Program Outcome for B.Sc.

PO 1 - Integrate student's learning across all facets of their lives

PO 2 -To understand the basic concept and principle involve in science

PO 3 - To develop performing practical skill, handling instrumentation and prepare them to use skill in industrial area and day to day life

PO 4 - To understand importance about environmental issue and Inspire them to work in accordance to save the nature

PO 5 -To develop effective communication skill in students

PO 6 -Understand the ethical implications of ideas, communications and actions

PO 7- To prepare and appear in competitive examinations.

PO 8 - To understand the importance social issue and make them a good citizen of India

Department of Chemistry

Programme Specific and Course Outcome

PSO 1- To understand basic facts and concept in chemistry so as to develop interest in study of chemistry

PSO 2- To know the role of chemistry in nature, society and day to day life

PSO 3-To develop ability to apply the principles of chemistry

PSO 4-To develop skill of proper handling of apparatus and chemicals

PSO 5-To understand the use of chemical and their concentration in day to day life

PSO 6-To develop problem solving scheme

PSO 7- To exposed different process and instruments are used in industry

PSO 8- To know the various reaction used for formation of different products, medicines, solutions etc.

Course Outcomes in Chemistry

Semester I

Paper I:- Inorganic Chemistry

1. To understand the structure of atom and basic principle related to it
2. To understand periodic table and properties related to it
3. To know the formation of covalent bond and structural bonding in various compounds
4. To know the formation of ionic bond and structure and bonding in various ionic crystals
5. To understand properties and roles of S-block and P-block elements in periodic tables
6. To know the qualitative analysis inorganic mixture containing acidic and basic radical

Paper II:-Physical chemistry

1. To understand concept of thermodynamics related tofirst law of thermodynamic and concept of heat of reaction at different conditions
2. To know about kinetic theory of gases and various gases law
3. To know about concept of ideal and real gases and difference between them

4. To understand forces in liquids and to understand liquid properties with experimental methods

5. To understand the concept of adsorption and equation of varying adsorption isotherm

6. To know the catalysis, its general characteristic and types of catalysis

7. To understand instrumental method and procedure for determination of types of heat reactions

8. To know instrumental methods and procedure for finding properties of liquids

Semester II

Paper I :- Organic Chemistry

1. To know structure and Bonding in organic compounds through concept of hybridization

2. To understand the mechanism involve in various organic reactions

3. To understand the stereochemistry and geometrical isomerismof organic compounds

4. To know nomenclature, chemical properties, methods of formations of alkane, cycloalkane and alkenes

5. To know nomenclature, chemical properties, methods of formations of Dienes, alkynes and aromatic compounds

6. To understand the qualitative analysis of organic compound through different experimental methods

Paper II:-Physical chemistry

1. To understand concept of second law of thermodynamics and application of its concept

2. To know about laws related to free energy function and chemical equilibrium

3. To understand phase, component system and use of phase rule in understanding various component system

4. To know the concept of nuclear chemistry, nuclear binding energy and nuclear reactions

5. To know the concept of rate of reaction, rate constant, calculation of rate constant for different order reaction

6. To understand the concept of various theories of chemical kinetics

7. To understand experimental method for determination of heat of solution various compounds

8. To know experimental method for construction of phase diagram for various component system

9. To understand experimental method for determination of rate constant for various hydrolysis reaction

Semester III

Paper I :- Inorganic Chemistry

1. To understand concept of molecular orbital theory for formation of homonuclear and heteronuclear molecule
2. To know the properties of first, second and third transition series element
3. To understand mathematical methods for determination of error in chemical analysis
4. To understand the periodical properties of Lanthanides and Actinides
5. To understand experimental methods for determination of content in commercial compounds using titration method

Paper II :- Organic Chemistry

1. To understand the concept of orientation in case of activating and deactivating groups
2. To know the classification, chemical reaction and method of preparation of alcohol
3. To understand the nomenclature, chemical reaction and method of preparation and properties of phenol
4. To understand the nomenclature, chemical reaction and method of preparation and properties of aldehydes and ketones
5. To understand the nomenclature, chemical reaction and method of preparation and properties of carboxylic acid
6. To know the chemical reaction and method of preparation and properties of dicarboxylic acid
7. To understand the qualitative analysis of organic compound through different identification methods

Semester IV

Paper I:- Inorganic Chemistry

1. To know the theory of formation of coordination compound and their behavior and stability
2. To know about structural isomerism and stereoisomerism of coordination compound
3. To understand the concept of oxidation and reduction
4. To know about the principles of colorimetery and spectrophotometery
5. To understand principle and various method for separation process
6. To understand the about nomenclature, method of preparation and chemical properties of Silicones and Phosphonitrilic halide polymer

7. To know the methods of preparation and properties of different coordination compounds
8. To know and study about the experimental method for separation of binary mixture

Paper II :- Physical Chemistry
1. To know about the classification of solid, type of solid, law of crystallography and Identification of crystal structure
2. To understand the concept of electrochemistry which include type of conductance, laws of conductance, transport number and its methods of determination
3. To understand the concept of rotational spectra of diatomic molecules
4. To understand the concept of vibrational spectra of various molecules
5. To know the concept quantum chemistry which include failure of classical mechanics and Schrodinger wave equation and its application
6. To know about conductometric experimental method for determination strength of acid

Semester V

Paper I:- Organic Chemistry
1. To know the methods of preparation and chemical properties of organic compounds of nitrogen
2. To understand about concept, method of preparation and chemical properties of heterocyclic compound
3. To understand the method of quantitative analysis for various elements
4. To know about method of preparation and chemical properties for organometallic compound
5. To understand the concept and laws of Electromagnetic specrum and Infrared absorption spectroscopy
6. To know experimental methods for estimation of various organic compounds

Paper II:- Physical Chemistry
1. To understand the concept and working of cell and concept of reversible electrodes
2. To know concept of quantum chemistry and molecular orbital theory
3. To understand the concept and laws of photochemistry and raman spectroscopy
4. To understand the concept of colligative properties and methods for determination of molecular mass

5. To know the concept and classification of macromolecule and to know methods for determination of molar masses
6. To understand potentiometric method for determination of experimental data
7. To understand experimental method for determination of molecular mass

Semester VI

Paper I:- Inorganic Chemistry

1. To understand the concept of metal ligand bonding in transition metal complex
2. To know the properties electronic spectrum of various transition metal complex
3. To understand the concept of magnetic properties of transition metal complex
4. To know definition, nomenclature, classification and properties of organometallic compound
5. To understand the concept, properties of Bioorganic chemical compounds
6. To know the concept of Hard and Soft acids and bases
7. To know experimental methods for estimation of inorganic compounds

Paper II:- Organic Chemistry

1. To understand concept of nuclear magnetic resonance and its role in determination of structure of compounds
2. To understand definition, classification, method of preparation and chemical properties of carbohydrates
3. To know the classification, structures, and properties of amino acids and nucleic acids
4. To know classification, preparation and properties of synthetic dyes
5. To know classification, preparation and properties of synthetic drugs
6. To know classification, preparation and properties of synthetic polymers
7. To understand experimental method for separation and identification of organic compound by qualitative analysis

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Arvindbabu Deshmukh Mahavidyalaya Bharsingi

Tah. Narkhed, Dist. Nagpur

Department of Botany

Programme Specific and Course Outcome

PSO 1-Understanding of the range of plant diversity in terms of structure, function and environmental relationships.

PSO 2- Understanding of Plant classification and the flora of Maharashtra.

PSO 3- Understanding ofthe role of plants in the functioning of the global ecosystem.

PSO 4- To know the analytical method (Statistics) as applied to biological data.

PSO 5- Apply the knowledge of basic science, life sciences and fundamental process of plants to study and analyze any plant form.

PSO 6-To learn to carry out practical work, in the field and in the laboratory, with minimal risk.

PSO 7- Interpreting plant morphology and anatomy for Plant identification.

PSO 8-Development of skill of vegetation analysis techniques.

PSO 9- Learning of the range of physiochemical analyses of plant materials in the context of plant physiology and biochemistry.

PSO 10- Plant pathology to be added for sharing of field and lab data obtained.

PSO 11- It help in solving the problem of identification of the taxonomic position of plants, formulate the research literature, and analyze non reported plants with substantiated conclusions using first principles and methods of nomenclature and classification in Botany.

PSO 12- Design solutions from medicinal plants for health problems, disorders and disease of human beings and estimate the phytochemical content of plants which meet the specified needs to appropriate consideration for the public health.

PSO 13- Create, select, and apply appropriate techniques, resources, and modern instruments and equipment's for Biochemical estimation, Molecular Biology, Biotechnology,

Plant Tissue culture experiments, cellular and physiological activities of plants with an understanding of the application and limitations.

PSO 14- To provide the knowledge to assess plant diversity, its importance for society, health, safety, legal and environmental issues and the consequent responsibilities relevant to the biodiversity conservation practice.

Course Outcomes of B.Sc. Botany

B.Sc. Part-I- Semester-I

Paper-I: Viruses, Prokaryotes & Algae

On completion of the course, students are able to:

1. Understand the diversity among Viruses.

2. Know the structure, function, reproduction and their mode of infection in plants

4. Know the structure, function and various forms of prokaryotes and their economic values

5. Understand the diversity among Algae.

6. Know the systematic, morphology and structure of Algae.

7. Understand the life cycle pattern of Algae and their economic importance.

Paper-II: Fungi, Lichen, Plant-Pathology &Bryophyta

On completion of the course, students are able to:

1. Understand the Biodiversity of Fungi

2. Know the structure, function and life cycle of fungi

3. Know the Economic Importance of Fungi

4. Understand the Biodiversity of Lichen

5. Know the occurrence, reproduction and economic importance of Lichen

6. Know the terminologies in plant pathology.

7. Understand the scope and importance of Plant Pathology.

8. Know the prevention and control measures of plant diseases and its effect on economy of crops.

9. Understand the morphological diversity of Bryophytes.

10. Know the taxonomic position, occurrence, thallus structure, reproduction of Bryophytes.

11. Understand the economic importance and alteration of generation of the Bryophytes.

Semester – II

Paper-I: Pteridophyta& Gymnosperms

On completion of the course, students are able to:

1. Understand the morphological diversity of Pteridophytes and Gymnosperms in India.

2. Understand the economic importance of the Pteridophytes and Gymnosperms.

3. Know the evolution of Pteridophytes and Gymnosperms.

4. Know the affinities of living gymnosperms with respect to external and internal features

5. Know the Concept of heterospory and seed habit.

6. Know the fossil forms of some plants to understand the ancestors of the plants

Paper – II

Palaeobotany& Morphology of Angiosperms

On completion of the course, students are able to:

1. Know the scope of Paleobotany, types of fossils, its role in global economy and geological time scale.

2. Understand the various fossil genera representing different fossil groups.

3. Know the external and internal structure of each and every part of plants.

4. Know the concept of methodology in taxonomy

5. Know the pattern of development, modifications the process by which structures originate and mature as a plant grows.

6. Gain the knowledge about plant identification, classification and descriptions.

B.Sc. Semester-III

Paper-I Angiosperm Taxonomy

On completion of the course, students are able to:

1. Know the concept of methodology in taxonomy.

2. Understand the Phylogeny of angiosperms -A general account of the origin of Angiosperms.

3. To learn the modern techniques in classification of angiosperms

4. Learn about the characters of biologically important families of angiosperms.

5. Know the floral variations in angiospermic families, their phylogeny and evolution.

6. Understand various rules, principles and recommendations of plant nomenclature produces in plant identification.

7. Understand major evolutionary trends in various parts of angiospermic plants

8. With respect to recent knowledge students should know about the different tools in the taxonomy so as to relocate the phylogenetic position of plant or taxa.

Paper – II

Cell Biology, Plant Breeding & Genetics

On completion of the course, students are able to:

1. Gain knowledge about "Cell Science".

2. Understand Cell wall Plasma membrane, Cell organelles and cell division.

3. Know the organization of Chromosomes and the biochemical nature of nucleic acids

4. Understand the science of plant breeding.

5. To study the techniques of production of new superior crop verities.

6. Get the detail knowledge about modern strategies applied in Plant Breeding for crop improvement i.e. Mass selection, Pureline Selection and Clonal selection.

7. Know about exploitation of Heterosis, hybrid and variety development and their release through artificial hybridization.

8. Understand the statistical analysis for proper arrangement of the biological data

9. Gain the knowledge about the origin of life and different trends in evolution

Semester – IV

Paper – I

Anatomy and Embryology of Angiosperms

On completion of the course, students are able to:

1. Understand the scope & importance of Anatomy.

2. Know various tissue systems.

3. Understand the normal and anomalous secondary growth in plants and their causes.

4. Perform the techniques in anatomy.

5. Know the methods of pollination and fertilization

6. Know the fertilization, endosperm and embryogeny

Paper-II

Genetics & Molecular Biology

On completion of the course, students are able to:

1. Mendelian and Neo-mendelian genetics

2. To study the phenomenon of dominance, laws of segregation, independent assortment of genes.

3. To understand the different types of genetic interaction, incomplete dominance,

codominance, inter allelic genetic interactions, multiple alleles and quantitative inheritance.

4. Learn the scope and importance of molecular biology.

5. Understand the biochemical nature of nucleic acids, their role in living systems, experimental evidences to prove DNA as a genetic material.

6. Understand the process of synthesis of proteins and role of genetic code in polypeptide formation.

7. Know about the genomic organization or living organisms, study of genes genome, chromosome etc.

8. The concept of operon and its structure and regulation

Semester – V

Paper – I

Biochemistry & Plant Physiology-I

On completion of the course, students are able to:

1. Understand the Biochemical nature of cell.

2. Understand the properties of Monosaccharides, Oligosaccharides and Polysaccharides.

3. They will learn about the Significance of Carbohydrates.

4. Understand the Properties of saturated fatty acids, and unsaturated fatty acids.

5. Understand lipid metabolism in plants.

6. Understand the Beta Oxidation, Gluconeogenesis and its role in mobilization of fatty acids during germination.

7. They will learn about the Significance of lipids.

8. Know the Structure and general features of enzymes.

9. Concept of enzyme activity and enzyme inhibition.

10. Know importance and scope of plant physiology

11. Understand the plants and plant cells in relation to water.

12. Learn and understand about mineral nutrition in plants.

13. Understand the respiration in higher plants with particular emphasis on aerobic and anaerobic respiration.

14. Understand the process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C3 and C4 pathways.

15. Know the nitrogen metabolism and its importance.

Paper – II

Plant Ecology – I

On completion of the course, students are able to:

1. Understand the branches of ecology and its significance

2. Know the climatic factors and edaphic factors

3. Gain the knowledge about biotic and abiotic factors

4. Study the Interactions between plants and animals and human with their environment

5. Understand the concept of Ecosysteme and its different parameters

6. Study of community with analytical and synthetic characters

7. Relate the physical features of the environment to the structure of populations, communities, and ecosystems

8. Gain the knowledge about the Climatic regions of India, Phytogeographic regions of India.

Semester – VI

Paper – I

Plant Physiology-II & Biotechnology

On completion of the course, students are able to:

1. Know importance and scope of plant physiology.

2. Understand the plant movements.

3. Understand the growth concept of the plants

4. Gain the knowledge about Plant growth regulators and its importance

5. Understand the concept of Photoperiodism and its different parameters

6. Understand the concept of Seed dormancy and the methods to break seed dormancy

7. Learn about the mechanism of Plant defense.

8. Understand the principle and basic protocols for Plant Tissue Culture.

9. Know about the genomic organization or living organisms, study of genes genome, chromosome etc.

10. Understand the fundamentals of Recombinant DNA Technology.

11. Know about the Genetic Engineering.

Paper – II

Plant Ecology, Techniques & Utilization of Plants

On completion of the course, students are able to:

1. Study the Plant succession and adaptations for the survival

2. Know about the various factors of Environmental Pollution and their Control measures

3. Learn about the renewable and non-renewable sources of energy

4. Understand the methodology for conservation of forest and water resources

5. Know the details of Microscopy- Principles of light microscopy, electron microscopy (TEM and SEM).

6. Understand & perform Chromatography and the techniques of centrifugation, electrophoresis and spectroscopy

7. Gain knowledge about various plants of economic use.

8. Know importance of plants & plant products.

9. Understand the chemical contents of the plant products.

10. Know about the utility of plant resources.

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Department of Zoology

Programme Specific and Course Outcomes

PSO 1 - Students gain knowledge and skill in the fundamentals of animal sciences, understands the complex interactions among various living organisms

PSO 2 - Analyse complex interactions among the various animals of different phyla, their distribution and their relationship with the environment

PSO 3- Apply the knowledge of internal structure of cell, its functions in control of various metabolic functions of organisms.

PSO 4 -Understands the complex evolutionary processes and behaviour of animals

PSO 5 - Correlates the physiological processes of animals and relationship of organ systems

PSO 6 -Understanding of environmental conservation processes and its importance, pollution control and biodiversity and protection of endangered species

PSO 7 - Gain knowledge of Agro based Small Scale industries like sericulture, fish farming, butterfly farming and vermicompost preparation.

PSO 8 - Understands about various concepts of genetics and its importance in human health

PSO 9- Apply ethical principles and commit to professional ethics and responsibilities in delivering his duties

Course Outcomes of B.Sc. Zoology

B.Sc. Part-I- Semester-I

Paper-I: Animal Diversity

On completion of the course, students are able to:

1. Students understand the general characters and classification up to classes in Protozoa.
2. Students studied Parasitic Protozoans of Man : Entamoeba, Trypanosoma, Giardia and Leishmania - Mode of infection and its controlScope and limitations of the invertebrates
3. Students aware about Porifera : General characters and classification up to classes, SyconStructure, reproduction and development, Canal system in spongesJob opportunities and avenues of the subject
4. Students know the Trochophore larva and its significance,Vermiculture and its importance Workshop on present syllabus understanding and research paper writing and presentation
5. Students study the anatomy with the help of available digital resources

Paper-II: Environment and Ecology

1. To know the various stages involved in the atmosphere
2. To apply the knowledge to collect various Biological data
3. Students understand the initial developmental procedures involved in ecology
4. Students Familiar with food Chain
5. Ability to explain various ecological Pyramids
6. CO6. Familiarize with the principle of developmental biology

Semester-II

Paper-I: Animal Diversity

1. Students familiar with the non-chordate world that surrounds us.
2. Students are able to appreciate the process of evolution (unicellular cells to complex, multicellular organisms)
3. Students are able to identify the invertebrates and classify them up to the class level with the basis of systematic
4. Students understand the basis of life processes in the non-chordates and recognize the economically important invertebrate fauna.

Paper-II: Cell Biology

1. Students studied Ultrastructure of prokaryotic and eukaryotic cell i.e. Plasma membrane: Structure- Fluid Mosaic Model and functions , Endoplasmic reticulum: Types, ultrastructure and functions, Golgi complex: Ultrastructure and functions etc.

2. Develop deeper understanding of what life is and how it functions at cellular level.

3. Describe cellular membrane structure and function, fine structure and function of cell organelles.

4. Perform a variety of molecular and cellular biology techniques

Semester-III

Paper-I: Animal Diversity

1. Students are able to identify the vertebrates and classify them up to the class level.

2. Students know the basis of life processes in the non-chordates and recognize the economically important vertebrate fauna. with the help of available digital resources

Paper-II: Genetics

1. Students appreciate the contribution of great scientists

2. Distinguish Classical Genetics and Molecular Genetics.

3. Understand the applications of Biotechnology.

4. Familiar with the tools and techniques of Genetics and Biotechnology

Semester- IV

Paper I: Animal Diversity

1. Describe the diversity in form, structure and habits of vertebrates

2. Explain general characteristics and classification of different classes of vertebrates

Paper II: Immunology and Microbiology

1. Appreciate the contribution of great immunologists

2. Distinguish Innate immunity and Acquired Immunity

3. Understand the importance of Immune system

Semester- V

Paper I: Animal Physiology

1. Understand the function of various systems

2. Apply the knowledge to lead a healthy life

3. Understand the importance of Bio molecules

4. Familiar with various biochemical pathways.

Paper II: Biochemical Techniques and Biotechnology

1. Ability to observe chromosomal arrangements during cell division.

2. Distinguish different chromosomal aberrations in man .

3. Familiarize knowledge of conventional biotechnological procedures

4. Ability to perform routine blood analysis.

Semester- VI

Paper I: Physiology and Biological Chemistry, Molecular Biology and Bioinformatics.

1. Demonstrate basic principles in physiology Objectives of the course.

2. Learn clinical procedures for blood & urine analysis.

3. Develop skill in simple biochemical laboratory procedures CO4.

4. Recognize the importance of various databases .

5. Skill in observing and to some extent in analyzing various Biological Data

Paper II: Applied Zoology

1. Appreciate the contribution of great scientists

2. Distinguish Classical Genetics and Molecular Genetics

3. Understand the applications of Biotechnology

4. Familiar with the tools and techniques of Genetics and Biotechnology

Department of Mathematics

Programme Specific and Course Outcomes

Objective of the program:

The objectives of the B.Sc. (Mathematics) program are to develop students with the following capabilities:

1. To provide students with a basic knowledge, insight in Mathematics and correlation with other subjects so that they are able to work as mathematical professional.

2. To provide students with advanced mathematical knowledge of mathematics that prepares them to pursue higher study.

3. To observe and analyze students to deal with the problems of mathematics faced by rural region people in daily routine life.

4. To provide students with capability in formulating and analysis of mathematical models of real life applications.

Outcome of the program:

The successful completion of this program will enable thestudents to:

1. Pursue post graduation and the Ph.D. degree in mathematics.

2. Surfing recent work and challenges in the emerging areas of Mathematics and try to at least sort out the desert area in it.

3. Demonstrate competence in using mathematical skills to model, formulate and solve real life applications.

4. Acquire deep knowledge of different mathematical and computational disciplines so that they can qualify GATE, JAM examination.

5. Equip the student with skills to analyze problems, formulate a hypothesis, evaluate and validate results, and draw reasonable conclusions thereof.

6. Imbibe effective scientific communication in both oral and writing.

7.   Continue to acquire relevant knowledge and skills through software an manually appropriate to professional activities and demonstrate highest standards of ethical issues in mathematics sciences.

Program Specific Outcomes: Mathematics

The specific programme outcomes of the course are:

PSO 1-Understanding of the fundamental laws in mathematics and capability of developing ideas based on them.

PSO 2-Develop mathematical reasoning.

PSO 3-Prepare, initiate and motivate students for post graduation in mathematics and related fields and research field too.

PSO 4-Provide advanced knowledge and information of reputed institutes in the subject mathematics so that students want to pursue higher degrees in this institute and so that they are ready from their graduation level.

PSO 5-Provide knowledge of mathematical software (mathematical equation writing skill, LaTeX documentary language etc) to develop interest of subject amongst the students.

PSO 6- Co-relation of the subject with other subjects, in other domain, stream.

Course Outcomes: Mathematics

Semester – I (B.Sc. (Mathematics)

Paper – I (Code: 1T1)

Algebra and Trigonometry

Course Objectives of Algebra and Trigonometry:

The objective of the course is to introduce basic concept of linear algebralike matrices, equations, De Movier's equations, and abstract algebra Group which are the basics of mathematics. The course gives the student a good mathematical maturity and enables to build mathematical thinking and skill.

Course Learning Outcomes (CLO): Upon completion of this course, the student will be able to:

1. Understand the role of matrices in linear algebra and its role in finding characteristic roots, inverse of matrix and for finding the solutions of differential equations.
2. Learn about the theory of equations, their transformation and methods to find solutions of cubic, biquadratic and the power of 5 and 6 equations.

3. Apply to expand complex quantities and its relation between circular and hyperbolic functions and know about expansion of series by Gregory's.

4. Understand and explore axioms of the group to solve polynomial equations, subgroups, even and odd permutation and permutation group.

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Semester – I (B.Sc. Mathematics)

Paper – II (Code: 1T2)

Calculus

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Course Objectives of Calculus:

This course presents a rigorous treatment of fundamental conceptsin calculus. To introduce students with basis of entire calculus i.e. limits, continuity and differentiability concept. To understand the method for finding (expanding) a function limited to finite number of terms which cannot be done by using elementary operators. To extend concept of differentiability for a function of two or three variables, called partial differentiation. To bring up the concept of integration by substitutions for reducing irrational expressions to integral of rational functions.

Course Learning Outcomes(CLO): Upon completion of this course, the student will be able to:

1. Understand the building block of calculus limit and its extension continuity and differentiability.

2. Expand the power series in finite terms especially Taylors and Maclaurin's and able to solve the not defined function by using L'Hospital rule.

3. Recognizes the partial differentiation of two or three variables and understand concept of chain rule, solution of homogeneous function by Euler's theorem and Jacobian.

4. Learn to integrate the irrational expression, transcendental function by using substitution method and some properties of definite integral.

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Semester – II (B.Sc. Mathematics)

Paper – I (Code: 2T1)

Geometry, Differential and Difference equation

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Course Objectives:

This course aims to teach the students geometric figure such as sphere, circle, right circular cone, right circular cylinder. Also to understand the methods for solving ordinary and higher order differential equations and difference equation too.

Course Learning Outcomes

Upon completion of this course, the students will be able to understand:

1. How to find the equation of geometric objects such as sphere, circle, tangent plane, right circular cone and cylinders. The geometry of three dimensional Euclidean geometry.

2. The ordinary differential equation of order one and higher order differential equations, and able to solve their solutions.

3. The higher order differential equations, each cases of complementary functions and particular integrals along with method of variation of parameters.

4. The difference equation which recursively defines a sequence, its formation, and to solve the linear difference equation of first order and higher order difference equation.

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Semester – II (B.Sc. Mathematics)

Paper – II (Code: 2T2)

Vector Calculus and Improper Integrals

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Course Objectives:

The objectives of the course are to introduce with basis of differentiation and integration of vector fields. Next objective is to evaluate double integration, its transformation in polar coordinates and evaluate definite triple integration. In this vector calculus, we extend the fundamental theorem of calculus to multiple dimensions. We focus on definite integrals that cover on an unbounded area, called improper integrals, existence of its limits, and the tool to solve integration.

Course Learning Outcomes:

Upon completion of this course, students will be able to understand:

1. Differentiation and integration of vector fields, basic concept of vector calculus.

2. Methods to solve double integration and triple integration.

3. Evaluate and understand the fundamental theorem of calculus i.e. Green's theorem, Stoke's theorem and Gauss divergence theorem to multiple dimensions.

4. The improper integration, whether limit exist or not, their comparison test and tool to solve integration and their basic properties.

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Semester – III (B.Sc. Mathematics)

Paper – I (Code: 3T1)

Advanced Calculus, Sequence and Series

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Course Objectives:

This course aims to study the concept calculus in advances way it means the same concept of calculus for functions of two variables. Limit and continuity along with mean value theorem of

Rolle's, Langranges mean value theorem of one function and Cauchy's mean value theorem of two functions. To find envelops of various family of curves, the extremum points maxima and minima. Next objectives are to learn many types of sequences, their existence also convergence behavior of infinite series, tests for convergences and absolute convergences.

Course Learning Objectives:

Upon completion of this advanced course of calculus, the students will be able to understand:

1. Concept of various mean value theorem and its verification, limit and continuity concept of calculus for two variables along with Taylor's series.
2. Concept of family of curves of two variables, maxima and minima points for two variables and Langrange's multiplier method for three and more variables.
3. Understand the difference between sequence and series, their properties bounded and monotonic sequences, Cauchy sequences and its convergence criteria.
4. The notion of series gives convergence behavior of infinite series, tests for convergences and absolute convergences.

Semester – III (B.Sc. Mathematics)
Paper – II (Code: 3T2)
Differential Equations & Group Homomorphism

Course Objectives:

The objective(s) of this course is to solve differential equations with other tools of mathematics, including Bessel's and Legendre's equations and Laplace and Fourier transform. To Solve linear differential equations with variable coefficient and differential equation used in problem of spherical symmetry, using tool Bessel's and Legendre's equations. Next objective is to solve linear ordinary and partial differential equation easily by reducing into algebric equation, Laplace transform is used also to find function from inverse Laplace transform. Next objective is find applications of Laplace Transform to differential equations. In abstract portion, to learn extensive part of group includes cyclic, normal subgroup, quotient group and mappings homomorphism and isomorphism of algebric structure to another structure.

Course Learning Objectives:

Upon completion of this course, the students will be able to understand:

1. The tool Bessel's and Legendre's equation and function for solving differential equation.
2. Basics, definition and properties of Laplace transform and its inverses by using partial fraction and convolution method.

3. Know about use of Laplace to solve ordinary constant and variable differential equation, partial and simultaneous differential equation. Also another tool Fourier sine and cosine transform and its application.

4. Definition, theorems of cyclic group, quotient group and normal subgroups. Also mapping of algebraic structure homomorphism and isomorphism.

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Semester – IV (B.Sc. Mathematics)

Paper – I (Code: 4T1)

Partial Differential Equations and Calculus of Variation

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Course Objectives:

The course is mainly aimed to study partial differential equations and methods for finding solutions of order one and higher order partial differential equations along with ordinary differential equation in more than two variable. Finally part of mathematical analysis, calculus of variation is study to identifying maximizing and minimizing functional.

Course Learning Objectives:

Upon completion of this course students will able to learn

1. The properties of ordinary differential equations in more than one variable which plays important roles in the theory of partial differential equations.

2. The methods for finding linear and non linear of order one.

3. The solutions of liner and homogeneous and non homogeneous linear partial differential equation and understand many cases for finding complementary function and particular integrals

4. Basic of functional concept, its extremum positions, functional dependent on one and two variables and Euler's differential equation.

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Semester – IV (B.Sc. Mathematics)

Paper – II (Code: 4T2)

Mechanics

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Course Objectives:

The main goal of this course is to study behavior of physical bodies subjected to forces and displacement and effect of bodies on the environment. The coplanar forces deals with equilibrium of bodies, virtual work with virtual displacement and definitions of caternary. The motions of bodies in two dimension, simple harmonic motion, the elementary concepts in mechanics. Final objective of this course is to study problem of two bodies moving under the influence of a mutual central force problem.

Course Learning Objectives:

Upon completion of this paper, the students will be able to understand:

1. Equation of resultant, moment, condition of equilibrium, examples, principle of virtual work to find tension of string.

2. The radial, transverse, tangential and normal components of velocity and acceleration and problems to find different physical quantities when bodies are in simple harmonic motion

3. Concept in mechanics such as conservations theorem, constraints, DeAlembert's principle, Lagrange's equations, velocity dependent potential, dissipation function and some simple applications of Lagrangian formulation

4. The problem of two bodies moving under the influence of a mutual central force field includes equivalent one body problem, motion of the particle, virial of the system, differential equation of the orbit, integrable power aw of force field.

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Semester – V (B.Sc. Mathematics)

Paper – I (Code: 5T1)

Analysis

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Course Objectives:

The course is design to analyses Fourier series, complex analysis, conformal mapping. This series is periodic function as a sum of sine and cosine functions and the tool Fourier transform breaks function into alternate representation. The generalization of Riemann integral, called Riemann Stieltje's integral the tool in unifying equivalent forms applied to discrete and continuous probability. Next, objective(s) is to study analytic functions, Cauchy Riemann equations, harmonic function, and constructions of analytic function and to learn conformal mapping and conformal transformation in w and z plane.

Course Learning Outcomes:

After completion of this course of analysis, the students will be able to

1. Know about periodic series of Fourier, the sine and cosine functions also its half ranges.

2. Learn the generalization of Riemann integral, their definition and theorem, and fundamental theorem of calculus in derivative and integration form.

3. Learn complex function, analytic function, harmonic function, the construction of analytic function by two methods Milne's Thomson method and exact method.

4. Understand conformal mapping and conformal and bilinear transformation, theorem and examples of perseverance of cross ration and lastly fixed and critical points.

Semester – V (B.Sc. Mathematics)
Paper – II (Code: 5T2)
Metric Space, Complex Integration and Algebra

Course Objectives:

This course is design for metric space, common and useful type of topological space, it contain its basic concept, properties and examples of metric spaces. In extension to the metric spaces, role of convergence of sequences is the main objective. Complex portion aims to study the line integral of complex function. Ring theory part of modern algebra is to study along with its two operation addition and multiplication. In it homomorphism of ring, ideals are to be studied.

Course Learning Outcomes:

Upon completion of this course, the student will able to learn about:

1. Basics, definition, theorems on count ability of sets, metric spaces, their related concept, neighborhoods, closed and open sets

2. Definition, theorems and examples of complete metric space, compact metric space and brief concept of connectedness.

3. Definition of Ring theory and understand difference with group theory, explore definition of homomorphism mapping, pigeonhole principle and concept and examples of Ideals.

4. Differentiate line integral to vector fields and line integral of a complex function, Cauchy's integral theorem and formula, the basic concept of singularities, their types, and residue of the poles and the closed concept counter.

Semester – VI (B.Sc. Mathematics)
Paper – I (Code: 6T1)
Abstract Algebra

Course Objectives:

The goal of this course is to understand the concept of modern algebra. This includes group, vector spaces, linear transformation and inner product spaces. This is mapped the object to itself while preserving all of its structure. After the group, another algebraic structure called vector space based on whole linear algebra is to be studied. The mapping from one vector space to another by means of functions with linearity property, called linear transformation. The linear

transformations from matrix and matrix to linear transformation along with inner product space are overall objectives of this course.

Course Learning Outcomes:

Upon completion of this course, the students will be able to understand:

1. The concept of automorphism of a group, Inner and outer automorphism, equivalence relation on finite set, measures the size of equivalence classes under the relation and equate the number of elements in the set to the sum of orders of these equivalence classes are illustrate.

2. Formal definition of vector spaces, and its connection with vectors in vector algebra, also structure of vector space depends on linear dependency, basis, dimension, along with vector subspaces and its direct sum are also understand.

3. Linear transformation, range and kernel, Inverse of linear transformation along with definition, examples, sum and scalar multiplication and its composition of map.

4. Convert map to matrix form and vice versa, definition of rank and nullity, and lastly about algebric structure inner product space.

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Semester – VI (B.Sc. Mathematics)

Paper – II (Code: 6T3)

Special Relativity

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Course Objectives:

This course aims to design only on relativity theory, which is optional paper. Its includes development of relativity from Newton to Maxwell to Einstein, the role of Galilean transformation in classical relativity, its failure ness in Maxell's theory and Lorentz transformation in special relativity introduce. The main branch kinematics and relativistic in related to relativity is introduced along with its consequences. The main geometrical object Tensor, its preliminary concept, four dimensional space, Riemannian space time is also added to this course.

Course Learning Outcomes:

Upon completion of this course, the students will be able to

1. Understand and differentiate classical, Einstein relativity, the transformations, and the non existence of ether medium given by Michelson and Morley experiment

2. In relativity, transformation equation of velocity, acceleration, Lorentz contraction factor, and three applications time dilation, length contraction, simultaneity in relativity are also known.

3. Known about basic, definition of tensor, their contraction, and 4 dimensional space-time.

4. The known standard relation mass energy equivalence, variation of mass and velocity, energy momentum four vector, four velocity and acceleration, transformation equation of mass, momentum, energy, propagation of electric and magnetic field strength are also understand.

Department of Physics

Programme-Specific and Course Outcomes

In this program the students will be able to:

PSO 1:   Provide a systematic understanding of basic physical concepts, principles and theories along with their import ants and applications.

PSO 2:   Develop practical knowledge, skills and important of experiments.

PSO 3:   Understand the significance of the experiments in physics in day to day life and society.

PSO 4:   Develop potentiality in data assets using different laboratory instruments, an analysis and implication of data.

PSO 5:   To know the basic concepts used in the optical devices, digital electronics, etc.

PSO 6:   Identify and use the appropriate concepts in solving problems.

PSO 7:   Proceed for post graduate programs such as M.sc., Ph.D. etc.

PSO 8:   Apply for employment in research centre, scientific institute, engineering industries and electronic instrument maintenance.

PSO 9:   Apply contextual knowledge to assess societal, health, safety, legal and cultural issues.

Course Outcomes in Physics

Semester I

Paper I: Properties of Matter and Mechanics

1. To understand the basic concept of elasticity and their laws.

2. To understand the relation between elastic constants.

3. To learn the concepts of bending of beams and torsional pendulum and Maxwell needle.

4. To know the basic concept of related viscosity.

5. To understand the Bernoulli's theorem and Poiseuille's formula and their applications.

6. The students will be able to learn concept about surface tension.

7. The students understand the concept of Newton laws of motion in a plane, components of velocity and acceleration in different coordinate system, Centripetal acceleration.

8. The students will be able to learn about Coriolis force and its applications.

9. The students understand basic concept of Mechanics and System of particles, Center of mass, Conservation of linear and angular momentum, Conservation of energy.

10. The students will be able to learn concept Single stage and multistage rockets, Elastic and inelastic collisions, Moments of inertia and their products.

Paper II: Electrostatics, Time-Varying Fields, and Electric Current

1. To understand about charges and various phenomena related to it.

2. To understand about dielectric and its properties.

3. To understand about time-varying fields and its electronic application in our day to life.

4. To understand about the concept of electric current.

5. To understand the concept of electric current in application point of view.

Semester II

Paper I: Oscillations, Kinetic theory of gases and Thermodynamics

1. To understand the basic concept of free oscillations and damped oscillations.
2. The students will be able to learn concept force oscillations.
3. To learn the concepts of kinetic theory of gases.
4. To know the basic concept of transport phenomenon in gases.
5. To understand the concept of thermodynamics and their laws.
6. The student will understand the concept of entropy.
7. The student study the Maxwell general relationship and it's applications.
8. To understand different laws of thermodynamics and Liquefaction of Helium, Air conditioning (Concept only).

Paper II: Gravitation, Astrophysics, Magnetism and Magneto statics

1. To understand about various law related to Gravitation.
2. To understand about Universe through study of solar system, stars, galaxies.
3. To understand concept of magnetism and various properties related to it.
4. To understand concept of magneto static and its various theories in application point of view.

Semester III

Paper I: Sound waves, Applied acoustic, Ultrasonic and Power supply

1. To learn the basic concepts of waves in media and
2. To understand the concept of Limit of human audibility, Intensity and loudness, bel and decibel, the musical scale, Temperaments and musical instruments.
3. To understand the basic concept of applied acoustic.
4. The student will able to understand the concepts of Crystal microphone, Moving coil loud speaker, Recording and reproduction of sound devices.
5. To understand the basic concept of ultrasonic and their applications.
6. To learn about piezoelectric effect, piezoelectric generator, Magnetostriction effect and oscillators.
7. The student will understand the concept of power supply and devices.

8. To understand the concept of regulated and unregulated power supply, line and load regulation, voltage stabilization and IC voltage regulation.

Paper II: Physical Optics and Electromagnetic wave

1. To understand the basic concept of interference and principle related to it.
2. To understand and apply the theory of Newton's ring to determine wavelength and refractive index.
3. The students will be able to learn about interferometer and its applications.
4. To describe the blue color of the sky.
5. To know diffraction grating, Nicol prism and its application as an analyzer, polarizer.
6. To understand retarders or wave plates.
7. To know about Electromagnetic wave and how Electromagnetic wave propagate in different medium.
8. To understand Maxwell's Electromagnetic equations and Poynting theorem.

Semester IV

Paper I: Solid State Physics, X-ray and Laser

1. To learn about light emitting diodes, solar cell, photovoltaic cell, Bipolar transistor, transistor characteristics in CE and CB mode
2. To understand the construction and working principal of field effect transistor
3. To understand about MOSFET and JFET and their applications in IC fabrication
4. To understand the concept of rotational and spectra of diatomic molecules
5. To understand the concept of vibrational spectra of hetero nuclear diatomic molecules
6. To know about details of Roman effect and its applications
7. To understand the application of Magnetic Resonance Imaging (MRI) using concepts of Nuclear Magnetic Resonance (NMR)

Paper II: Solid State Electronics and Molecular Physics

1. To know about different crystal systems, Miller Indices, the structure of NaCl, diamond.
2. To understand the concept of X-ray spectra and its applications in various field.
3. To understand the theory of X-ray diffraction

4. To understand how lasers are manufactured.
5. To know about different types of lasers, their characteristics and applications in different field.

Semester V

Paper I: Atomic Physics, free electron theory and Statistical physics

1. To know the concept of vector atom model and details about Stren-Gerlach experiment.
2. To understand the concept space quantization, quantum numbers, Zeeman effect.
3. To understand the concept of free electron gas model to explain thermal conductivity, electrical conductivity, optical properties in solids and the concept of Hall effect.
4. To know the concept of position, momentum, phase space, macrostate and microstate.
5. To know about Maxwell-Boltzmann statistics and its applications.
6. To know about Bose-Einstein statistics and its application to black body radiation.
7. To understand all three statistics. Students are able to distinguish between different types of particles like bosons, fermions and classical particles among energy levels.

Paper II: Quantum Mechanics, Nonmaterial and Nanotechnology

1. To understand the failure of classical mechanics and explain black body spectrum, Compton effect.
2. To know about Schrodinger wave equation and apply to solve problems in quantum mechanics.
3. To know the difference between nanomaterials and bluck materials.
4. To understand various morphologies and properties of nanomaterial.
5. To know and study about different methods of synthesis of nanomaterials.
6. To understand many aspects of nanoscience and Technology (SEM, TEM) and their applications in various field.

Semester VI

Paper I: Relativity, Nuclear Physics and Bio Physics

1. To understand about theory of relativity and various experiments related to it.
2. To understand about the concept in nuclear physics and its experiment in application point of view.
3. To understand about the concept of decay theory of alpha, beta gamma particles.

4. To understand about relation between biology and physics in respect to its application in various medical fields.

Paper II: Electronics, Fiber optics, Communication and Digital electronics

1. To understand different types of Amplifiers, parameters of OP-AMP, basic ideas if IC 741OP-AMP and their applications in electronics field.
2. To understand the difference between amplifier circuit and oscillator circuit and will be able to explain the circuits of different oscillators.
3. To understand the fundamentals of fiber optics, it's importance, propagation of light, its structure and applications in various fields.
4. To know the various aspects of modulation and their limitations in communication System.
5. To know about different number systems and their conversions.
6. To understand the basic concept of digital electronics which are the basics of computer hardwar