

**Atul Vidha Mandir's
Rajarshee Shahu Science College Chandur
Rly**

Affiliated to Sant Gadge Baba Amravati University, Amravati

NAAC Reaccredited "B+" Grade (CGPA 2.51)

Website: www.rssc.edu.in, Ph. No. 07222-254111

Department of Chemistry

Program Outcomes, Program Specific Outcomes and Course Outcomes

Programme Outcomes: Bachelor of Science (B. Sc.)

PO1: To introduce the fundamentals of science education

PO2: To enrich students' knowledge in all basic sciences

PO3: To develop interdisciplinary approach amongst students

PO4: To inculcate sense of scientific responsibilities and social & environment awareness

PO5: To help student to build-up a progressive and successful career in academics and industry

PO6: To motivate the students to contribute in the development of Nation

Rajarshee Shahu Science College Chandur Rly

Department of Chemistry

Programme Outcomes – B.Sc.

Subject – Chemistry

Department of Chemistry	After successful Completion of B.Sc. with Chemistry Students should able to
Programme Outcomes	<p>PO-1 .Demonstrate, solve and an understanding of major concepts in all discipline of chemistry.</p> <p>PO-2.Solve the problem and also think methodically, independently and draw a logical conclusion.</p> <p>PO-3 Employ critical thinking and scientific knowledge to design, carryout, record and analyze the result of chemical analysis.</p> <p>PO-4. Create an awareness of the impact of chemistry on the environment, society and development outside the scientific community.</p> <p>PO-5. Find out green route for chemical reaction. For sustainable development.</p> <p>PO-6. To inculcate the scientific temperament in the students and outside the scientific community.</p> <p>PO-7. Use modern techniques, decent equipments and chemistry software.</p>
Programme Specific Outcomes	<p>PSO-1. Gain the knowledge of chemistry through theory and practical</p> <p>PSO-2.To explain nomenclature stereochemistry, structure, reactivity and mechanism of chemical reactions. PSO-3. Identify chemical formulae and solve numerical problems.</p> <p>PSO-4. Use modern chemical tools Models Charts and equipments.</p> <p>PSO-5 Know structure activity relationship.</p> <p>PSO-6. Understand good laboratory Practices and safety. PSO-7. Develop research oriented skills</p> <p>PSO-8.Make aware and handle the sophisticated equipments.</p>
Course outcomes of Chemistry B.Sc. Semester –I	
Course Outcomes	After completion of these courses students should able to ;
Inorganic Chemistry	<p>CO-1. Get knowledge of periodic classification of elements. CO-2. Understand periodic Properties.</p> <p>CO-3. Know the periodic classification in S-block, P-block CO-4. Discuss different physical and chemical properties.</p>
Organic Chemistry	<p>CO-1.Get the knowledge of Inductive effect, electromric effect, resonance and hyper conjugation.</p> <p>CO-2 Acquaint about reactive intermediate.</p> <p>CO-3. To study Aliphatic hydrocarbon and their properties. CO-4. Information about aromatic hydrocarbon.</p>

Physical Chemistry	CO-1. To get knowledge of Thermodynamics CO-2. Solve numerical problems on thermodynamics. CO-3. To understand gaseous state. CO-4 To solve the problem on gaseous state CO-5 To understand phase rule and different systems.
Organic Practicals	CO-1. To develop skill in student regarding different methods of organic preparation. CO-2. To develop new concept of green synthesis. CO-3. To develop skill of organic preparation.
Inorganic Qualitative Analysis	CO-1. Identify acidic and basic radicals from mixtures. CO-2. To develop skill of inorganic separation. CO-3 To develop idea about semi micro analysis
Course outcomes B.Sc. Chemistry B.Sc.-Semester II	
Course Outcomes	After completion of these courses students able to
Inorganic Chemistry	CO-1 To understand the concept of polarization, covalent bonding acid and bases. CO-2. To get the knowledge of p-block and noble gas elements. CO-3. To understand concept of hybridization, type of hybridization, geometry. CO-4 .Know information regarding gravimetric analysis.
Organic Chemistry	CO-1. To get knowledge of alkyl halides, aryl halides preparation properties uses. CO-2. To develop method of preparation of phenols, Ethers and Epoxide. CO-3. To get newer method of synthesis.
Physical Chemistry	CO-1. To understand concept of chemical kinetics Order, molecularity, pseudo-molecular reaction CO-2 To understand first, second order reaction their characteristics example. CO-3. To study electrical properties for polar and nonpolar molecule CO-4 To know magnetic properties paramagnetic diamagnetic, ferromagnetic and antiferromagnetic CO-5. To measure magnetic susceptibility.
Organic Chemistry practical	CO-1 Analysis of organic compound and to study different parameters like m.p., Element detection, functional group, derivative preparation. CO-2. -Analysis of Glucose, <i>a</i> -naphthol, <i>b</i> -naphthol, Toluene, Anthracene, Benzoic acid, Salicylic acid.
Physical Chemistry practical	CO-1. To measure surface tension, Viscosity, Parachor value, Cleaning power of detergent. CO-2. To determine activation energy of reaction between $K_2S_2O_8$ and KI

Course outcomes Chemistry B.Sc.-Semester III	
Course Outcomes	After completion of these courses students able to
Inorganic Chemistry	CO-1. To understand the concept of covalent bonding, metallic bonding CO-2. To get the knowledge of VSPER theory. CO-3 Know frees electron theory, Valence bond theory and molecular orbital theory. CO-4. To understand concept of volumetric analysis. CO-5. Know information regarding gravimetric analysis.
Organic Chemistry	CO-1 To get the information of different of aldehyde and caboxylic acid. CO-2. Understand the terms Optical isomerism and conformational isomerism. CO-3. To Know meaning of resolution, enatomers Diasteromers, Rand S Configuration. CO-4. To understand the terms Newmans projection formula, Sawhorse projection formula.
Physical Chemistry	CO-1. To get the Knowledge Thermodynamic and Equilibrium. CO-2. To solve the numerical problem on thermodynamics. CO-3. To understand the concept of liquid state surface tension, Viscosity. CO-4. Understand measurement application of surface tension and viscosity.
Practical	CO-1. To understand principal of redox titration. CO-2. To inculcate importance of water, measurement of different parameters. CO-3 Importance of different analysis. CO-4 to develop skill based aptitude among the students
Inorganic Chemistry Practicals	CO-1. To develop concept among the students For prepatation of different solution. CO-2. To performs redox titration, iodometry and iodimetric titration.
Physical Chemistry Practicals	CO-1. To develops skill for construction of phase diagram. CO-2. To develops laboratory skill for study order of reaction.
Course outcomes Chemistry B.Sc. Semester IV	
Course	Outcomes After completion of these courses students able to
Inorganic Chemistry	CO-1. Knowledge about 3d transition series elements. CO-2. To develop skill among the students for extraction of elements. CO-3. To get the knowledge of metallurgy. CO-4. To understand inner transition elements.
Organic Chemistry	CO-1. Information regarding polynuclear hydrocarbon. CO-2. To understand the chemistry of reactive methylene group. CO-3. To inculcate importance of carbohydrate. CO-4. To acquire importance of amino acids, diazonium salt and proteins.
Physical Chemistry	CO-1. To know the importance of colligative properties. CO-2. To solve numerical problems. CO-3. To understand crystalline state by using different models

	and video film. CO-4. To solve numerical problem on crystallography.
Inorganic Chemistry practical	CO-1 To know various parameters of water like hardness of water and its estimation. CO-2 Estimation of KMnO ₄ calorimetrically and also copper
Physical Chemistry practicals	CO-1 To develop skill regarding separation of Casein, nicotine, caffeine. CO-2 Determination of equivalent weight of organic acid
Course outcomes B.Sc. Chemistry B.Sc. Semester V	
Course	Outcomes After completion of these courses students able to
Inorganic Chemistry	CO-1. Know the meaning of various terms involved in coordination chemistry. CO-2. To understand Werners formulation of complexes and identify the type of valences. CO-3. To get importance of electronic spectra of transition series elements. CO-4. To solve numerical on crystal field theory.
Organic Chemistry	CO-1. Information regarding heterocyclic compounds their synthesis, physical and chemical Properties. CO-2. Have the knowledge of various drugs their synthesis and application. CO-3. Knowledge about various pesticides and herbicides. CO-4. Acquaint about mode of action of drugs on various diseases.
Physical Chemistry	CO-1. Understand concept of photochemistry. CO-2. To understands different terms Lamberts law Beers law, Quantum yield, Fluorescence, phosphorescence. CO-3. Derive expression for rotational spectra, vibrational spectra, band spectra. CO-4. Solve numerical on rational and vibrational spectroscopy.
Inorganic Chemistry Practicals	CO-1. To develop skill for inorganic complex salt preparation. CO-2. Know idea for preparation of complexes like tetrammine Cu(II) sulphate, hexamine Ni(II) chloride, prussian blue, Sodium thiosulphate.
Physical Chemistry	CO-1. To develop skill for handling various sophisticated equipments CO-2. To perform titration and estimation by conductometry, potentiometry, photometrically.
Course out comes Chemistry B.Sc. semester VI	
Course	Outcomes After completion of these courses students able to
Inorganic Chemistry	CO-1. To get the knowledge of different reaction SN ₁ and SN ₂ substitution reaction . CO-2. To understand various concept of beers law verification beers law, expressions. CO-3. To understand chromatography types. CO-4. To get information of organometallic compound.

	CO-5. To know the role Na ,K,Ca,Mg haemoglobin myoglobin in biological system.
Organic Chemistry	CO-1.To understand different spectroscopic terms In electronic spectroscopy chromophore, auxochrome bathochromic shift, hypsochromic shift CO-2. Application of electronic spectra for dienes unsaturated aldehydes and ketones,aromatic compound. CO-3.To understand concept of NMR,Mass spectroscopy and their application in structure determination. CO-4.To solve numerical on spectroscopy.
Physical Chemistry	CO-1.To get information about redox potential, determination types of different electrode. CO-2 Determination pH of solution by using hydrogen ,glass, quinhydrone electrode. CO-3.To understand different terms of nuclear chemistry Shell model, liquid drop model, meson theory. CO-4. Knowledge about nuclear fusion and fission ,Q value CO-5.application of radioisotope in industries agriculture and medicine.
Organic Chemistry y practicals	CO-1 To develop skill among the students for performing titrations. CO-2. Know the idea to perform various titration formaldehyde, ascorbic acid, phenol,aniline,urea. CO-3. To develop skill based practicals like separation of mixtures of dyes.
Physical Chemistry Practicals	CO-1.To give knowledge to students for handling various sophisticated equipments. CO-2.To develop titration skill for conductometry, potentiometry , pH meter. CO-3.To verify lamberts beers law by using colorimeter.

Rajarshee Shahu Science College Chandur Rly
Department Of Botany

Programme Outcomes B.Sc Botany

- PO1. Knowledge and understanding of:** 1. The range of plant diversity in terms of structure, function and environmental relationships. 2. The evaluation of plant diversity. 3. Plant classification and the flora of Maharashtra. 4. The role of plants in the functioning of the global ecosystem. 5. A selection of more specialized, optional topics. 6. Statistics as applied to biological data.
- PO2. Intellectual skills – able to:** 1. Think logically and organize tasks into a structured form. 2. Assimilate knowledge and ideas based on wide reading and through the internet. 3. Transfer of appropriate knowledge and methods from one topic to another within the subject. 4. Understand the evolving state of knowledge in a rapidly developing field. 5. Construct and test hypothesis. 6. Plan, conduct and write a report on an independent term project.
- PO3. Practical skills:** Students learn to carry out practical work, in the field and in the laboratory, with minimal risk. They gain introductory experience in applying each of the following skills and gain greater proficiency in a selection of them depending on their choice of optional modules. 1. Interpreting plant morphology and anatomy. 2. Plant identification. 3. Vegetation analysis techniques. 4. A range of physiochemical analyses of plant materials in the context of plant physiology and biochemistry. 5. Analyze data using appropriate statistical methods and computer packages. 6. Plant pathology to be added for sharing of field and lab data obtained.
- PO4. Transferable skills:** 1. Use of IT (word-processing, use of internet, statistical packages and databases). 2. Communication of scientific ideas in writing and orally. 3. Ability to work as part of a team. 4. Ability to use library resources. 5. Time management. 6. Career planning.
- PO5. Scientific Knowledge:** Apply the knowledge of basic science, life sciences and fundamental process of plants to study and analyze any plant form.
- PO6. Problem analysis:** Identify 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.
- PO7. Design/development of solutions:** 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.

- PO8. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and development of the information to provide valid conclusions.
- PO9. **Modern tool usage:** 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.
- PO10. **The Botanist and society:** Apply reasoning informed by the contextual 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.
- PO11. **Environment and sustainability:** Understand the impact of the plant diversity in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- PO12. **Ethics:** Apply ethical principles and commit to environmental ethics and responsibilities and norms of the biodiversity conservation.
- PO13. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO14. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- PO15. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- PO16. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes

- 1) Understand the importance of plants, their diversity and conservation.
- 2) Understand contribution of botany in increase and improve our supply of medicine and food.
- 3) Gain knowledge of pure and applied branches of botany.
- 4) Understand knowledge of botany is an essential pre requisite for the pursuit of many applied sciences like Agriculture, Horticulture, Sericulture, Forestry, Pharmacy and medicine.
- 5) Understand to care nature.
- 6) Understand Experiment in botany.
- 7) Understand to solve pollution and environmental problem.

Course Outcome:**Course Name – B.Sc. Ist (Sem – I) Diversity of Microbes and Cryptogams**

Students should be able to know -

1. Student will attain subject knowledge in terms of individual course as well as holistically.
2. To compare and contrast the characteristics of plants, algae, and fungi that differentiate them from each other and from other forms of life.
3. To learn about the structure, pigmentation, food reserves and methods of reproduction of algae and fungi.
4. To identify the major groups of organisms with an emphasis on plants and be able to classify them within a phylogenetic framework.
5. To know about the Economic importance of algae, Fungi and lichen.
6. The students shall be able to analyze the role and significance of microbes in human welfare and environment.
7. Learn about the general characters and classification by K.R. Sporne, stellar evolution in Pteridophytes, heterospory and origin of seed habit.
8. Students will be able to discuss the symptoms of selected diseases caused by microbes with special reference to the causative agents, symptoms, etiology and control measures.

Course Name – B.Sc. I (Sem – II) Gymnosperm, Morphology of Angiosperms and Utilization of Plants

Students should be able to know -

1. Studied the methods of fossilization and fossil plants.
2. Understand Gymnosperms with respect to PALEOBOTANY distinguishing characters, comparison with Angiosperms, economic importance and classification.
3. Know about the structure, life history and Economic importance of Gymnosperms.
4. Understand the habit of the angiosperm plant body.
5. Can understand & describe the parts of flower & its various modifications with example
6. Understand the basic concepts of inflorescence.
7. Gets familiar with the types of fruits and their botanical relevance.
8. Know the technique of medicinal gardening - Cultivation practices, marketing and utilization of selected medicinal plants.
9. Understand the techniques for drug evaluation (Chemical, Physical and Biological), Phytochemical investigations, standardization and quality control of herbal drugs.
10. Know about history and relevance of herbal drugs in Indian system of medicine
11. Learn the macroscopic and microscopic characters, chemical constituents, adulterants, therapeutically and pharmaceutical uses of medicinal plants.

Course Name – B.Sc. III (Sem – III) Angiosperm systematic anatomy and embryology

Students will be able to -

1. Understand various Angiospermic plant habits.
2. Learn about vegetative and reproductive structural features of Angiosperms.
3. Comprehend the concept of plant taxonomy and classification of Angiosperms.
4. Learn about various Angiosperm families and its economic values.
5. Learn about the basic concepts in anatomy.
6. Understand the various components of stem and wood during its secondary growth.
7. Be enlightened about the mechanism of pollination and basic structure of the embryo.
8. are able to understand modern approaches in taxonomic studies
9. Gain knowledge about Botanical Survey of India (BSI).

10. Briefly studied on herbarium techniques

Course Name – B.Sc. III (Sem – IV) Cell Biology, Genetics and Biochemistry

Students will be able to -

1. By the end of this course students will be able to understand the structure of cells in relation to the functional aspects.
2. To understand the difference between prokaryotic and eukaryotic cells.
3. To study the details of the plant cell wall , cytosol and cytoplasmic organelles.
4. To understand the properties of nucleic acids(DNA and RNA).
5. Learn about Mendelian principal and phenomenon of dominance , laws of segregation, independent assortment
6. Know about gene mapping methods & Extra chromosomal inheritance.
7. Learn the properties, Enzyme catalysis and activation energy– Mechanism of enzyme action.
8. Understanding the biochemical nature of cell.
9. To know the chemical nature of biomolecules.
10. Structure and general features of enzymes.
11. Concept of enzyme activity and enzyme inhibition.
12. eukaryotic cell cycle and mitotic and meiotic cell division.

Course Name – B.Sc. III (Sem – V) Plant Physiology and Ecology

Students will be able to -

1. Know importance and scope of plant physiology.
2. Understand the plants and plant cells in relation to water.
3. Understand the process of photosynthesis in higher plants with particulars emphasis on light and dark reactions, C3 and C4 pathways.
4. Understand the respiration in higher plants with particular emphasis on aerobic and anaerobic respiration.
5. Learn about the movement of sap and absorption of water in plant body.
6. Understand the plant movement.
7. Understand the process of translocation of solutes in plants.
8. Know the nitrogen metabolism and its importance.
9. Learn about the process of soil formation, soil profile, biota and their rule.
10. Know the structure and function of ecosystem.
11. Understand the types of Ecosystem.
12. Learn about Sensory photobiology
13. Know about the Plant Growth hormones (Auxins, Gibberellins. Cytokinins, Ethylene)

Course Name – B.Sc. III (Sem – VI) Molecular Biology and Biotechnology

Students will be able to -

1. Know about the genomic organization or living organisms, study of genes genome, chromosome etc.
2. Understand the fundamentals of Recombinant DNA technology.
3. Know about the Genetic Engineering.
4. Concept of operon and its structure and regulation.
5. Learn the specific and non-specific methods of gene transfer
6. Applications of Biotechnology in Plant, Animal and Human welfare.
7. Learn the micro and megasporogenesis.
8. Know about the morphogenesis and organogenesis in plants
9. Gain skill on working principles of pH meter, colorimeter and centrifuge
10. Learn the technique of Electrophoresis & Chromatography.

11. Understand the basic knowledge about tissue culture tools, medium, sterilization and techniques of tissue culture
12. Study about the role of tissue culture in crop improvement.

Zoology

Program Outcomes

Students taking admission to Zoology Programme are expected to get equipped with following outcomes:

- Explaining the basic scientific principles and methods
- Apply knowledge to solve the issues related to animal sciences
- Take appropriate steps towards conservation of endemic and endangered animal species
- To create awareness amongst students for the basic and applied areas of Zoology
- To orient students about the importance of abiotic and biotic factors of environment and their conservation
- To inculcate good laboratory practices in students and to train them about proper handling of lab instruments.
- Demonstrate knowledge and understanding of Zoology and management principles and apply these to one's own work, as a member and leader in a team.
- Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Program Specific Outcomes

- Understand the nature and basic concepts of cell biology, genetics, taxonomy, physiology, ecology and applied Zoology
- Analyse the relationships among animals with their ecosystems
- Perform procedures as per laboratory standards in the areas of Taxonomy, Physiology, Ecology, Cell biology, Genetics, Applied Zoology, Clinical science, tools and techniques of Zoology, Toxicology, Sericulture, Biochemistry, Fish biology, Animal biotechnology, Immunology and research methodology
- Understand the applications of Zoology in Agriculture, Medicine and daily life
- Gains knowledge about research methodologies, effective communication and skills of problem solving methods
- Contributes the knowledge for Nation building.

Semester I: Life and Diversity of Non-Chordata

Course Outcomes

- Improving the knowledge about criteria for non-chordata.classification.
- Study of salient features of non-chordates.
- Different systems of non-chordata –understand
- Understand the terminology needed in classification.
- To classify invertebrates and to be able to understand the possible group of the invertebrate observed in nature.

Zoology Semester II: Cell and Developmental Biology

Course Outcomes

- The learner will understand the importance of cell as a structural and functional unit of life.
- The learner understands and compares between the prokaryotic and eukaryotic system and extrapolates the life to the aspect of development.
- The dynamism of bio membranes indicates the dynamism of life. Its working mechanism and precision are responsible for our performance in life.
- The cellular mechanisms and its functioning depends on endo-membranes and structures.
- Differentiate between prokaryotes and eukaryotes
- Comparison between meiosis and mitosis cell division
- Identify the developmental stages
- Describe the key events in early and systematic embryological development.
- Explain the theories of preformation, and concepts like growth, differentiation and reproduction.
- Explain the principles and process of fertilization and cleavage.

Zoology Semester III: Life and Diversity of Chordata and Concept of Evolution

Course Outcomes

- Improving the knowledge about criteria for chordate classification.
- Study of salient features of chordates.
- Different systems of chordata –understand
- Understand the terminology needed in classification.
- To classify invertebrates and to be able to understand the possible group of the vertebrate observed in nature.
- Knowledge of organic evolution
- Understood the theories of evolution and highlighted the role of evidences in support of evolution

Zoology Semester IV: Advanced Genetics and Animal Ecology

Course Outcomes

- Define the basic terms in genetics.
- Discuss the linkage groups and gene frequency.
- An overview of evolutionary ecology and environmental concepts
- Description of nature of ecosystem, production, food webs, energy flow, biogeochemical
- Cycles, resilience of ecosystem and ecosystem management.
- Understanding the biosphere, biomes and impact of climate on biomes.

Zoology Semester V: Animal Physiology and Economic Zoology

Course Outcomes

- Define the basic terms in physiology.
- Explain the physiological processes in animals.
- Explain the anatomy of various systems.
- Illustrate the reproductive cycles with hormonal control.

- Diagrammatically represent the working of neuron.
- Understands processes of fisheries, sericulture, apiculture along with crop pest management techniques

Zoology Semester VI: Molecular Biology and Biotechnology

Course Outcomes

- Explain the concept of mutation.
- Explain DNA structure.
- Paraphrase the Central dogma of molecular biology.
- Illustrate the mechanism of replication, transcription and translation.
- Understand the principles and techniques involved in DNA technology.
- Get an overview of modern techniques like PCR, Hybridoma technology
- Understand the principles and mechanism of immunology
- Distinguish Innate immunity and Acquired Immunity
- Understand the importance of Immune system
- Learn malfunctioning and disorders of immune system.

RajarsheeShahu Science College, Chandur Rly
Department of Physics

Program Outcomes, Program Specific Outcomes and Course Outcomes

PROGRAMME OUTCOMES: B.Sc. PHYSICS

- PO-1:** Demonstrate, solve and an understanding of major concepts in all disciplines of Physics.
- PO-2:** Solve the problem and also think methodically, independently and draw a logical conclusion
- PO-3:** Employ critical thinking and the scientific knowledge to design, carry out, record and analyze the results of Physics experiments.
- PO-4:** Create an awareness of the impact of Physics on the society and development outside the scientific community.
- PO-5:** To inculcate the scientific treatment in the students and outside the scientific community.
- PO-6:** Use modern techniques, descent equipments and different software.

PROGRAMME SPECIFIC OUTCOMES: B.Sc. PHYSICS

- PSO-1:** Gain the knowledge of Physics through theory and practical's.
- PSO-2:** Understand good laboratory practices and safety.
- PSO-3:** Develop research oriented skills.
- PSO-4:** Make aware and handle the sophisticated instruments/equipments.

COURSE OUTCOMES B.Sc. PHYSICS

Course Outcomes B.Sc. Physics
Semester-I

Unit I: Gravitation

- CO-1: Know the Newton's law of gravitation.
- CO-2: To study variation of acceleration due to gravity at different places..
- CO-3: To study Kepler's laws of planetary motion.
- CO-4: To understand above concepts through experiments in laboratory.
- CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit II: Rotational Motion

- CO-1: Know the translational, vibrational & rotational motion.
- CO-2: To find out moment of inertia of different body shapes.
- CO-3: To understand the concept of linear & angular momentum.
- CO-4: To understand above concepts through experiments in laboratory.
- CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit III: Oscillation I

CO-1: Know the concept of simple harmonic motion

CO-2: To derive & solve differential equation of S.H.M.

CO-3: To study examples of S.H.M. like Compound pendulum, Kater's pendulum, etc.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit IV: Oscillations-II

CO-1: Know the damped & forced harmonic motion.

CO-2: To understand resonance & its types.

CO-3: To study superposition of two S.H.M.s (parallel & perpendicular)

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit V: Elasticity

CO-1: Know the concept of elasticity & plasticity

CO-2: To understand different elastic constants.

CO-3: To determine elastic constant by different methods.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit VI: Viscosity

CO-1: Know the viscous properties of fluid.

CO-2: To understand Bernoulli's theorem, Raynold's number.

CO-3: To study property of matter: surface tension.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Course Outcomes B.Sc.Physics

Semester-II

Unit I: Ideal gas, Real gas & Transport phenomenon

CO-1: Know the kinetic theory of gases.

CO-2: To understand Brownian motion, Avagadro,s number & specific heat.

CO-3: To study Transport phenomenon in gases.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit II: Laws of thermodynamics

CO-1: Know the laws of thermodynamics.

CO-2: To understand Carnot's heat engine & Carnot's theorem.

CO-3: To study Entropy.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit III: Liquification of gases

CO-1: Know the Joule-Thomson effect.

CO-2: To understand liquification of hydrogen & helium.

CO-3: To study thermodynamic variables.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit IV: Motion of charged particles

CO-1: Know the motion of charged particle in electric & magnetic fields.

CO-2: To understand working principle of electron gun, Discharge tube & mass spectrograph.

CO-3: To study linear accelerator & Cyclotron.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit V :Network theorems

CO-1: Know the network theorems.

CO-2: To understand Ballistic galvanometer.

CO-3: To study Varying current.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit VI: Alternating current

CO-1: Know the concept of alternating current.

CO-2: To understand applications of j-operator & complex number.

CO-3: To study resonance & transformer.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Course Outcomes B.Sc.Physics

Semester-III

Unit I: Mathematical background & electrodynamics

CO-1: Know the Scalar & Vector fields.

CO-2: To understand Gradient, Divergence & Curl.

CO-3: To study Ampere's law.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit II: Magnetostatics & Maxwell's equation

CO-1: Know the Faraday's law.

CO-2: To understand Maxwell's equation.

CO-3: To study Poynting theorem.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit III: Solid state electronic devices-I

CO-1: Know the semiconductor.

CO-2: To understand Hall effect.

CO-3: To study different types of diodes.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numerical based on syllabus)

Unit IV: Solid state electronic devices- II

CO-1: Know the BJT.

CO-2: To understand types & applications of FET.

CO-3: To study IC OP-AMP.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numerical based on syllabus)

Unit V: Special theory of relativity

CO-1: Know the special theory of relativity.

CO-2: To understand length contraction, Time dilation.

CO-3: To study Einstein's mass-energy relation.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numerical based on syllabus)

Unit VI: Atmosphere & Geophysics

CO-1: Know the structure of earth.

CO-2: To understand Atmosphere.

CO-3: To study earthquakes.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numerical based on syllabus)

Course Outcomes B.Sc.Physics

Semester-IV

Unit I: Geometrical Optics

CO-1: Know the lens system.

CO-2: To understand interference in thin films.

CO-3: To study Newton's ring.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit II: Diffraction

CO-1: Know the types of diffraction.

CO-2: To understand diffraction through plane transmission grating.

CO-3: To study zone plates.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numerical based on syllabus)

Unit III: Polarization

CO-1: Know the Polarization.

CO-2: To understand Brewster's law.

CO-3: To study Nicol's prism.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit IV: Laser

CO-1: Know the mechanism of Laser.

CO-2: To understand types & applications of laser.

CO-3: To study concept of holography.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit V: Fiber optics

CO-1: Know the mechanism of Optical fiber.

CO-2: To understand types & applications of optical fiber.

CO-3: To study optical communication system.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit VI: Renewable energy sources

CO-1: Know the types of renewable energy sources.

CO-2: To understand concept of solar energy.

CO-3: To study photovoltaic cell.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students.(Numericals based on syllabus)

Course Outcomes B.Sc.Physics

Semester-V

Unit I: Quantum mechanics-I

CO-1: Know the black body radiation.

CO-2: To understand Plank's radiation law & photoelectric effect.

CO-3: To study Compton effect & Heisenberg's uncertainty principle.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit II: Quantum mechanics-II

CO-1: Know the Schrodinger's wave equation.

CO-2: To understand mathematical operator's.

CO-3: To study motion of particle in rectangular box.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit III: Atomic & molecular Physics

CO-1: Know the different atomic models.

CO-2: To understand quantum numbers.

CO-3: To study Raman effect.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit IV: Nuclear Physics

- CO-1: Know the theory of nucleus.
- CO-2: To understand alpha & beta decay.
- CO-3: To study Nuclear reaction & reactor.
- CO-4: To understand above concepts through experiments in laboratory.
- CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit V: Hybrid parameters

- CO-1: Know the h-parameters.
- CO-2: To understand concept of amplifier.
- CO-3: To study Noise & distortion in amplifier.
- CO-4: To understand above concepts through experiments in laboratory.
- CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit VI: Feedback in amplifier

- CO-1: Know the concept of feedback.
- CO-2: To electronic oscillators.
- CO-3: To study multivibrators.
- CO-4: To understand above concepts through experiments in laboratory.
- CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Course Outcomes B.Sc. Physics

Semester-VI

Unit I: Statistical mechanics-I

- CO-1: Know the phase space, unit cell, micro & macro states.
- CO-2: To understand Boltzmann's entropy relation.
- CO-3: To study Maxwell-Boltzmann statistics & its applications.
- CO-4: To understand above concepts through experiments in laboratory.
- CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit II: Statistical mechanics-II

- CO-1: Know the concept of boson & fermions.
- CO-2: To understand Bose-Einstein statistics & its applications.
- CO-3: To study Fermi-Dirac statistics & its applications.
- CO-4: To understand above concepts through experiments in laboratory.
- CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit III: Crystallography

CO-1: Know the crystalline & amorphous solids.

CO-2: To understand different crystal structures & X-ray diffraction.

CO-3: To study crystal defects.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit IV: Electrical properties of materials

CO-1: Know the concept of drift motion.

CO-2: To understand Fermi energy.

CO-3: To study band structure in solids.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit V: Magnetic properties of materials

CO-1: Know the concept of magnetism.

CO-2: To understand types of magnetic materials.

CO-3: To study Hysteresis.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Unit VI: Superconductivity & Nano technology

CO-1: Know the concept of superconductors.

CO-2: To understand types of superconductors & BCS theory.

CO-3: To study Basic concepts of nanotechnology.

CO-4: To understand above concepts through experiments in laboratory.

CO-5: To develop numerical solving technique in students. (Numericals based on syllabus)

Course Outcomes B.Sc. Physics

Semester-VI

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PO,PSO,CO of B.Sc Mathematics

Programme Outcome of Mathematics

- Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study.
- A student should get a relational understanding of mathematical concepts and concerned structures, and should be able to follow the patterns involved, mathematical reasoning.
- Ability to analyze a problem, identify and define the computing requirements, which may be appropriate to its solution.
- Introduction to various courses like group theory, ring theory, field theory, metric spaces, number theory.
- Enhancing students' overall development and to equip them with mathematical modelling abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- Ability to pursue advanced studies and research in pure and applied mathematical science.

Programme Specific Outcome of Mathematics

- Think in a critical manner.
- Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.
- Formulate and develop mathematical arguments in a logical manner.
- Acquire good knowledge and understanding in advanced areas of mathematics and statistics, chosen by the student from the given courses.
- Understand, formulate and use quantitative models arising in social science, business and other contexts.

Course Outcome:- B.Sc-I

Course Title:- Algebra and Trigonometry

Course Outcomes

Students will able to

- Solve system of linear equation.
- Solve Diophantine equation.
- Find roots of polynomial over rational.
- Find graphs, roots and primes integer
- Introduction to complex analysis
- Find summation of Series
- Learn Quaternion

- Find Rank, Characteristic Equation, Eigen Values, Eigen Vectors of a Matrix.
- Prove Cayley- Hamilton theorem.

Course Title:- Differential and Integral Calculus

Course Outcomes

Students will able to

- Understand the definition of limit of a function ,Continuity of a functions, discontinuity of function.
- Understand the differentiability of Functions.
- Prove Leibnitz theorem and solve the examples.
- understand the indeterminate forms , L'Hospital rule
- State and prove Rolle's theorem, Lagrange's mean value theorem,Cauchy's mean value theorem.
- Solve examples on Maclaurian and Taylor's series.
- Understand partial derivative and differentiation of real valued function of two variables, homogeneous functions.

Course Title:- Differential equations (ordinary and Partial Differential equations)

Course Outcomes

Students will able to

- Extract the solution of differential equations of the first order and of the first degree by variables separable, Homogeneous and Non-Homogeneous methods.
- Find a solution of differential equations of the first order and of a degree higher than the first by using methods of solvable for p, x and y.
- Solve first order differential equations utilizing the standard techniques for separable, exact, linear, homogeneous, or Bernoulli cases. Student will be able to find the complete solution of a non-homogeneous differential equation as a linear combination of the complementary function and a particular solution.
- Student will be able to find the complete solution of a non-homogeneous differential equation as a linear combination of the complementary function and a particular solution.
- Compute all the solutions of second and higher order linear differential equations with constant coefficients, linear equations with variable coefficients.
- Solve simultaneous linear equations with constant coefficients and total differential equations.
- Form partial differential equations.
- Find the solution of First order partial differential equations for some standard types.

Course Title:- Vector Analysis and Solid Geometry

Course Outcomes

Students will able to

- Describe the various forms of equation of a plane, straight line, Sphere, Cone and Cylinder.
- Find the angle between planes, Bisector planes, Perpendicular distance from a point to a plane, Image of a line on a plane, Intersection of two lines
- Define coplanar lines and illustrate
- Compute the angle between a line and a plane, length of perpendicular from a point to a line
- Define skew lines
- Calculate the Shortest distance between two skew lines
- Find and interpret the gradient curl, divergence for a function at a given point.
- Interpret line, surface and volume integrals
- Evaluate integrals by using Green's Theorem, Stokes theorem, Gauss's Theorem

Course Outcome:- B.Sc-II

Course Title:- Number Theory

Course Outcomes

Students will able to

- Find quotients and remainders from integer division
- Apply Euclid's algorithm and backwards substitution
- Understand the definitions of congruences, residue classes and least residues
- Add and subtract integers, modulo n , multiply integers and calculate powers, modulo n
- Determine multiplicative inverses, modulo n and use to solve linear congruences.

Course Title:- Advanced Calculus

Course Outcomes

Students will able to

- Gain Knowledge of fundamental concepts of real numbers.
- Verify the value of the limit of a function at a point using the definition of the limit
- Introduction to sequence and series.
- Learn to check function is continuous understand the consequences of the intermediate value theorem for continuous functions.
- Understand Maxima and Minima of two variables
- Solve Double and Triple Integral.

Course Title:- Modern Algebra (Groups, Rings)

Course Outcomes

Students will able to

- Define Group, subgroup, center, Normalizer of a subgroup.
- Find cycles and transpositions of a given permutations.
- Prove Lagrange's theorem ,Euler's theorem and Fermats theorem
- Define cyclic groups .
- Prove a group has no proper subgroup if it is cyclic group of prime order.
- Define normal subgroups , quotient groups and index of a subgroup.
- Define homomorphism , kernel of a homomorphism, isomorphism.
- Prove Cayley's theorem , the fundamental theorem of homomorphism for groups.
- Define rings , zero divisors of a ring , integral domain , field and prove theorems.

Course Title:- Classical Mechanics

Course Outcomes

Students will able to

- Have a deep understanding of Newton's laws,
- To solve the Newton equations for simple configurations using various methods,
- Understand the foundations of chaotic motion
- Understand the D'Alembert principle
- Understand the Kepler's laws
- Understand the Lagrange's equation of motion.

Course Outcome:- B.Sc-III

Course Title:- Mathematical Analysis

Course Outcomes

Students will able to

- Deep understanding of Riemann integral.
- Understand Improper integral and their Convergence.
- Apply the comparison and limits test.
- Understand Continuity and differentiability of complex function.
- Understand the analytic function.
- Understand the metric spaces.

Course Title:- Mathematical Methods

Course Outcomes

Students will able to

- Find Laplace transform, Inverse Laplace transform , Fourier and inverse Fourier Transform of a function
- Find derivative of a function through laplace transform.

- Apply Laplace transform to solve second order linear differential equation and simultaneous linear differential equations.

Course Title:- Linear Algebra

Course Outcomes

Students will able to

- Define Vector Space, subspace, Quotient space Direct sum, linear span and linear independence, basis and inner product.
- Discuss the linear transformations, rank, nullity.
- Find the characteristic equation, eigen values and eigen vectors of a matrix.
- Schwartz inequality, Gramschmidt orthogonalisation process.
- Solve the system of simultaneous linear equations.

Course Title:- Special Theory of Relativity

Course Outcomes

student will be able to

- Differentiate wrong general public ideas about the theory and what the theory is really about.
- Understand time – spacial relations at the local and global levels.
- Understand the basis of Standard model.
- Understand the gravity as bending of space-time.
- Calculate the angle light bends under the influence of gravity.
- Calculate the increase of wavelength of light leaving Earth.
- Calculate time dilation corrections used in GPS satellites due to special and general relativity.
- Understand the basic characteristics of black holes.
- Understand the basic characteristics of gravitational waves.
- Understand the accelerated expansion of the universe in relation to Einstein's cosmological constant.