEVELOPMENT
- To enhance critical thinking by making them to participate in social activities and imbibe human values among them.
- To bring awareness among students about various ways and schemes for Rural development.
- SEMESTER-4 INDIAN ECONOMY.
- To enable students to have an understanding of the various issues of Indian economy.
- To develop the skill of critical appraisal of current Economic issues.
- SEMESTER-4 ENTREPRENEURSHIP DEVELOPMENT.

- To develop their entrepreneur skills.
- To boost up their spirit towards innovative entrepreneur ideas.
- SEMESTER-5 PUBLIC ECONOMICS
- To enable students to understand the proper role of the Government in the economy.
- To analyse the impact of public policy on the allocation of resources and distribution of income in the economy.
- SEMESTER-6 DEVELOPMENT ECONOMICS-
- This course introduces the students to the central issues of economic development in poor countries.
- To enable them to explain the concept of economic growth.

Department of Botany

Program Outcome:

- They understand the nature and role of microorganisms like bacteria and viruses their uses directly and indirectly.
- They understand the role of plants in the functioning of a healthy global ecosystem.
- They gain scientific knowledge in life science and fundamental metabolism of plants.
- They will be able to identify the taxonomic position plants in their surrounding environment, and also understand the ecological adaptations of the plants.
- They will be able to apply reasoning informed by the text knowledge to assess plant diversity, its importance for society and environmental issues and the consequent responsibilities relevant to the biodiversity conservation practice.

Botany Course Outcome:

Microbial Diversity of Lower Plants:

- Understand the morphology and staining techniques of bacteria
- Gain the knowledge about plant diseases caused by bacteria and viruses.
- Understand the morphological diversity of the lower plants which include algae, fungi, lichens Bryophyta and Pteridophyta.
- It also imparts knowledge about biofertilizers, Stellar evolution, Heterospory and seed habit.

Gymnosperms, Taxonomy of Angiosperms and Ecology

- Understand the general characters of Gymnosperms and gain knowledge about the morphological and anatomical features of Pinus and Gnetum.
- Understand the Geological time scale and Paleobotany.
- Understand the Principles of plant classification
Knowledge about Bentham & Hooker and Engler & Pantlessness of plant classifications.
- Understand ICN, Shenzhen code and Herbarium techniques.
- Learn about the characters of biologically important families of angiosperms.
- Know the floral variations in angiospermic families, their phylogeny and evolution.
- This course provides the skills needed to recognize and characterize several plants.
- The students are made to understand different types of plant classifications and principles involved in nomenclature.
- They are also made to understand the role of anatomy, embryology, cytology in solving taxonomic and phylogenetic problems.
- Understand the concept of Ecosystem & its components, Plant adaptations and plant successions.
-

Plant Anatomy and Embryology

- Know various types of plant tissues, Internal structure of dicot and monocot stem.
- Understand the normal and anomalous secondary growth found in specific stems and root.
- Gain knowledge about the wood structure in some plants like teak, rosewood, neem etc.
- Know the structure and morphology of anther, microsporogenesis.
- Understand the development of male gametophyte and female gametophyte.
- Know the different mechanisms of pollination and fertilization in flowering plants.

- Know the structure appendages and dispersal mechanisms in seeds
- Understand the development and types of endosperms and embryo.
- Gain knowledge about Polyembryony and Apomixis.
- These studies have been designed to impart an insight into the internal structures and also the embryological features of the highly evolved plants i.e. the angiosperms.

Cell Biology, Genetics and Plant Physiology

- Gain knowledge about plant cell envelopes, cell organelles, nucleus, chromosomes-structure and types of DNA & RNA
- Understand the mechanism of cell division- mitosis and meiosis.
- Gain knowledge about Mendel's laws of inheritance, Incomplete dominance and co-dominance.
- Understand the concepts Linkage and crossing over, Variation in number and structure of Gene mutations.
- Understand the growth and developmental processes in plants.
- Know about Photosynthesis and Respiration in plants.
- Understand the process of translocation of solutes in plants
- Know the nitrogen metabolism and its importance.
- Gain knowledge about plant-water relations, mineral nutrition, transpiration, enzymes. Understand the role of phytohormones.

Biodiversity and Conservation

- Know about the Plant diversity and its scope- Genetic diversity, species and agro diversity
- Gain knowledge about values and uses of biodiversity.
- Understand the loss of biodiversity, Gain knowledge about organizations associated with biodiversity, biodiversity legislation and conservation.
- Learns the need to conserve biodiversity and Principles of conservation.
- Understand the role of plants in relation to human welfare.
- Learn about the alcoholic beverages through ages, important fruit crops and their commercial importance.

Plant Molecular

- Learn the structural levels of Nucleic acids, structure types of DNA, mitochondrial and chloroplast DNA.
- Structure of RNA and its types.
- Learn about Nucleosome, chromatin structure.
- Gain knowledge about molecular events in replication of DNA,
- Understand the overview of central dogma of life and genetic code.
- Understand the mechanism of transcription, split gene concept of introns and exons.
- Learn about eukaryotic mRNA processing.
- Understand the molecular events of Translation in prokaryotes leading to protein synthesis. Learn about transcriptional regulation in prokaryotes.

Department of English

General English for UG courses PROGRAMME OUTCOMES

- To improve basic skills of Listening, Speaking, Reading and Writing.
- To Improve behavioral skills through language.
- To develop effective Communicative skills
- To improve their personal, professional and intellectual abilities through reading various aspects of literature.
- To improve verbal and non-verbal communication through the exposure to literature and language.
- To emphasize the process of learning and equipping modern usage of language by getting exposed to creative writings.
- To perfect variety of expressions by way of exposure to variety of English across the World.
- To improve vocabulary effectively.
- To acquire writing skills
- To enhance employable skills by way of developing their linguistic skills in communication.

PROGRAMME SPECIFIC OUTCOMES

- To enjoy different forms of literature such as Drama, Poetry, Novel, Story and One Act plays.
- To appreciate the beauty of literature and language.
- To study and perfect 'Pronunciation i.e. Sound system of English'.
- To acquire various skills of communication both written and spoken.
- To strengthen vocabulary of English (the use of Synonyms, Homonyms, Homophones, One-Word substitutes and figure of speeches).
- To gain commendable knowledge of English Grammar.
- To develop knowledge of conversion of Sentences situational.
- To improve the various techniques of presentation in English both in Writing and in Speaking according to the demand and necessarily.

General English for UG courses COURSE OUTCOMES

- Students can possess good communication skills at the end of the course.
- Students are able to communicate the views and ideas frankly.
- Students could be ready to face all kinds of language tests.
- Students could get good command over English Grammar.
- Students could gain employable skills.
- Students are able to gain comprehension skills.
- Students could gain skills of creative writings.

DEPARTMENT OF POLITICAL SCIENCE

PROGRAMME OUTCOME

PO1-Political Science and Society: understanding the inter relationship between policy decisions and its effects on society. This is achieved through a comprehensive teaching of the practice of public administration in India.

PO2-Critical thinking: the ability to analyse and predict socio political phenomena based on the study of existing socio economic determinants and past experiences. This goal is achieved by training students in the different methods and tools of investigation such as empirical research methods, survey research and data analysis of subject responses. Some of the research projects carried out by the students are *WaterSupply and Sanitation Provisioning in Schools in Kolkata; The Role of The Media in The 16th Lok Sabha Elections; Women's Empowerment and Local Self- Government: Kolkata MunicipalCorporation Case Study.*

PO3 - Effective citizenship: the course curriculum inculcates among students a basic understanding of the rights and duties of citizenship and thereby to act as responsible citizens through the observation of important days such as Independence Day, Republic Day and also spreading awareness in society through street plays based on specific socio political issues such as domestic violence, disillusioned youth of the materialistic world etc.

PO4 - Communication: Establishment of linkages between academics and civil society at large so as to successfully address socio political problems. The fortnightly wall journal is a means for keeping the entire student population up to date with political occurrences both global and domestic. Debates, seminars and panel discussions are also regularly organized on relevant themes and participation is sought from experienced resource persons. Some of the events in this regard have been an interactive session on the Presidential Election In America with members of the American Senate, Senator Wayne Harper, a Utah State Senator (Republican Party) and Mrs. Aruna Miller, a Maryland House Delegate (Democratic Party) and Mr. Greg Pardo, Assistant Public Affairs Officer, US Consulate Kolkata; a panel discussion and debate on *Role of the Media in Politics in 21st Century India***PO5- Individual and team work:** Function effectively as an individual and as a member/leader in different social

settings. This aim is achieved through team research and presentations, especially inter college student seminars which have addressed themes such as *Diverse Paradigms of Indian Democracy: Crises and Challenges* and *The Indian Parliament: A critical Retrospect* and also by participating in the Youth Parliament competition organised by the Department of Parliamentary Affairs, Government of West Bengal.

PROGRAMME SPECIFIC OUTCOME:

- PSO1 - Understanding the nature and developments in national and international politics
- PSO2 - Analysing the Indian constitutional provisions, major legislations and reforms.
- PSO3 - Critical evaluation of social, economic and political variables for a proper understanding of the plurality of Indian society
- PSO3 - Building overall consciousness regarding national political history, international relations and present Indian and Western political thinkers.
- PSO4 - Encouraging a comprehensive, comparative understanding of specific world constitutions such as UK, USA, China, Russia, Switzerland and France.
- PSO5 - Developing knowledge of administrative studies with special reference to Indian administrative structures and practices.
- PSO6 - Examining India's foreign relations with her neighbours and great powers.
- PSO7 - Use of case study method for analysing the working of important international and regional organization like UN, EU, ASEAN etc.

COURSE OUTCOMES

1. POLITICAL THEORY

- CO1** - Analyzing what is Politics and explaining the approaches to the Study of Political Science – Normative, Behavioral, Post Behavioral, Feminist.
- CO 2** - Assessing the theories of State (Origin, Nature, Functions): Contract, Idealist, Liberal and Neo-Liberal Theories.
- CO3** – Explaining the Concept of State Sovereignty: Monistic and Pluralistic Theories. Analyzing the changing concept of Sovereignty in the context of Globalization.
- CO4** – Classification of David Held’s Democratic Theories.
- CO5** – Understanding basic concepts of Liberty, Equality, Rights, Law and Justice.
- CO6** – Assessing empirical Political Theory: System’s Analysis, Structural Functionalism.
- CO7**- Explaining Dialectical Materialism and Historical Materialism with special reference to relationship between base and superstructure.
- CO8** – Analyzing the theory of class and class struggle.
- CO9** – Describing the Marxist Approach to politics.
- CO10** – Analysing Marx’s concept of Freedom and Democracy: Nature, Features and Critique.
- CO11** – Discussing Marx’s Theory of State with special reference to Relative Autonomy of the State.
- CO12** - Explaining Marxian theory of Revolution.
- CO13** – Evaluating the major debates in Marxism: Lenin-Rosa Luxembourge debate on Political party.

COMPARATIVE GOVERNMENT AND POLITICS

- CO1** Tracing the evolution of Comparative Politics as a discipline and drawing a distinction between Comparative Politics and Comparative Government.
- CO2**- Investigating the nature and scope of Comparative Politics.
- CO3**- Analyzing the approaches the approaches and models of comparison: systems analysis; structural functionalism; and institutional approach.
- CO 4**- Critically analyzing the features of a liberal democratic and socialist political system with focus on UK, USA and the People’s Republic of China.
- CO5** - Discussing the features of a federal system with special reference to USA and Russia.
- CO 6**- Conducting an intensive comparative study of the Executive (UK, USA, France and Russia); Legislature (UK, USA and the PRC); the Judiciary (UK, USA and PRC).

CO7- Critically looking at the rights of the citizens of UK, USA and PRC from a

GOVERNMENT AND POLITICS IN INDIA

CO1- Introducing the Indian Constitution with a focus on the role of the Constituent Assembly and examining the essence of the Preamble.

CO2- Examining the Fundamental Rights and Duties of Indian citizens with a study of the significance and status of Directive Principles.

CO 3- Assessing the nature of Indian Federalism with focus on Union-State Relations.

CO4- Critically analyzing the important institutions of the Indian Union: the Executive: President; Prime Minister, Council of Ministers; Governor, Chief Minister and Council of Ministers; The legislature : Rajya Sabha, Lok Sabha, Speaker, Committee System, State Legislature, The Judiciary : Supreme Court and the High Court's: composition and functions- Judicial Activism

CO5- Looking at the Constitutional Amendment Procedure with focus on the main recommendations of the Constitutional Review Commission (Venkatachalliah Commission)

CO6- Critically evaluating the Indian Party system—its development and looking at the ideology of dominant national parties

CO7- Evaluating the role of various forces on Indian politics: religion; language; caste; tribe; regionalism; business; working class and peasants

CO8- Evaluating the Electoral Process in India with focus on the Election Commission: Composition, Functions and Role

CO9- Investigating the New Social Movements since the 1970s: environmental movements, women's movement and human rights movement

INTERNATIONAL RELATIONS

- CO1-** Explaining scope and subject matter of International Relations as an autonomous academic discipline.
- CO2-** Approaches and methods to study the discipline through Political realism, Pluralism and World system's Model.
- CO3-** Examining the issues of Underdevelopment, Terrorism, Regionalism and Integration that characterizes the Post second world war order.
- CO4-** Studying the role of Diplomacy, Propaganda and Military capabilities in the making of foreign policy.
- CO5-** Explaining certain basic concepts like Globalization in contemporary world order.
- CO6-** Describing the Cold War phases and understanding the post Cold War era.
- CO7-** Discussing the developments in European Ethno-nationalism since 1990's. Tracing the growth of European Union
- CO8-** Examining Indian Foreign Policy: Basic Principles, Evolution and Bilateral Relations.
- CO9-** Evaluating the working of UN and its organs; Peacekeeping Function and Human Rights.
- CO10-** Analyzing the Foreign Policy of USA and China.
- CO11-** Studying the developments in third world countries in post world war II era like NAM: Relevance, ASEAN, SAFTA and SAARC, OPEC, OAU, West Asia-Palestine ~~pol~~ after Cold War

WESTERN POLITICAL THOUGHT

- CO 1-** Providing an insight into the dominant features of Ancient Western Political Thought: Ancient Greek political thought with focus on Aristotle and Plato; Roman Political Thought: its contributions with special emphasis on the emergence of Roman law.
- CO2-** Examining the features of Medieval Political Thought.
- CO3-** Evaluating the Renaissance; political thought of Reformation; and Machiavelli.
- CO4-** Critically examining Bodin's contribution to the theory of Sovereignty; Hobbes as the founder of the science of materialist politics; Locke as the founder of Liberalism with focus on his views on natural rights, property and consent; and Rousseau's views on Freedom and Democracy; Bentham's Utilitarianism; and John Stuart Mill's views on liberty and representative government.
- CO5-** Taking an insight into the following: Hegel's views on Civil Society and State; Utopian and Scientific socialism: basic characteristics.
- CO6-** Examining the varieties of non-Marxist socialism: Fabianism, Syndicalism, Guild Socialism,

German Revisionism.

INDIAN POLITICAL THOUGHT AND MOVEMENT

CO1- Tracing the evolution of Indian political thought from ancient India to modern India. **CO2-** Analysing the nationalist thought of Raja Rammohun Roy.

CO3- Assessing the nationalist thought of Bankim, Vivekananda and Tagore.

CO4- Discussing the nationalism of Gandhi, M.N. Roy, Narendra Deva and Syed Ahmed Kha

CO5- Explaining the formation of the Congress in 1885.

CO6- Tracing the Bengal Partition and the Swadeshi movement.

CO7- Analysing the Gandhian Movements such as the Khilafat, Non Cooperation, Civil Disobedience movements.

CO8- Assessing the alternatives to the Indian National Congress - the Forward Bloc, Congress Socialist Party, Communist Parti of India.

CO9- Describing the movements against caste and untouchability, Ambedkar's view on Social Justice and the depressed classes.

CO10- Analysing the Working Class and Peasant movements under colonial rule

CO11- Discussing the roots of communalism - Savarkar and Hindu Nationalism and Jinnah and the two nation theory

CO12- Estimating the contribution of the August 1942 movement, the INA and then a valorizing.

POLITICAL SOCIOLOGY

CO1- Studying the concepts of Power, Authority and Legitimacy in the context of society.

CO2- Examining social stratification through the index of class, caste and elite.

CO3- Evaluating the impact of Religion on society.

CO4- Relating Gender and Politics

CO5- Creating awareness among students about Nationalism and State building processes in Western Europe and third world

CO6- Establishing State - society interrelationship.

CO7- Classifying the different types of Political systems.

CO8-Discussing the approaches to the study of Political Culture. Evaluating the different agents of Political Socialization and their interrelationships.

CO9-Evaluating the concept and types of Political Participation.

CO10-Discussing the relation between Military and Politics with reference to conditions and types of intervention

CO11-Studying groups in politics: political parties and pressure groups.

CO 12- Assessing the approaches to Political Communication; Electoral Behaviour

CO13-Evaluating the concept of Political Development and Social Change-Role of Tradition and Modernity.

PUBLIC ADMINISTRATION

CO1-Explaining the nature, scope and evolution of Public Administration; Private and Public Administration; Principles of Socialist Management.

CO2-Discussing making of Public Policy Making and methods of Implementation

CO3-Analysing the major Concepts in Public Administration.

CO4-Tracing the Challenges in the discipline of Public Administration like New Public Administration (NPA); Comparative Public Administration (CPA) and Development Administration.

CO5-Discussing the Ecological approach to Pub. Adm.

CO6-Analysing the Administrative Processes: decision making; communication and control; leadership; co-ordination.

CO7-Discussing Weberian and Marxian theories of bureaucracy.

CO8-Studying the Organisation of the Union Government and State Government.

CO9-Examining the Institutions of Local Self Government in India

CO10-Assessing the relationship between the Citizen and Administration: Lokpal and Lokayukt.

CO11-Understanding the concept of District Administration in India.

CO 12- Examining the Institutions of Financial Administration in India. **CO 13-** Analysing the Civil Service in India.

CO14-Explaining the Planning and Planned Administration in India. Continuity and Change in Indian Administration.

POLITICAL THEORY (General)

CO1-Explaining nature and scope of Political Science. Discussing different Approaches:

(a) Normative approach (b) Behavioural Approach (c) Marxist Approach.

CO2-Analysing the concept of Sovereignty of the State. Discussing Monistic Theory, Pluralistic Theory, Doctrine of Popular Sovereignty.

CO3-Evaluating the theories of the State: Contract theory, Idealist theory, Liberal and Neo-liberal theory, Marxist theory and Gandhian theory.

CO4-Discussing the nature of International Relations. Analysing the Liberal Approach and Realist Approach of International Relations.

CO5-Accessing the different theories and concepts of Marxism, like Dialectical Materialism and Historical Materialism, concept of Class and Class Struggle, Revolution and Lenin's theory of Imperialism

CO6-Explaining Schools of Jurisprudence, Theories of Law and sources of Law

CO7-Methods of Representation, Political Parties and Pressure Group.

CO8-Accessing the concepts of Rights, liberties and their relationship.

CO9-Explaining the theories of Nationalism, Internationalism and fascism.

COMPARTIVE POLITICS AND GOVERNMENT (General)

CO1-Examining diverse political systems: Liberal-democratic, Authoritarian, Socialist forms of political systems.

CO 2- Exploring the Constitution of UK: salient features; the executive – the Crown, Prime Minister and cabinet; the legislature: House of Lords, House Commons, speaker and Committees; Party System in UK.

CO 3- Exploring the US Constitution: salient features; the executive: President; Legislature: Senate. House of Representative; Speaker; Judiciary: the composition and role of the Supreme Court; Bill of Rights; Party System.

CO4-Making a comparative analysis of the following institutions of UK and USA: Legislature, Executive and party systems.

CO5- Exploring the Chinese Constitution : salient features in the light of the General Principles; the Executive; Legislature; Judiciary; and the role of the Communist Party

GOVERNMENT AND POLITICS IN INDIA

- CO1-** Outlining the basic values and philosophy of Indian Constitution as expressed in the Preamble.
- CO2-** Studying Fundamental rights, duties and Directive Principles of State Policy.
- CO 3-** Examining Indian federalism through Centre-state relations.
- CO4-** Evaluating the structures of government at the National level.
- CO 5-** Evaluating the structures of government at the State level.
- CO6-** Examining the role of Political parties in Indian Democracy.
- CO7-** Studying the Election Commission and electoral process in India.
- CO 8-** Assessing Judicial Activism in India with particular reference to Supreme Court.
- CO9-** Studying the process of interaction between society and politics in contemporary India-Caste, tribe and religion.
- CO10-** Creating awareness about social movements and empowerment related to women

CONTEMPORARY POLITICAL AND ADMINISTRATIVE ISSUES IN INDIA

- CO1-** Explaining the determinants and features of Indian Foreign Policy.
- CO2-** Evaluating the role of UN and assessing its relevance in future.
- CO 3-** Analysing the various dimensions of the working of the Indian Administrative system-
PMO, Cabinet Secretariat, UPSC (Recruitment and Training of civil servants)
- CO4-** Understanding the concept of Human Rights. Assessing the availability of Human Rights in the Constitution of
India. Studying the State Human Rights Commission.
- CO5-** Examining the dynamics of Globalization.
- CO6-** special reference to West Bengal
- CO7-** Explaining the Processes and Procedures of Union and State Legislatures

Department of Microbiology

Program Outcomes:

- ✓ Students of the B.Sc. Microbiology Program will learn various aspects of basic microbiology such as Bacteriology, Virology, Biochemistry, Microbial Physiology, Immunology, Cell Biology, Molecular Biology, Genetics, Systems Biology, Immunology and Molecular biology, in addition to becoming aware of the applied aspects of microbiology such as Industrial Microbiology, Food and Dairy Microbiology, Environmental Microbiology and Medical Microbiology.
- ✓ Students will become familiar with scientific methodology and execution of experiments.
- ✓ Students will acquire and demonstrate proficiency in good laboratory practices in a microbiological laboratory and be able to explain the theoretical basis and practical skills of the tools/technologies commonly used to study this field.
- ✓ Students will develop strong oral and written communication skills through the effective presentation through discussions and student seminars.
- ✓ They are able to understand and evaluate the impact of new research discoveries in the life sciences and will be able to pursue a wide range of careers, including biological and medical research in higher education institutions as well as careers in public and global health, environmental organizations, and food, pharmaceuticals and biotechnology industries.

Programme Specific Outcomes:

GENERAL MICROBIOLOGY

1. To gain a preliminary understanding about the history and developments in Microbiology
2. To familiarize with Microbiological techniques.
3. Understand the principle of work, energy and power
4. To develop interest in control measures of pathogens and other microbes

MICROBIAL TAXONOMY

1. To gain a preliminary understanding about the classification methods in Microbiology
2. To familiarize with different groups of microorganisms
3. To develop interest in systematics

BIOCHEMISTRY FOR MICROBIOLOGY

1. To gain an understanding about essential Biochemistry required for Microbiology students

2. To develop interest in the chemistry of life.

MICROBIAL PHYSIOLOGY

1. To gain a preliminary understanding about microbial nutrition.
2. To familiarize with energy production in microorganisms

MOLECULAR BIOLOGY

1. To gain an understanding about essential Molecular Biology required for Microbiology students
2. To develop interest in the chemistry of life.

MICROBIAL GENETICS & GENETIC ENGINEERING

1. To gain a preliminary understanding about the genetic changes in microorganisms
2. To familiarize with applied aspects of genetic engineering
3. To create interest in various aspects of development of GMO

IMMUNOLOGY

1. To gain a preliminary understanding about various immune mechanisms.
2. To familiarize with Immunological techniques
3. To develop interest in serodiagnosis of infectious diseases

MICROBIAL BIOTECHNOLOGY

1. To gain preliminary understanding about fermentation technology.
2. To familiarize with microbial products by fermentation process.
3. To develop interest in bioinsecticides

BACTERIAL DISEASES

1. To gain understanding about various pathogenic microorganisms.
2. To familiarize with symptoms of common infectious diseases and their diagnostic procedures and to develop interest in prophylactic measures of infectious diseases

ENVIRONMENTAL MICROBIOLOGY

1. To gain a preliminary understanding about Environmental Microbiology
2. To enhance awareness about xenobiotic pollution
3. To develop interest in bioremediation

VIROLOGY, MYCOLOGY AND PARASITOLOGY

1. To gain a preliminary understanding about viral, fungal, protozoan and helminth pathogens
2. To develop interest in noting infectious diseases other than bacterial infection

FOOD MICROBIOLOGY

1. To gain a preliminary understanding about Food Microbiology
2. To enhance awareness about food borne diseases, microbial pathogens responsible and food safety
3. To develop interest in advanced food preservation techniques
4. To gain an understanding about food quality standards

AGRICULTURAL MICROBIOLOGY

1. To gain a preliminary understanding of Agricultural Microbiology
2. To enhance awareness about plant diseases and microbial pathogens
3. To develop interest in biofertilizers and organic farming

MICROBES AND ENVIRONMENT

1. To gain an understanding about Environmental Microbiology
2. To enhance awareness about xenobiotics and other pollution.

COs

FUNDAMENTALS OF MICROBIOLOGY

CO 1: Understand the history, development & scope of microbiology

CO 2: Understand the principle and procedure of microscopy

CO 3: Understand the detailed structure of bacteria

CO 4: Explain the techniques for visualization of microorganisms

CO 5: Explain various media and components for cultivation of different microorganisms

CO 6: Understand various techniques used for isolation and preservation of bacteria

CO 7: Understand the principle and methods for controlling microorganisms and attain knowledge in controlling microbes in day today life.

MICROBIAL DIVERSITY

CO 1: Understand the basics and tools in Microbial taxonomy

CO 2: Explain classification and diversity of bacteria

CO 3: Understand general characteristics and taxonomy of viruses.

CO 4: Understand general characteristics and taxonomy of fungi

CO 5: Understand general characteristics and taxonomy of microscopic algae & Protozoa

MICROBIAL PHYSIOLOGY AND METABOLISM

CO 1: Understand the nutritional diversity among microorganisms, the different macro and micronutrients required for microbial growth and understand the physical factors affecting microbial growth.

CO 2: Describe the pattern of growth, reproduction, death and growth kinetics of microbes and measure population growth by different methods.

CO 3: Understand the phototrophic nutrition in microorganisms, different mechanisms seen in different microbial groups and their ecological importance.

CO 4: Understand the unique nutritional type among microorganisms- the chemolithotrophs-, their types, use of different inorganic sources for energy production, ecological importance and role in biogeochemical cycles.

CO 5: Understand how carbohydrates, proteins and fats are metabolized in the microbial cells and the diverse metabolic pathways leading to energy production.

MICROBIOLOGY PRACTICAL

CO 1: Understand the basic rules and regulations in Microbiology lab and the procedure of cleaning & preparation of materials for lab experiments

CO 2: Understand the working and understand how to operate major microbiology lab instruments **CO**

3: Understand and carry out the preparation of various media for cultivation of microorganisms **CO 4:** Carry out the techniques for isolation and cultivation of bacteria

CO 5: Understand the procedure of comparing the efficiency of disinfectants commonly used

BASIC IMMUNOLOGY

CO 1: Understand various immune mechanisms

CO 2: Describe various immune cells and organs involved in immunity

CO 3: Understand different immunological techniques used and serological diagnosis of infectious diseases

CO 4: Understand the basis of allergy reactions, auto immune mechanisms, transplantation and cancer immunity.

MICROBIOLOGY PRACTICAL

CO 1: Understand the principle, parts of Compound light microscope and carry out the procedure of using Microscope

CO 2: Carry out the techniques of visualizing bacteria

CO 3: Understand and carry out the procedure of differentiating bacterial populations

CO 4: Carry out the techniques for visualizing different parts of bacteria

CO 5: Understand the procedure of separating compounds by using chromatography

MICROBIAL BIOTECHNOLOGY

CO 1: Describe about fermenter and fermentation technology. **CO 2:**

Understand microbial products by fermentation process. **CO 3:**

Understand enzyme technology and its application

BACTERIAL DISEASES

CO 1: Describe about infection, its types, transmission of infection & virulence factors **CO**

2: Understand the details of causative agent of major human bacterial infection **CO 3:**

Understand the diagnostic & treatment methods of various bacterial infections

CO 4: Understand prophylactic measures of different bacterial diseases

CO 5: Understand epidemiological aspects of bacterial diseases

ENVIRONMENTAL MICROBIOLOGY

CO 1: Understand the concept of ecosystem and its components and concept of biogeochemical cycles and N, S and P cycles.

CO 2: Explain the principles of microbial interactions and its importance with suitable examples.

CO 3: Describe microorganisms in air, methods by which they reach and remain in air and its medical importance. Air sampling methods and its use in agriculture.

CO 4: Describe microorganisms in aquatic environment, various factors that can influence their survival and distribution in different aquatic systems. Their role in the aquatic ecosystem is the biotic factor- producer, consumer and decomposer.

CO 5: Understand the concept of xenobiotics, xenobiotics as pollutants of environment, concept of biomagnification, concept of persistence and recalcitrance of various xenobiotics. Concept of bioremediation of environment and microbial degradation of various xenobiotics.

CO 6: Understand the concepts of leaching, corrosion and microbial biofilms. Involvement of microorganisms in metal leaching and corrosion.

VIRAL, FUNGAL AND PARASITIC DISEASES

CO 1: Understand the architecture of animal viruses, its classification, methods for studying viruses and the multiplication strategies of animal viruses

CO 2: Understand the most prevalent viral diseases of human beings including the emerging viral diseases and to understand the preventive measures to be taken by studying the pathogenesis and mechanism of survival of pathogens.

CO 3: Describe overview of fungal infections affecting human beings and the treatment strategies against fungal infections

CO 4: Understand important protozoan and helminthic infections of human beings

MICROBIOLOGY PRACTICAL

CO 1: Perform basic laboratory techniques in Microbiology to detect bacterial motility and use of special media in order to differentiate pathogenic microorganisms

CO 2: Understand the isolation and identification of normal flora

CO 3: Determine the effect of environmental factors influencing the growth of microorganisms

CO 4: Perform basic laboratory experiments in Biochemistry, Genetics and Bioinformatics

MICROBIOLOGY PRACTICAL

CO 1: Determine the microbial load and diversity in soil

CO 2: Determine the microbiological quality of drinking water and air

CO 3: Understand the laboratory procedure for the growth of fungi and identify the fungi by macroscopic and microscopic examination

CO 4: Isolate microorganisms with special metabolic capacities from the Environment

FOOD MICROBIOLOGY

CO 1: Understand the role of microorganisms in food fermentation, food processing, food spoilage and foodborne diseases

CO 2: Understand the significance of microbes in spoilage of different varieties of food and the role of intrinsic and extrinsic factors affecting the growth and survival of microbes in food.

CO 3: Describe ways to control the growth of microbes in foods and know the principles involved in methods of food preservation.

CO 4: Understand the beneficial role of microbes in fermented foods and the microbiology of fermented dairy products and other indigenous fermented foods and understand the basis of food safety regulations. **CO 5:**

Understand the role of microbes in foodborne illnesses and their characteristics and their preventive measures

AGRICULTURAL MICROBIOLOGY

CO 1: Understand the role of microbes in agriculture

CO 2: Explain the production and application of biofertilizers

CO 3: Understand plant disease mechanism and how to control plant diseases and also to get awareness on the impact of chemical fertilizer

CO 4: Understand various plant diseases commonly found.

MICROBIOLOGY PRACTICAL

CO 1: Perform Antigen – Antibody reactions for the Serodiagnosis of infectious Diseases

CO 2: Identify bacterial species from clinical samples by microscopy, Cultural characteristics and

biochemical reactions

CO 3:Determine the antimicrobial spectrum of the given bacterial species

MICROBIOLOGY PRACTICAL

CO 1:Determine the microbial count of fish, milk and fermented milk samples

CO 2:Understand the production of wine using yeast

CO 3:Analyze the microbiological quality of milk sample

CO 4:Perform experiments for the isolation of nitrogen fixing bacteria

GENERIC ELECTIVE COURSE I: FOODBORNE DISEASES

CO 1:Understand etiological agents of important foodborne infections and intoxications **CO**

2:Explain the sources, symptoms and preventive measures of foodborne illnesses **CO**

3:Understand the preventive and prophylactic measures of foodborne diseases.

GENERIC ELECTIVE COURSE II: MICROBES AND ENVIRONMENT

CO 1:Understand the basic concept of Ecology and factors influencing the growth of microorganisms in the environment

CO 2:Understand biogeochemical cycling in the environment and microbial interactions in the soil

CO 3:Explain the role of microorganisms causing diseases transmitted through water and the importance of indicator organisms in determining the microbiological quality of drinking water

CO 4:Understand steps involved in waste water treatment

CO 5:Explain the methods to resolve important global environmental problems

GENERIC ELECTIVE COURSE III: SOLID WASTE MANAGEMENT

CO 1:Understand the magnitude of health risk and other socio economic problems of solid waste.

CO 2:Explain methods of disposal of solid waste , hazardous solid waste and e waste

CO 3:Understand the methods for reduction of solid waste

MUSHROOM CULTIVATION AND PROCESSING

CO 1: Understand and identify the edible and poisonous mushrooms and their significance

CO 2: Create skills in mushroom cultivation methods

CO 3: Understand the marketing trends of mushroom

CO 4: Train and help students to learn a means of self employment and income Generation

FERMENTED FOODS AND BEVERAGES

CO 1: Understand the role of microorganisms in the production of fermented foods and beverages

CO 2: Understand the production of important fermented foods, beverages and single cell proteins

BIOCHEMISTRY FOR MICROBIOLOGY

CO 1: Understand the aspects of different types of bonding in biomolecules and the concept and importance of pH and redox reactions in living systems.

CO 2: Describe the detailed structure of carbohydrates with different bonding patterns, their properties, classification and functions in cells.

CO 3: Explain the structure, classification, properties of amino acids and the structure, levels of organization, types, conjugate forms and functions of protein in cells.

CO 4: Understand in detail the properties, classification, mechanism and kinetics of enzyme action and the principles of enzyme regulation.

CO 5: Describe the components, structure and organization of nucleic acids (DNA and RNA) and their functional importance in living systems.

CO 6: Understand the structure, types and properties of fats, fatty acids, lipids, their conjugate forms and their functional importance.

MOLECULAR BIOLOGY

CO 1: Understand the history of molecular biology, the experiments that proved the role of DNA as genetic material, physical and chemical properties of DNA, and organization of genetic material in cells. **CO**

2: Explain mechanisms and molecules involved in replication of DNA and different models of replication.

CO 3: Describe molecular mechanisms of recombination.

CO 4: Understand chemical nature and types of RNA, transcription mechanisms and different types of molecules involved and processing of RNA

CO 5: Understand concept of genetic code and concept of translation, steps involved and post translational modification.

CO 6: Understand concept of gene regulation in prokaryotes using lac and trp operon as examples.

MICROBIAL GENETICS AND rDNA TECHNOLOGY

CO 1: Understand genomic organization of prokaryotes including bacterial chromosome, plasmids and transposable genetic material

CO 2: Understand gene transfer mechanism in prokaryotes, its applications and genetic make-up of bacteriophage and yeast briefly

CO 3: Explain molecular mechanism underlying mutations and useful phenotypes of bacterial mutants. **CO 4:** Explain the basics and molecular techniques involved in recombinant DNA technology and the role of microbes in rDNA technology

CO 5: Describe the applications of transgenic plants and animals.