

ATUL VIDYA MANDIR WARDHA'S



RAJARSHEE SHAHU SCIENCE COLLEGE

Chandur Railway, Dist – Amravati, Maharashtra



Affiliated to

Sant Gadge Baba Amravati University, Amravati



2nd Cycle

Assessment & Accreditation by NAAC

CRITERIA II- TEACHING LEARNING AND EVALUATION

2.6: Student Performance and Learning Outcome

Metric No. - 2.6.1

**Programme Outcomes (POs) and Course Outcomes (COs)
for all Programmes offered by the institution are stated
and displayed on website.**



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Rajarshee Shahu Science College

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(College Code : 807)

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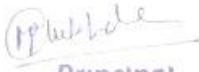
Declaration

The information, reports, true copies of the documents, numerical data, etc furnished in this file is verified by IQAC and found correct.


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STUDENT PERFORMANCE AND LEARNING OUTCOME:

2.6.1

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Programme Outcomes of 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

Programme B.Sc. (Chemistry)

Programme Outcome: At the time of graduation, Students would be able to:

- PO-1: Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- PO-2: Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- PO-3: Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.
- PO-4: Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- PO-5: Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
- PO-6: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
- PO-7: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

The Programme Specific Outcomes (PSOs)

Upon completion of the programme successfully, the learners would be able to-

- PSO-1: Understand the scope, methodology and application of modern chemistry.
- PSO-2: Apply theoretical and practical concepts of instruments that are commonly used-in most chemistry field.
- PSO-3: Plan and conduct scientific experiments and record the results of such experiments.
- PSO-4: Get acquainted with safety of chemicals, transfer, and measurements of chemicals, preparation of solutions, and using physical properties to identify compounds and chemical reactions.
- PSO-5: Describe how chemistry is useful to solve social, economic and environmental problem and issues facing our society in energy, medicine, and health.

Course Outcomes (COs)**CHEMISTRY: B.Sc. I SEM-I**

By the end of this course, the students would be able to:

- CO-1:** Solve the conceptual questions using the knowledge gained by studying periodicity in atomic radii, ionic radii, ionization energy and electron affinity of elements.
- CO-2:** Apply concepts of acids and bases as well as non-aqueous solvents and their industrial usage.
- CO-3:** Compare different reaction intermediates, functional group chemistry through the study of methods of preparation, properties and chemical reactions with underlying mechanism.
- CO-4:** Choose correct synthetic approach to prepare derivatives of industrially important molecules
- CO-5:** Solve different numerical problem of varying difficulty associated with gaseous and liquid state.
- CO-6:** Apply the concepts from advanced mathematics to solve the derivation of different chemical formulae.
- CO-7:** Create models associated with periodic table
- CO-8:** Associate reaction intermediates and functional group chemistry with different types of reaction mechanisms.
- CO-6:** Solve numerical problem associated with gaseous and liquid state.

(Laboratory/Practical/practicum/hands- on/Activity)

At the end of Lab/Practical course, students would be able to:

- CO-1:** Synthesize different types of organic compounds.
- CO-2:** Perform the process of filtration, crystallization, melting point, waste management.
- CO-3:** Understand the effect of orientation effect of a group
- CO-4:** Skilfully determine the surface tension, viscosity of liquid.
- CO-5:** Predict the endothermic or exothermic process from heat of solution of a salt.

Course Outcomes (COs)**CHEMISTRY: B.Sc. I SEM-II**

By the end of this course, the students would be able to:

- CO-1:** Apply the knowledge gained by studying types of bonding, solvation, hybridization and molecular geometries.
- CO-2:** Draw the correct molecular structures, bond order and bond length.
- CO-3:** synthesize commercially important compounds of varying carbon backbone.
- CO-4:** Choose correct synthetic approach to prepare derivatives of industrially important molecules.
- CO-5:** Solve numerical problems related to crystalline state.
- CO-6:** Acquire skills to use chemical kinetics to develop mechanism of chemical reactions.
- CO-7:** Create models associated with molecular geometries, hybridization, MO diagrams.
- CO-8:** Develop synthetic routes for halobenzenes and benzyl halides.
- CO-9:** Solve numerical problems associated with crystalline state and chemical kinetics.

(Laboratory/Practical/practicum/hands- on/Activity)

At the end of Lab/Practical course, students would be able to -

CO-1: Analyse the given organic compound qualitatively by different tests.

CO-2: Prepare the derivative of the provided substance.

CO-3: Illustrate the practical skills in volumetric analysis.

CO-4: Differentiate types of titrations e.g. acid-base, redox, etc.

CO-5: Comprehend the kinetics of reactions and interpret the experimental data.

CO-6: Calculate, communicate and analyse the result.

Course Outcomes (COs)**CHEMISTRY: B.Sc. II SEM-III****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 free 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 carboxylic acid.

CO-2: Understand the terms Optical isomerism and conformational isomerism.

CO-3: To know meaning of resolution, enantiomers, Diastereomers, R and S Configuration.

CO-4: To understand the terms Newman's 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's**

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 Practical

CO-1: To develop concept among the students For preparation of different solution.

CO-2: To perform redox titration, iodometry and iodimetric titration.

Physical Chemistry Practical

CO-1: To develop skill for construction of phase diagram.

CO-2: To develop laboratory skill for study order of reaction.

Course Outcomes (COs)**CHEMISTRY: B.Sc. II SEM-IV****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

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 Practical

- CO-1:** To develop skill regarding separation of Casein, nicotine, caffeine.
CO-2: Determination of equivalent weight of organic acid

Course Outcomes (COs)**CHEMISTRY: B.Sc. III SEM-V****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 Practical

- 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 Practical
CO-1: To develop skill for handling various sophisticated equipments.
CO-2: To perform titration and estimation by conductometry, potentiometry, potentiometrically.

Course Outcomes (COs)**CHEMISTRY: B.Sc. III SEM-VI****Inorganic Chemistry**

- CO-1:** To get the knowledge of different reaction SN1 and SN2 substitution reaction.
CO-2: To understand various concept of beer's law verification beer's 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 Practical

- 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 Practical

- 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 Lambert's Beer's law by using colorimeter.

Programme B.Sc. (BOTANY)**Programme Outcome**

The students graduating with the degree B.Sc. with Botany will be able to:

- PO1. Critical Thinking:** Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- PO2. Effective Communication:** Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- PO3. Social Interaction:** Elicit views of others, mediate disagreements and help reach conclusions in group settings.
- PO4. Effective Citizenship:** Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- PO5. Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
- PO6. Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development.
- PO7. Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

The Programme Specific Outcomes (PSOs):

- PSO-1:** Upon completion of the programme successfully, students would be able to
- PSO-2:** Identify major groups of plants and compare the characteristics of lower (microbes, algae ,fungi, bryophytes and pteridophytes) and higher (Gymnosperms and angiosperms).
- PSO-3:** Use evidence based comparative botany approach to explain the evolution of organism and understand the genetic diversity.
- PSO-4:** Explain various plant processes and functions, metabolism, concepts of gene, genome and how organism's function is influenced at the cell, tissue and organ level.
- PSO-5:** Understand adaptation, development and behavior of different forms of life.
- PSO-6:** Demonstrate the experimental techniques and methods of their area of specialization in Botany.

Course Outcomes (COs)**BOTANY : B.Sc. I SEM-I****DIVERSITY OF MICROBES , PHYCOLOGY,MYCOLOGY AND PHYTOPATHOLOGY**

After completion of this course successfully , the students would be able to

CO-1: Understand microbial diversity, reproduction and economic importance.

CO-2: Differentiate the microbes, algae and fungi on the basis of morphology, cellular organization, nutrition and metabolic activities.

CO-3: Classify and identify the various algal genera.

CO-4: Classify and identify the various fungal genera.

CO-5: Systematize the plant diseases and their pathogens

CO-6: Apply understanding of microbial diversity, phycology and mycology for teaching primary to high school students

CO-7: **Acquire skill** of isolation of Arbuscular Mycorrhizal Fungal and also able to classify the various species of mycorrhiza.

CO-8: **Evaluate** the AMF spore in the soil sample of crop plants.

CO-9: **Establish** own production unit of mushroom cultivation

CO-10: **Asses** the economy of mushroom cultivation

CO-11: **Diagnosed** the local crop diseases.

CO-12: **Advise** the proper fungicides or other measures to prevent crop diseases.

(Laboratory/Practical/practicum/hands- on/Activity)

CO-1: After completion of this course successfully , the students would be able to:

CO-2: Identify and classify the algae on the basis of morphology and other characters.

CO-3: Create monograph of Algae and Fungi.

CO-4: Demonstrate the structural details of viruses and bacteria included in practical work.

CO-5: Evaluate the plant diseases of local plants and diagnosed the diseases on the basis of symptology.

Course Outcomes (COs)**BOTANY : B.Sc. I SEM-II****Bryophytes, Pteridophytes, Gymnosperm, Morphology of Angiosperms**

After completion of this course successfully , the students would be able to

CO: 1 Demonstrate on understanding of Archegoniate, Bryophytes, Pteridophytes and Gymnosperms.

CO: 2 Identify and classify plants from Bryophytes, Pteridophytes and Gymnosperms.

CO: 3 Develop critical thinking on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms.

CO: 4 Acquire skill of collection and preservation of Bryophytes, Pteridophytes and Gymnosperms

CO: 5 Understand the herbal technology.

CO: 6 Develop the skill for cultivation of plants.

CO: 7 Acquire the skill of morphological and microscopic examination of herbal plants.

CO: 8 List the major herbs, their Botanical names and chemical constituent's.

(Laboratory/Practical/practicum/hands- on/Activity)

By the end of the Lab/Practical Course, generally students would be able to:

- CO: 1** Understand forms of Bryophytes, Pteridophytes and Gymnosperms.
CO: 2 Acquire the skill of preparation of slides of plant body and reproductive organs.
CO: 3 Classify and identify different plant parts on the basis of external morphology.
CO: 4 Describe the plants in technical language.
CO: 5 Develop critical understanding on morphology, botanical names and cultivation practices of economically important plants.

Course Outcomes (COs)**BOTANY : B.Sc. II SEM-III****Angiosperm systematic anatomy and embryology**

- CO-1:** Understand various Angiospermic plant habits.
CO-2: Learn about vegetative and reproductive structural features of Angiosperms.
CO-3: Comprehend the concept of plant taxonomy and classification of Angiosperms.
CO-4: Learn about various Angiosperm families and its economic values.
CO-5: Learn about the basic concepts in anatomy.
CO-6: Understand the various components of stem and wood during its secondary growth.
CO-7: Be enlightened about the mechanism of pollination and basic structure of the embryo.
CO-8: To understand modern approaches in taxonomic studies
CO-9: Gain knowledge about Botanical Survey of India (BSI).
CO-10: Briefly studied on herbarium techniques

Course Outcomes (COs)**BOTANY : B.Sc. II SEM-IV****Cell Biology, Genetics and Biochemistry**

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

Course Outcomes (COs)**BOTANY : B.Sc. III SEM-V****Plant Physiology and Ecology**

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

Course Outcomes (COs)**BOTANY : B.Sc. III SEM-VI****Molecular Biology and Biotechnology**

- CO-1:** Know about the genomic organization of living organisms, study of genes genome, chromosome etc.
- CO-2:** Understand the fundamentals of Recombinant DNA technology.
- CO-3:** Know about the Genetic Engineering.
- CO-4:** Concept of operon and its structure and regulation.
- CO-5:** Learn the specific and non-specific methods of gene transfer
- CO-6:** Applications of Biotechnology in Plant, Animal and Human welfare.
- CO-7:** Learn the micro and megasporogenesis.
- CO-8:** Know about the morphogenesis and organogenesis in plants
- CO-9:** Gain skill on working principles of pH meter, colorimeter and centrifuge
- CO-10:** Learn the technique of Electrophoresis & Chromatography.
- CO-11:** Understand the basic knowledge about tissue culture tools, medium, sterilization and techniques of tissue culture
- CO-12:** Study about the role of tissue culture in crop improvement.

Programme B.Sc. (ZOOLOGY)**Programme Outcome**

At the time of graduation, Students will be able to

- PO-1: Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- PO-2: Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- PO-3: Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.
- PO-4: Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- PO-5: Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
- PO-6: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
- PO-7: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

The Programme Specific Outcomes (PSOs)

By the end of the programme, Students would be able to”

- PSO- 1: Develop a deeper sense with respect to phylum Protozoa to Echinodermata relation to taxonomy, classification, body organization and general characteristics this strengthens students' capability in basic zoology.
- PSO- 2: grasp various the Systematic positions from Protozoa to Echinodermata their pathogenicity and its epidemiology.
- PSO- 3: describe unique characters and recognize life functions of Protozoa, Porifera, Coelenterate, Helminthes, Arthropoda, Annelida, Mollusca and Echinodermata. Improve ability and apply Knowledge of Non- chordates for its execution in Agriculture especially with the phylum Arthropoda.
- PSO- 4: Implement an extensive idea about economic and ecological significance of various non-chordates phylum's in human life.

Course Outcomes (COs)**ZOOLOGY : B.Sc.-I SEM-I****Life and Diversity of Animals (Non-Chordata)**

Upon completion of this course successfully, students would be able to

- CO-1: Develop a deeper sense with respect to phylum Protozoa to Echinodermata relation to taxonomy, classification, body organization and general characteristics this strengthens students' capability in basic zoology.
- CO-2: Grasp various the Systematic positions from Protozoa to Echinodermata their pathogenicity and its epidemiology.
- CO-3: Describe unique characters and recognize life functions of Protozoa, Porifera, Coelenterate, Helminthes, Arthropoda, Annelida, Mollusca and Echinodermata.
- CO-4: Improve ability and apply Knowledge of Non-chordates for its execution in Agriculture especially with the phylum Arthropoda.
- CO-5: Implement an extensive idea about economic and ecological significance of various non-chordates phylum's in human life.

Practical :

Upon completion of this course successfully, students would be able to perform/demonstrate:

CO-1: Observation, classification upto classes and sketching of the following animals (Specimens and models)

- Phylum : Protozoa: Plasmodium trophozoite, Euglena, Entamoeba histolytica
- Phylum : Porifera : Sycon, bath sponge, Euplectela
- Phylum :Coelenterata : Obelia, Aurelia, Tubipora,
- Phylum : Helmenthis : Taenia, Ascaris (male and female)
- Phylum Annelida : Neris, Earthworm, Leech,
- Phylum :Arthropoda : Prawn, Aranea,scolopendra, julus, moth, mosquito
- Phylum : Mollusca : Chiton, Pila, Dentalium, Unio, Octopus
- Phylum : Echinodermata :Antodon, holothuria, seastar, Brittle star
- Phylum : Hemichordata : Balonaglossus

CO-2: Study of permanent slides

L.S. of Sycon, nematocyst, Ascaris egg, T.S Ascaris through Testis and ovaries, T.S. Leech through Crop, Compound eye of Insect, Radula of Pila, Gill lamella, Osphradium of Pila, Scolex and gravid proglottid of Taenia

CO-3: Anatomical Study through computer aided techniques, Video clipping, models, photographs and other available resources

- Leech/Earthworm: Alimentary canal, reproductive system, Nervous system,
- Grasshopper/ Cockroach; Digestive system, Nervous system, Reproductive system,
- Culture of Hydra and Volvox (to be given to all students)

CO-4: Mounting

- Mosquito (culex and Anopheles) : Wings ,legs, mouthparts
- House fly; Mouth pars, legs, wings
- Paramecium and volvox

Course Outcomes (COs)**ZOOLOGY : B.Sc.-I SEM-II****Life and diversity of Animals (Chordata) and concept of Evolution**

Upon completion of this course successfully, students would be able to

- CO-1: Know what the chordates are.
- CO-2: Learn about the different phylum of chordates.
- CO-3: Confidently explain the general characters and classification of Protochordates upto class Mammalia.
- CO-4: Understand the level of organization in chordate.
- CO-5: Explain the origin and evolutionary relationship in different subphylums of chordates.
- CO-6: Describe specific features of Protochordates upto class Mammalia.
- CO-7: Recognize and differentiate life functions of Protochordates upto class Mammalia.
- CO-8: Understand Migration in fishes and birds , parental care in Amphibians and Poisonous and non-poisonous snakes.
- CO-9: Explain the adaptations in Birds and Mammals.

Practical :

Upon completion of this course successfully, students would be able to perform/demonstrate:

- CO-1: Study on edible fishes from the local region.
- CO-2: Case study of diversity in frogs from surrounding areas.
- CO-3: Survey of Photographic evidence of parental care in frogs in monsoon.
- CO-4: Survey the diversity of snakes in the surrounding area.
- CO-5: Survey of Migratory birds in the forest /Grassland/Field.
- CO-6: Case Study of migratory wetland birds from local reservoirs.
- CO-7: Prepare a model on the evolution of man.

Course Outcomes (COs)**ZOOLOGY : B.Sc.-II SEM-III****Life and Diversity of Chordata and Concept of Evolution**

- CO-1: Improving the knowledge about criteria for chordate classification.
- CO-2: Study of salient features of chordates.
- CO-3: Different systems of chordata –understand • Understand the terminology needed in classification.
- CO-4: To classify invertebrates and to be able to understand the possible group of the vertebrate observed in nature.
- CO-5: Knowledge of organic evolution
- CO-6: Understood the theories of evolution and highlighted the role of evidences in support of evolution

Course Outcomes (COs)

ZOOLOGY : B.Sc.-II SEM-IV**Advanced Genetics and Animal Ecology**

- CO-1:** Define the basic terms in genetics.
- CO-2:** Discuss the linkage groups and gene frequency.
- CO-3:** An overview of evolutionary ecology and environmental concepts
- CO-4:** Description of nature of ecosystem, production, food webs, energy flow, biogeochemical
- CO-5:** Cycles, resilience of ecosystem and ecosystem management.
- CO-6:** Understanding the biosphere, biomes and impact of climate on biomes.

Course Outcomes (COs)**ZOOLOGY : B.Sc.-III SEM-V****Animal Physiology and Economic Zoology**

- CO-1:** Define the basic terms in physiology.
- CO-2:** Explain the physiological processes in animals.
- CO-3:** Explain the anatomy of various systems.
- CO-4:** Illustrate the reproductive cycles with hormonal control.
- CO-5:** Diagrammatically represent the working of neuron.
- CO-6:** Understands processes of fisheries, sericulture, apiculture along with crop pest management techniques

Course Outcomes (COs)**ZOOLOGY : B.Sc.-III SEM-VI****Molecular Biology and Biotechnology**

- CO-1:** Explain the concept of mutation.
- CO-2:** Explain DNA structure.
- CO-3:** Paraphrase the Central dogma of molecular biology.
- CO-4:** Illustrate the mechanism of replication, transcription and translation.
- CO-5:** Understand the principles and techniques involved in DNA technology.
- CO-6:** Get an overview of modern techniques like PCR, Hybridoma technology
- CO-7:** Understand the principles and mechanism of immunology
- CO-8:** Distinguish Innate immunity and Acquired Immunity
- CO-9:** Understand the importance of Immune system
- CO-10:** Learn malfunctioning and disorders of immune system.

Programme B .Sc. (PHYSICS)

Programme Outcome

At the time of graduation, Students will be able to

- PO-1: Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- PO-2: Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- PO-3: Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.
- PO-4: Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- PO-5: Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
- PO-6: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
- PO-7: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

The Programme Specific Outcomes (PSOs)

Upon completion of the Programme successfully, students would be able to

- PSO-1: Acquire a comprehensive knowledge and sound understanding of fundamentals of Physics
- PSO-2: Develop laboratory skills, enabling them to take measurement in a physic laboratory and analyze the measurements to draw valid conclusions.
- PSO-3: Be prepared to acquire a range of general skills, to solve problems, to evaluate information, to use computers productively, to communicate with society effectively and learn independently.
- PSO-4: Develop good oral and written scientific communication skill.

Course Outcomes (COs)

PHYSICS: B.Sc. I SEM-I

Mechanics, Properties of matters, Oscillations & Relativity

On successful completion of this course, the students would be able to:

- CO-1: Discuss the basic concepts of rotational dynamics.
- CO-2: Examine the phenomenon of simple harmonic motion and distinction between undamped, damped and force oscillations and the concept of resonance.
- CO-3: Explain the superposition of simple harmonic motion and acquire the knowledge of Ultrasonic waves, their production, detection and applications in different field.
- CO-4: Determine the constants of elasticity and relate it with appropriate things
- CO-5: Interpret the postulates of special theory of relativity.
- CO-6: Know the concept of Global positioning system (GPS)

Basics of Measurement Technique

After completion of this course students will able to:

CO-1: Apply the principles of measurement and error analysis.

CO-2: Develop the skills to handle various instruments with precision.

(Laboratory/Practical/practicum/hands- on/Activity)

On successful completion of this practical course, the students would be able to:

CO-1: List out, identify and handle various equipment likes different types of pendulum.

CO-2: Learn the procedures of operation of various oscillating objects.

CO-3: Acquire skills in observing and measuring different types of errors.

CO-4: Perform procedures and techniques related to experiments based on mechanics.

CO-5: Conduct experiments collaboratively and ethically.

Course Outcomes (COs)

PHYSICS: B.Sc. I SEM-II

Electrostatics, Magneto- statics, Ultrasonic Waves and Acoustics, Network Theorems

After going through the course, the student would be able to

CO-1: Discuss the concept of scalars & vectors and their properties.

CO-2: Develop an understanding of Gauss law and its applications to obtain electric field in different cases.

CO-3: Formulate the relationship between electric displacement vector, electric polarization and dielectric constant.

CO-4: Distinguish between the magnetic effect of electric current, electromagnetic induction and the related laws in appropriate circumstances.

CO-5: Simplify electrical circuits by applying various network theorems.

Introduction to electrical components:

After completion of this course students would be able to

CO-1: Make use of Multimeter for the measurement of electrical parameters and get the knowledge of electronic components and their applications.

CO-2: Estimate the power consumption of domestic appliances and carry out energy audit.

(Laboratory/Practical/practicum/hands- on/Activity)

On successful completion of this practical course, the students would be able to:

CO-1: Simplify various electrical circuits by using network theorems.

CO-2: Learn the procedures of operation of electrical components like capacitor, resistor and inductor.

CO-3: Acquire skills in measuring dielectric constants of different materials.

CO-4: Perform procedures and techniques related to experiments based on electrical and electronic circuits.

CO-5: Conduct experiments collaboratively and ethically.

Course Outcomes (COs)**PHYSICS: B.Sc. II SEM-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.

Unit II: Magnetostatics & Maxwell's Equation

- CO-4:** Know the Faraday's law.
CO-5: To understand Maxwell's equation.
CO-6: To study Poynting theorem.

Unit III: Solid state electronic devices-I

- CO-7:** Know the semiconductors.
CO-8: To understand Hall effect.
CO-9: To study different types of diodes.

Unit IV: Solid state electronic devices- II

- CO-10:** Know the BJT.
CO-11: To understand types & applications of FET.
CO-12: To study IC OP-AMP.

Unit V: Special theory of relativity

- CO-13:** Know the special theory of relativity.
CO-14: To understand length contraction, Time dilation.
CO-15: To study Einstein's mass-energy relation.

Unit VI: Atmosphere Geophysics

- CO-16:** Know the structure of earth.
CO-17: To understand Atmosphere.
CO-18: To study earthquakes.

- CO-19:** To understand concepts in all units through activities and experiments in laboratory.
CO-20: To develop numerical solving technique in students. (Numericals based on syllabus)

Course Outcomes (COs)**PHYSICS: B.Sc. II SEM-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.

Unit II: Diffraction

- CO-4:** Know the types of diffraction.
CO-5: To understand diffraction through plane transmission grating.
CO-6: To study zone plates.

Unit III: Polarization

- CO-7:** Know the Polarization.
CO-8: To understand Brewster's law.
CO-9: To study Nicol's prism.

Unit IV: Laser

- CO-10:** Know the mechanism of Laser.
CO-11: To understand types & applications of laser.
CO-12: To study concept of holography.

Unit V: Fiber optics

- CO-13:** Know the mechanism of Optical fiber. CO-2:
CO-14: To understand types & applications of optical fiber.
CO-15: To study optical communication system.

Unit VI: Renewable energy sources

- CO-16:** Know the types of renewable energy sources.
CO-17: To understand concept of solar energy.
CO-18: To study photovoltaic cell.
CO-19: To understand concepts in all units through activities and experiments in laboratory.
CO-20: To develop numerical solving technique in students. (Numericals based on syllabus)

Course Outcomes (COs)**PHYSICS: B.Sc. III SEM-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.

Unit II: Quantum mechanics-II

- CO-4:** Know the Schrodinger's wave equation.
CO-5: To understand mathematical operator's.
CO-6: To study motion of particle in rectangular box.

Unit III: Atomic & molecular Physics

- CO-7:** Know the different atomic models.
CO-8: To understand quantum numbers.
CO-9: To study Raman effect.

Unit IV: Nuclear Physics

- CO-10:** Know the theory of nucleus.
CO-11: To understand alpha & beta decay.
CO-12: To Study Nuclear reaction & reactor.

Unit V: Hybrid parameters

- CO-13:** Know the h-parameters.
CO-14: To understand concept of amplifier.
CO-15: To study Noise & distortion in amplifier.

Unit VI: Feedback in amplifier

- CO-16:** Know the concept of feedback.
CO-17: To study electronic oscillators.
CO-18: To study multivibrators
CO-19: To understand concepts in all units through activities and experiments in laboratory.
CO-20: To develop numerical solving technique in students. (Numericals based on syllabus)

Course Outcomes (COs)**PHYSICS: B.Sc. III SEM-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.

Unit II: Statistical mechanics-II

- CO-4:** Know the concept of boson & fermions.
CO-5: To understand Bose-Einstein statistics & its applications.
CO-6: To study Fermi-Dirac statistics & its applications.

Unit III: Crystallography

- CO-7:** Know the crystalline & amorphous solids.
CO-8: To understand different crystal structures & X-ray diffraction.
CO-9: To study crystal defects.

Unit IV: Electrical properties of materials

- CO-10:** Know the concept of drift motion.
CO-11: To understand Fermi energy.
CO-12: To study band structure in solids.

Unit V: Magnetic Properties of Materials

- CO-13:** Know the concept of magnetism.
CO-14: To understand types of magnetic materials.
CO-15: To study Hysteresis.

Unit VI: Superconductivity & Nanotechnology

- CO-16:** Know the concept of superconductors.
CO-17: To understand types of superconductors & BCS theory.
CO-18: To study Basic concepts of nanotechnology.
CO-19: To understand concepts in all units through activities and experiments in laboratory.
CO-20: To develop numerical solving technique in students. (Numericals based on syllabus)

Programme B.Sc. (Computer Science)

Programme Outcome:

After completion of graduation, students will be competent to:

- PO1: Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- PO2: Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- PO3: Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.
- PO4: Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- PO5: Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
- PO6: Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
- PO7: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

The Programme Specific Outcomes (PSOs)

At the end of this program, the students would be able to:

- PSO1: Understand the computer hardware and software.
- PSO2: use the knowledge of software installation.
- PSO3: Select modern computing tools and techniques for programming task.
- PSO4: Identify, analyze, formulate and develop computer-based solutions to meet desired needs within realistic constraints.
- PSO5: Develop databases and perform operations on them.
- PSO6: Identify research and development areas in multiple disciplines.
- PSO7: Design and develop the small web applications.

Course Outcomes (COs)

Computer Science: B.Sc. I SEM-I

Fundamentals of Computer and C Programming :

Upon completion of this course successfully, Students would be able to -

- CO-1: Understand the computer, I/O and peripheral devices.
- CO-2: Understand concept of Operating systems.
- CO-3: Apply the Programming concepts.
- CO-4: Learn C language.
- CO-5: Write Simple C Programs.
- CO-6: To draw flowchart, learn Algorithms and write simple programs.
- CO-7: To assess the curricular skills acquired by students at college level through Assignments, Unit test, Internal Test, Group Discussion/Seminar/Mini Project, Study Tour

Laboratory/Practical of Fundamentals of Computer and C Programming

Upon completion of this course successfully, Students would be able to demonstrate /perform/ accomplish the following:

- CO-1:** Write word processing task.
- CO-2:** Create worksheet and perform operations on it.
- CO-3:** Design, compile and debug programs in C language.
- CO-4:** Classify conditional expressions and looping statement to solve problems associated with conditions and repetitions.
- CO-5:** Demonstrate the programs using arithmetic and relational operators.
- CO-6:** Implement the concept of various string handling functions.
- CO-7:** Classify programming components that efficiently solve computing problems in real-world.

Course Outcomes (COs)**Computer Science: B.Sc. I SEM-II****Data Structure and OOPS**

Upon completion of this course successfully, Students would be able to –

- CO-1:** Implement basic data structures such as arrays, stacks.
- CO-2:** use linked list, trees and queues.
- CO-3:** Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.
- CO-4:** Describe the procedural and object-oriented paradigm with concepts of streams, classes, functions, data and objects.
- CO-5:** Perform programming on functions, inline functions, constructor and destructor.
- CO-6:** Perform programming on the concept of function overloading, operator overloading, virtual functions and polymorphism.
- CO-7:** Acquire skill to work with core components of data structure
- CO-8:** Acquire object oriented programming skill.

Laboratory/Practical of Fundamentals of Computer and C Programming

Upon completion of this course successfully, Students would be able to demonstrate /perform/ accomplish the following:

- CO-1:** Perform various operations Data structure using CPP.
- CO-2:** Develop the concept of dynamic memory allocation through linked list.
- CO-3:** Design stack and queue with contiguous and non-contiguous data storage mechanism.
- CO-4:** Perform the various operations on binary tree.
- CO-5:** Implement sorting on 1-D array using different techniques.

Programme B.Sc. (Electronics)**Programme Outcome:**

At the end of the programme, students would be able to

- PO-1:** Utilize the basic knowledge in Electronics science.
- PO-2:** Identify electronic components and ICs.
- PO-3:** Design system components that meet the requirement of public safety and offer solutions to the societal and environmental concerns
- PO-4:** Apply research based knowledge to design and conduct experiments
- PO-5:** Construct choose and apply the techniques, resources and modern electronics tools required for Electronics applications.
- PO-6:** Apply the contextual knowledge to assess societal, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional electronics practice.
- PO-7:** Examine the impact of electronics solutions in global and environmental contexts and utilize the knowledge for sustained development.
- PO-8:** Develop consciousness of professional, ethical and social responsibilities as experts in the field of Electronics and Communication.
- PO-9:** Perform effectively as a member/leader in multidisciplinary teams.
- PO-10:** Demonstrate resourcefulness for contemporary issues and lifelong learning.

The Programme Specific Outcomes (PSOs)

Upon completion of the programme successfully, students would be able to:

- PSO- 1:** Acquire knowledge in fundamental aspects of all branches of Electronics
- PSO- 2:** Create inquisitiveness and problem-solving skills
- PSO- 3:** Apply the principles of Electronics in solutions to real world problems
- PSO- 4:** Get prepared for higher education and career in Electronics
- PSO- 5:** Develop skills in the proper handling of apparatus and components
- PSO- 6:** Apply Electronics in their day to day life
- PSO- 7:** Act as a responsible citizen
- PSO- 8:** Select and apply cutting-edge engineering hardware and software tools to solve complex Electronics and Communication Engineering problems
- PSO- 9:** Apply the fundamental concepts of electronics and communication science to design a variety of components.

Course Outcomes (COs)**Electronics: B.Sc. I SEM-I****Basic Electronics**

Upon completion of this course successfully, Students would be able to:

- CO-1:** Know passive and active components, analysis and verification of network theorems with numericals.
- CO-2:** Select and identify electronic components such as resistors capacitors etc. of required value.
- CO-3:** Understand principle and working of different meters and CRO
- CO-4:** Handle and connect the measuring instruments such as Voltmeter, Ammeter etc. at appropriate place
- CO-5:** Know function of diodes, rectifiers and voltage regulators.
- CO-6:** Design simple dc power supply.
- CO-7:** Know types transistor and their working in different modes, amplification and biasing, faults detection in electronic circuits.
- CO-8:** Design and construct simple amplifiers.
- CO-9:** Know Switching and Optoelectronic devices and their working.
- CO-10:** Use these active devices for many applications.
- CO-11:** Know design and fabrication process of ICs and their scale of integration

Course Outcomes (COs)**Electronics: B.Sc. I SEM-II****Digital Electronics**

Upon completion of this course successfully, Students would be able to –

- CO-1:** Know number systems and binary codes, their interconversion and arithmetic, logic gates, use of logic gates in adders.
- CO-2:** Design and construct logic circuits using logic gates.
- CO-3:** Understand Boolean algebra, De’Morgan’s theorem, logic equations, K-map and logic families like DTL,TTL etc.
- CO-4:** Minimize logic equation, design and construct logic circuits using logic gates.
- CO-5:** Know construction and working of multivibrators and flip-flops.
- CO-6:** Design and construct different types of flip-flops using logic gates.
- CO-7:** Understand the construction and working of different types of counters and shift registers and their IC version.
- CO-8:** Design and construct different types of counters and shift registers using flip-flops and logic gates.
- CO-9:** Know the construction and working of different types of encoders, decoders, multiplexers and demultiplexers and their IC version.
- CO-10:** Design and construct different types of encoders, decoders, multiplexers and demultiplexers using logic gates.
- CO-11:** Know different types of memories and their working.
- CO-12:** Access these memories in serial and parallel mode (to read and write operations).

Programme B.Sc. (MATHEMATICS)

Programme Outcome

At the end of the programme, graduates would be able to:

- PO-1:** Enhance the knowledge of student in all basic sciences.
- PO-2:** Identify, formulate and develop solutions to computational challenges.
- PO-3:** Develop scientific temper and think in a critical manner.
- PO-4:** Build up progressive and successful career in academics, industry and society.
- PO-5:** Develop student's abilities and aptitudes to apply the mathematical ideas.

The Programme Specific Outcomes (PSOs)

Upon completion of the programme successfully, students would be able to:

- PSO-1:** Understand major concepts in all disciplines of Mathematics
- PSO-2:** Formulate and develop Mathematical arguments in a logical manner
- PSO-3:** Gain good knowledge and understanding in advanced Mathematics
- PSO-4:** Create an awareness of the impact of Mathematics on the environment, society and development outside the scientific community.
- PSO-5:** Create sensitivity towards environmental concerns and contribute in the development of nation

Course Outcomes (COs)

MATHEMATICS: B.Sc. I SEM-I

DSC-I / Mathematics Algebra and Trigonometry :

After completing this course, students would be able to

- CO-1:** Find inverse and normal form of matrices .
- CO-2:** evaluate the characteristic equation, eigen value and corresponding eigen vector of a given matrix
- CO-3:** Evaluate relation between the roots and coefficients of equations .
- CO-4:** To study application of De Moivre's theorem .
- CO-5:** Compute summation of trigonometric series.
- CO-6:** To enhance interest among the students about course.
- CO-7:** To develop the learning and writing skills.
- CO-8:** To create mental ability.

DSC-II / Mathematics Differential and Integral Calculus

After completing this course, students would be able to:

- CO-1:** Define limit and study the basic properties.
- CO-2:** Classify continuity and discontinuity of the functions.
- CO-3:** Solve the differentiability and L'Hospital rule with their applications.
- CO-4:** Describe the geometrical applications of mean value theorems.
- CO-5:** Evaluate the reduction formulae for integration.
- CO-6:** To enhance interest among the students about course.
- CO-7:** To develop the learning and writing skills.
- CO-8:** To create mental ability.

Course Outcomes (COs)**MATHEMATICS: B.Sc. I SEM-II****DSC-III / Mathematics Ordinary Differential Equations**

After completing this course, students would be able to

- CO-1:** Solve first order differential equations using different techniques..
- CO-2:** Solve higher order differential equations and orthogonal trajectories.
- CO-3:** Calculate complementary function and particular integral of the second order differential Equation.
- CO-4:** Describe the different methods to solve second order differential equations.
- CO-5:** Illustrate applications of differential equations.
- CO-6:** To enhance interest among the students about course.
- CO-7:** To develop the learning and writing skills.
- CO-8:** To create mental ability.

DSC –IV/ Mathematics Vector Analysis and Geometry

After completing this course, students would be able to

- CO-1:** Interpret the vectors, their products, differentiation and integration.
- CO-2:** Determine curvature and torsion.
- CO-3:** Apply the concepts of divergence, curls which are useful in physics.
- CO-4:** Describe the different forms of sphere and properties.
- CO-5:** Discuss the equations of cone and cylinder.
- CO-6:** To enhance interest among the students about course.
- CO-7:** To develop the learning and writing skills.
- CO-8:** To create mental ability.

GIC/ Mathematics Numerical Ability-I

After completing this course, students would be able to:

- CO-1:** Restate the ideas and concept of HCF & LCM of number and also find square root & cube roots.
- CO-2:** Illustrate the problem on numbers, ages, percentage, profit and loss.
- CO-3:** Analyze ratio and proportion, time, work and distance.
- CO-4:** Outline the problems on train, simple interest, compound interest, area measurement.
- CO-5:** Create the Bar graphs, Pie charts and Line graphs.

Course Outcomes (COs)**MATHEMATICS: B.Sc. II****Number Theory**

Students will able to -

- CO-1:** Find quotients and remainders from integer division
- CO-2:** Apply Euclid's algorithm and backwards substitution
- CO-3:** Understand the definitions of congruences, residue classes and least residues
- CO-4:** Add and subtract integers, modulo n, multiply integers and calculate powers, modulo n
- CO-5:** Determine multiplicative inverses, modulo n and use to solve linear congruences.

Advanced Calculus

Students will able to -

- CO-1:** Gain Knowledge of fundamental concepts of real numbers.
- CO-2:** Verify the value of the limit of a function at a point using the definition of the limit
- CO-3:** Introduction to sequence and series.
- CO-4:** Learn to check function is continuous understand the consequences of the intermediate value theorem for continuous functions.
- CO-5:** Understand Maxima and Minima of two variables
- CO-6:** Solve Double and Triple Integral.

Modern Algebra (Groups, Rings)

Students will able to -

- CO-1:** Define Group, subgroup, center, Normalizer of a subgroup.
- CO-2:** Find cycles and transpositions of a given permutations.
- CO-3:** Prove Lagrange's theorem, Euler's theorem and Fermat's theorem
- CO-4:** Define cyclic groups .
- CO-5:** Prove a group has no proper subgroup if it is cyclic group of prime order.
- CO-6:** Define normal subgroups, quotient groups and index of a subgroup.
- CO-7:** Define homomorphism, kernel of a homomorphism, isomorphism.
- CO-8:** Prove Cayley's theorem, the fundamental theorem of homomorphism for groups.
- CO-9:** Define rings, zero divisors of a ring, integral domain, field and prove theorems.

Classical Mechanics

Students will able to -

- CO-1:** Have a deep understanding of Newton's laws,
- CO-2:** To solve the Newton equations for simple configurations using various methods,
- CO-3:** Understand the foundations of chaotic motion
- CO-4:** Understand the D'Alembert principle
- CO-5:** Understand the Kepler's laws
- CO-6:** Understand the Lagrange's equation of motion.

Course Outcomes (COs)**MATHEMATICS: B.Sc. III****Mathematical Analysis**

Students will able to -

- CO-1:** Deep understanding of Riemann integral.
- CO-2:** Understand Improper integral and their Convergence.
- CO-3:** Apply the comparison and limits test.
- CO-4:** Understand Continuity and differentiability of complex function.
- CO-5:** Understand the analytic function.
- CO-6:** Understand the metric spaces.

Mathematical Methods

Students will able to -

- CO-1:** Find Laplace transform, Inverse Laplace transform , Fourier and inverse Fourier Transform of a function
- CO-2:** Find derivative of a function through laplace transform.
- CO-3:** Apply Laplace transform to solve second order linear differential equation and simultaneous linear differential equations.

Linear Algebra


Students will able to -

- CO-1:** Define Vector Space, subspace, Quotient space Direct sum, linear span and linear independence, basis and inner product.
- CO-2:** Discuss the linear transformations, rank, nullity.
- CO-3:** Find the characteristic equation, eigen values and eigen vectors of a matrix.
- CO-4:** Schwartz inequality, Gramschmidt orthogonalisation process.
- CO-5:** Solve the system of simultaneous linear equations

Special Theory of Relativity

Students will able to -

- CO-1:** Differentiate wrong general public ideas about the theory and what the theory is really about.
- CO-2:** Understand time – spacial relations at the local and global levels.
- CO-3:** Understand the basis of Standard model.
- CO-4:** Understand the gravity as bending of space-time.
- CO-5:** Calculate the angle light bends under the influence of gravity.
- CO-6:** Calculate the increase of wavelength of light leaving Earth.
- CO-7:** Calculate time dilation corrections used in GPS satellites due to special and general relativity.
- CO-8:** Understand the basic characteristics of black holes.
- CO-9:** Understand the basic characteristics of gravitational waves.
- CO-10:** Understand the accelerated expansion of the universe in relation to Einstein's cosmological constant.


IQAC Co-ordinator
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