



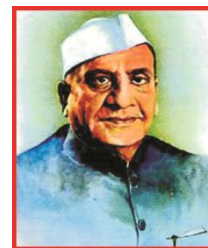
**SHRI SHIVAJI EDUCATION SOCIETY AMRAVATI'S
SCIENCE COLLEGE, PAUNI**

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Program Outcomes, Program Specific Outcomes and Course Outcomes

Overview:

Shri Shivaji Education Society, founded in the year 1932, by Dr. Panjabrao alias Bhausaheb Deshmukh, the great visionary, the educationists and the first Union Agriculture Minister of Independent India. The mission of the society is to bring the students of the poor, middle class and the farmers in the main stream of development by providing them the quality education. From the time of inception, the organization has been serving the purpose of providing education at the affordable costs and hence started opening schools and colleges in different parts of the state, especially in Vidharbha region. At moment, the parent organization is providing education to the students from villages to the urban areas from primary schools to higher education, including the professional institutions like polytechnics, engineering, medical, educational and agricultural training colleges. There are about 290 school, colleges run by the parent organization, and is the second largest education society in the state of Maharashtra.

Pauni is the one of the backward Taluka in Bhandara district and the people are mostly having agriculture and the labour as their main source of income. It is one of the historical place having lots of natural resources available. However, before 1988, there was no facility for the students, within the radius of about 35 km, to get science stream education. Considering the need of Degree College, on demands of the local philanthropists, the parent organization started Degree College in Pauni with the least resources available. Right from the inception of this institution, we are offering a single programme in science stream only i.e. Bachelor of Science. The programme initially had only two courses viz. B.Sc. in Mathematics with combination of Chemistry, Physics, and Mathematics as major subjects, and the other B. Sc. In Biology with combination of Botany, Chemistry and Zoology as three major subjects. Later, in the academic year 2000-2001, considering the applicability and need of computer education, we have added another course in the programme, i.e. B. Sc. In Computer Science having Computer science, Mathematics and Physics as three major subjects. At present, all the three courses are run on grant-in aid basis and have been approved and permanently affiliated to the RTM Nagpur University, Nagpur.

The institution is permanently affiliated to RTM Nagpur University and as per the university act, the affiliated colleges are at the implementation end so far as the curriculum is concerned. The design and development of the curriculum of various subjects comes under the jurisdiction of the affiliating university. The curriculum of various subjects of the three courses, offered by the institution, is designed and developed by Board of Studies constituted in different subjects of the

affiliating university in accordance with the guidelines of University Grant Commission. Our institution has completed 32 years of providing education and hence most of the faculties working in the institution are having ample years of teaching experience, and few of them have been either elected or nominated as the member of Board of Studies in their respective subjects. These members have contributed in the design and development of the curriculum by obtaining and incorporating constructive suggestion from the faculties.

The affiliating institutions, though not authorized to frame the entire curriculum of different subjects, we, in the meeting of IQAC has taken a unanimous decision to decide over the programme and course outcomes. The IQAC coordinator explained different parameters to device the programme and course outcomes. Meanwhile, the IQAC coordinator conducted workshop for all the faculty members regarding various parameters to be considered for deciding over the Programme Outcomes (POs), Programme Specific Outcomes (PSOs) and the Course Outcomes (COs). Accordingly, the faculties of various subjects were asked to prepare the POs, PSOs and COs of their subjects and submit it to the IQAC. The IQAC discussed the received outcomes in detail and prepared the combined draft of the POs, PSOs and COs and then uploaded on the institutional website. Teachers were also asked to make aware the students about POs, PSOs and COs. The students were also guided about the career opportunities available after the completion of the specified programme and the course taught in the institution. The institution set certain Course Outcomes (COs) of the courses and the subject taught and is properly documented with following benefits in mind.

- 1. Teaching will become a far more creative and innovative career,**
- 2. Faculty members will no longer feel the pressure of having to be the ‘source of all knowledge’,**
- 3. Faculty members can be able to shape up the thinking and vision of students towards a course.**

Guidelines used for devising POs, PSOs and Cos:

1. Programme Outcomes (POs) comprise various attributes like understanding, skills, knowledge, and attributes of the students of the three year undergraduate programme in science stream,
2. Programme Outcomes (POs) should describe what students should know and able to do at the end of the programme,
3. Programme outcomes (POs) are required to be specific, measurable and achievable,
4. Course Outcomes (COs) is the resultant knowledge skills the students acquires at the end of the specific course,
5. Programme Specific Outcomes (PSOs) are the statement that describes the career and professional accomplishment in the three years after graduation that the programme is preparing graduates to achieve,

6. The COs must state the major skills, knowledge, attitude or ability that students will acquire,
7. COs should be presented in terms of measurable and/or observable behaviors,
8. COs should be agreed upon by the faculties in the programme and should drive programme outcomes,
9. All the courses in the institution should have uniform number of Course Outcomes (COs),
10. The parameters may be vary from discipline to discipline and level to level.

Objectives of devising POs, PSOs and COs:

1. To help students for the preparation of higher education,
2. To cope up with national and global competency,
3. To develop research aptitude and interest in doing research in their chosen fields and functions,
4. Development of effective communication skills, performance-based leadership quality to perform individually and in a multi-disciplinary team,
5. To make the students aware of the career opportunities after the completion of the course,
6. Continue the process of life-long learning through various academic activities, and to adopt themselves with ease to new technologies,

Attributes considered for POs, PSOs and Cos:

1. **Understanding:** The outcomes should be based on initial capabilities, competence skills, understanding the concept,
2. **Conceptual:** The receiver (Students) must be able to understand the concept by acquiring knowledge
3. **Applicability:** The students must be able to apply the knowledge for solving the problems,
4. **Analysis:** The students must be able to Identify, formulate and analyze the complex problems reaching to the substantial conclusions using various principles of natural science, chemistry, physics and mathematics,
5. **Research aptitude:** Development of the research aptitude based on the knowledge acquired. Need to inculcate the research interests so as to make them able to design the experiments, analysis and interpretation of the data, and synthesis of the information to provide valid conclusions.
6. **Creativity and innovations:** Creativity and innovations needs to be promoted to develop logical reasoning for selection and application of appropriate techniques, resources and use of IT tools,
7. **Responsiveness:** Application of reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the subjects.
8. **Impact of solutions:** Understanding the impact of solutions in societal and environmental context, and demonstrate the knowledge of need for the sustainable development,

9. **Leadership development:** Students must be able to function effectively as an individual, and as a member or leader in diverse teams, and multi-disciplinary settings,
 10. **Ethical values:** Application of ethical principles and commitment towards the professional ethics and responsibilities and norms of the nature,
 11. **Communication skills:** Effective communications on complex academic activities with the society as a large. Should be aimed at development of effective writing skills for reports and design documentation, making effective presentation and clear instructions,
 12. **Managerial skills:** Development of managerial skills to lead the diverse team,
 13. **Capacity building:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.
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DEPARTMENT OF BOTANY

Programme Outcome: B.Sc. Botany

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| Department of Botany | After successful completion of three year degree program in Botany a student is able to: |
| Programme Outcome (POs) | <p>PO-1.: To make students aware about different groups of plant right from the algae to angiosperms and also understand their life cycle, economic and ecological significance.</p> <p>PO-2.: To make the students aware about the structure and importance of viruses and microbes.</p> <p>PO-3.: Understanding of Fungi and concept in plant pathology gives the knowledge of structure of fungi and various diseases of plants and their control measures.</p> <p>PO-4.: Understanding of structural complexity in lower cryptogams, mode of reproductions and economic importance.</p> <p>PO-5.: Understanding of evolutionary aspects in lower plants, by studying various fossils.</p> <p>PO-6.: Students are able to describe the morphological and reproductive characters of flowering plants.</p> <p>PO-7.: Students get knowledge of identification of various plant species based on the characteristics.</p> <p>PO-8.: Students are able to understand different modern tools in identification and classification of plants.</p> <p>PO-9.: Acquire the knowledge of various plants belonging to different families and their economic importance.</p> <p>PO-10.: Acquire the knowledge of structure of cells and different cell organelles and their function. Also the methods of cell division</p> <p>PO-11.: Students aware about the basics of plant breeding and various methods for the improvement of crop variety.</p> |

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| | <p>PO-12.: Students get aware with the different types of tissue system and their functions and also the anatomical peculiarities in different plants. Topics in embryology help to understand the pattern of development.</p> <p>PO-13: Topics in genetics help them to understand the concept of inheritance, chromosomal aberrations and pattern of genetic interactions.</p> <p>PO-14.: Understanding of biochemical processes help students in getting aware of structure and functions of various biomolecules and the faith of metabolism in plants.</p> <p>PO-15.: Physiological aspects can provide understandings of various processes and their importance to plants.</p> <p>PO-16.: Students get aware of types of vegetation, ecological aspects and impact of environmental and other factors on the life of organisms. Also the importance of natural resources.</p> <p>PO-17: Techniques of plant tissue and other culture help them possible for producing and conservation of different plants.</p> <p>PO-18.: Students will be able to handle various apparatus and equipment by knowing their principle and working. They can get practical information on techniques of genetic engineering.</p> <p>PO-19.: Students will be know the causes and control measures of various types of pollutions. They learn various techniques having research importance.</p> <p>PO-20.: Various commercial and economic aspects of plants can be learned by the students by studying the ethnobotanical plants and the plants having commercial, medicinal values.</p> |
| Department of Botany | After successful completion of three year degree program in Botany a student is able to: |
| Programme Specific Outcome (PSOs) | <p>PSO-1.: Students acquire basic and fundamental knowledge of Botany through learning of theory and conducting practical.</p> <p>PSO-2.: Students get basic knowledge of structure and life cycle of plants, modes of reproduction, and economic importance.</p> |

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| | <p>PSO-3.: Understanding of evolutionary significance through study of fossil and living plants and their affinity.</p> <p>PSO-4.: Make aware of the students about laboratory techniques and practices.</p> <p>PSO-5.: Creation of the awareness regarding the biodiversity conservation and sustainable development.</p> <p>PSO-6.: Advance techniques used in plant sciences like tissue culture, sterilization, plant identification and genetic engineering through demonstration and conduct of the practical.</p> <p>PSO-7.: Students can exploit the knowledge for generating self-employment by mushroom cultivation, micro propagation, formulation of various products, etc.</p> |
| Course Outcomes (COs) | B. Sc. Botany (30) |
| B.Sc. I, Semester I | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| BO-101: Viruses, Prokaryote and Algae | <p>CO-1.: Study the structure of microorganisms, mode of reproduction and their economic importance.</p> <p>CO-2.: Study of diversity of microbes and their economic importance.</p> <p>CO-3.: Acquire the knowledge of general characteristics and classification of algae.</p> <p>CO-4.: Know the life history of algal members and their economic importance</p> |
| BO-102: Fungi, Lichen, Plant Pathology and Bryophyta | <p>CO-1.: To gain knowledge of general characteristics and classification of fungi.</p> <p>CO-2.: Acquire knowledge of life cycles in fungal members and their economic importance.</p> <p>CO-3.: Know about the types, mode of reproduction and economic importance of Lichens and life cycle of few fungal member. Gain</p> |

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| | <p>the knowledge of plant pathogens, symptoms, causes and control measures.</p> <p>CO-4.: Get acquainted with classification, general characters, economic importance of Bryophytes.</p> <p>CO-5.: Know about the structure and life cycle of some members of Bryophyta</p> |
| BO-103: Laboratory Course | <p>CO-1.: To identify bacterial forms and staining technique</p> <p>CO-2.: Identification and characterization of cyanobacterial and algal members</p> <p>CO-3.: Identification and characterization of fungal members</p> <p>CO-4.: To know the structure and types of Lichens</p> <p>CO-5.: To identify the causative organism and symptoms by section cutting</p> <p>CO-6.: Structural characterization and identification of Bryophytes</p> <p>CO-7.: To know the types of vegetation, habits and the environmental conditions of the plant locality by organizing excursion tours</p> |

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| BO-202: Palaeobotany and Morphology of Angiosperms | <p>CO-1.: Get information about geological past, and the fossil plants available during that periods.</p> <p>CO-2.: Study of process of fossilization, different types of fossils and their structures.</p> <p>CO-3.: Understand morphological characters of vegetative parts of flowering plants and their modifications for various functions</p> <p>CO-4.: Know the details about reproductive parts and the functions of different floral whorls.</p> <p>CO-5.: Understand the different types of fruits and their origin</p> |
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| B.Sc. I, Semester II | |
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| Course | Outcomes |
| | After completion of the course the students should be able to |
| BO-201: Pteridophytes and Gymnosperms | <p>CO-1.: Know the classification, general characters and economic importance of Pteridophyta.</p> <p>CO-2.: Know the structural affinity between fossil and living Pteridophytes.</p> <p>CO-3.: Understand the concept of heterospory and its relevance with seed habit, modification in life cycles in terms of apospory and apogamy and to able to identify the types of various steles based on the characters.</p> <p>CO-4.: Know the classification, general characters and economic importance of Gymnosperms.</p> <p>CO-5.: Know the morphological, anatomical structures and modes of reproduction in Gymnosperms.</p> <p>CO-6.: Gain of knowledge about morphological, anatomical and reproductive structure of fossil Gymnosperms</p> |
| BO-203: Laboratory Course | <p>CO-1.: Understand morphological and anatomical structures of fossils and living Pteridophytes.</p> <p>CO-2.: Study of morphological, anatomical and reproductive structures of fossil and living Gymnosperms.</p> <p>CO-3.: Study of fossil plants, different vegetative and reproductive parts of angiosperms with their modifications, shape, size, surface and types.</p> <p>CO-4.: On field identification of various plants and their natural habitats by organizing short plant excursion tours to different localities.</p> |
| B.Sc. II, Semester III | |
| Course | Outcomes |

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| | After completion of the course the students should be able to |
| BO-301: Angiosperm Taxonomy | <p>CO-1.: Study the origin and phylogeny of angiosperms and the fossil angiosperms.</p> <p>CO-2.: Understand the technique of herbarium preparation, keys for identification of plants and method of nomenclature.</p> <p>CO-3.: Study of various classification system and the modern techniques used in taxonomy</p> <p>CO-4.: Study of various families belonging to dicot and monocots along with their economic importance</p> |
| BO-302: Cell Biology, Plant breeding and Evolution | <p>CO-1.: Understand the cellular details and the structure and functions of different cell organelles in plant cells organelles and theirs functions.</p> <p>CO-2.: Study of types and morphology of chromosomes, functions of different parts of chromosomes and the structure of sex chromosomes.</p> <p>CO-3.: Understand the mechanism of cell division in plants and their significance</p> <p>CO-4.: Understand the basic objectives and scopes of plant breeding, different methods of plant breeding and the techniques to improve the plant architecture.</p> <p>CO-5.: Understand the basic concepts of biostatistics and its applications in analysis of data</p> <p>CO-6. Get knowledge of evolution about origin of life on the earth.</p> |
| BO-303: Laboratory Course | <p>CO-1.: Study of morphological and reproductive characters of the representative members of dicot and monocot families</p> <p>CO-2.: Study of morphological and anatomical characters of different fossil specimens</p> <p>CO-3.: Study of structure of various cell organelles</p> <p>CO-4.: Learn the technique of squash and smear preparation and identification of different phases of mitosis and meiosis</p> |

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| | CO-5.: Solving problems bases on biostatistics from the given data |
| B.Sc. II, Semester IV | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| BO-401: Anatomy and Embryology of Angiosperms | <p>CO-1.: Study of basic body plan and modular type of growth</p> <p>CO-2.: Study of types of classification of meristems, different types of tissue system and their functions.</p> <p>CO-3.: Study of different theories explaining root and stem meristems and know the anatomical peculiarities in dicot and monocot root and stems.</p> <p>CO-4.: Study of normal and anomalous pattern of growth in different stems.</p> <p>CO-5.: Know the anatomical structure of dicot and monocot leaves as well as the phenomenon of senescence and abscission in leaves.</p> <p>CO-6.: Understand the types and significance of pollination</p> <p>CO-7.: Study the internal structure of anthers and the mechanism of micro and megesporogenesis in plants.</p> <p>CO-8.: Understand the mechanism of double fertilization and triple fusion, and embryological aspects including types of ovules, endosperms and embryo.</p> |
| BO-402: Genetics and Molecular Biology | <p>CO-1.: Study the concept of Mendelism and pattern of inheritance by studying laws of inheritance</p> <p>CO-2.: Study of modification in Mendelian ratios with suitable examples.</p> <p>CO-3.: Know the theories and types of linkage and its significance.</p> <p>CO-4.: Understand the concept and significance of crossing along with theories.</p> <p>CO-5.: Know the causes and significance of variation in chromosome number.</p> |

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| | <p>CO-6. Study the molecular structure of DNA as genetic material and its method of replication.</p> <p>CO-7.: Understand the classical concept of gene and its parts</p> <p>CO-8.: Study different types of mutations, mutagenic agents and role of induced mutations in crop improvements.</p> <p>CO-9.: Understand the mechanism of DNA damage and repair.</p> <p>CO-10.: Study of characteristics of genetic code, concept of satellite and repetitive DNA.</p> <p>CO-11.: Study the structural details of t-RNA.</p> <p>CO-12.: Study of mechanism of gene expression and regulation in prokaryotes and eukaryotes</p> |
| BO-403: Laboratory Course | <p>CO-1.: Study of different types of tissue system and types of vascular bundles in plants</p> <p>CO-2.: Technique of section cutting and identification of plant material based on anatomical characters</p> <p>CO-3.: Study the abnormal pattern of secondary growth in stems</p> <p>CO-4.: Study of different types of ovules, internal structure of anther and types of adaptations for pollination</p> <p>CO-5.: Learn the technique of pollen germination in plants</p> <p>CO-6.: Practical learning of Mendel's laws of inheritance</p> <p>CO-7.: Identify the type of gene interaction and solve the problems based on given data</p> |
| B.Sc. III, Semester V | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| BO-501:Biochemistry and Plant Physiology-I | <p>CO-1.: Study the properties, structure and functions of various biomolecules in plants.</p> |

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| | <p>CO-2.: Basic information about the nomenclature, characteristics and properties of enzymes, factors affecting the enzyme activity, regulation of enzyme activities and mechanism of action of enzyme</p> <p>CO-3.: Study the water-relation in plants, various processes and their significance in plants.</p> <p>CO-4.: Learn different theories and hypothesis regarding water and mineral absorption from soil.</p> <p>CO-5.: Know the role and deficiency symptoms of various nutrients and theories of absorption</p> <p>CO-6.: Understand the mechanism and significance of major biosynthetic pathways such as photosynthesis and respiration</p> <p>CO-7.: Understand the mechanism of biological fixation of nitrogen</p> |
| <p>BO-502:Plant Ecology-I</p> | <p>CO-1.: Learn the basic concepts of ecology and its significance</p> <p>CO-2.: Understand various environmental factors and their impact on vegetation.</p> <p>CO-3.: Know the origin, structure and physical and chemical properties of soil.</p> <p>CO-4.: Understand the nature of interaction between various biotic and abiotic factors as well as biogeochemical cycles</p> <p>CO-5.: Understand the structure of ecosystem and its components, characteristics and importance.</p> <p>CO-6.: Study the basic aspects of autecology and synecology and different analytical and qualitative parameters.</p> <p>CO-7.: Get knowledge about phytogeographic regions of India and their vegetation types, principles and theories of phytogeography.</p> <p>CO-8.: Understand the climatic regions of India and the impact of climate on vegetation types. Also to know the nature and occurrence of various species throughout the world</p> |
| <p>BO-503: Laboratory Course</p> | <p>CO-1.: Study of effects of various chemicals on plant membrane</p> <p>CO-2.: Know and confirm the path of water in plants</p> |

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| | <p>CO-3.: Technique of extraction and separation of chlorophyll pigment by paper chromatography method</p> <p>CO-4.: Determination of rate of respiration and effects of various factors on photosynthetic process</p> <p>CO-5.: Identify various molecules in plant material by performing micro chemical tests</p> <p>CO-6.: Study of activities of various enzymes in plant material</p> <p>CO-7.: Know various parameters by using quadrat method</p> <p>CO-8.: Learn technique to know the water holding as well as water rising capacity and soil moisture content of various soil samples</p> <p>CO-9.: Preparation of practical record and study of various ecological parameters and vegetation types of different localities by organizing excursion tours</p> |
| B.Sc. III, Semester VI | |
| Course | Outcomes |
| BO-601: Plant Physiology-II and Biotechnology | <p>After completion of the course the students should be able to</p> <p>CO-1.: Understand the concept of growth and growth curve, role of various phytochromes.</p> <p>CO-2.: Understand the concept of Circadian rhythms and biological clock.</p> <p>CO-3.: Knowledge of structure and role of various growth regulators</p> <p>CO-4.: Understand different types of plant movements.</p> <p>CO-5.: Know the mechanism of flowering, effect of light on flowering, technique of vernalization and role florigen hormone.</p> <p>CO-6.: Understand the mechanism and causes of senescence and abscission.</p> <p>CO-7.: Causes and role of seed dormancy, and learn various methods of breaking seed dormancy.</p> <p>CO-8.: Understand the mechanism of plant defence and role of different secondary metabolites in plants</p> |

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| | <p>CO-9.: Study basic aspects of plant tissue culture, know methods of sterilization and application of tissue culture.</p> <p>CO-10.: Learn method of preparation of various culture media, and technique of various culture</p> <p>CO-11.: Know basic aspects of genetic engineering</p> <p>CO-12.: Study of construction of cDNA and genomic library, technique of <i>Agrobacterium</i> mediated gene transfer</p> <p>CO-13.: Aware of advantages and disadvantages of transgenic plants</p> |
| <p>BO-602: Plant Ecology, Techniques and Utilization of plants</p> | <p>CO-1.: Understand the process of plant succession, like Hydrosere and Xerosere.</p> <p>CO-2.: Study the morphological and anatomical adaptive characters of various ecological categories of plants such as hydrophytes, xerophytes and halophytes.</p> <p>CO-3.: Understand the causes of environmental pollution and its control measures.</p> <p>CO-4.: Know the types of natural resources and factors responsible for their depletion.</p> <p>CO-5.: Understand the measure to be taken for conservation of forest and water resources.</p> <p>CO-6.: Know the principles, applications and technique of microscopy, centrifugation, electrophoresis, spectroscopy and chromatography.</p> <p>CO-7.: Study of morphological characters, chemical constituents and the utilization of food plants, oil plants, fibre yielding plants and plants used in medicine and beverages and for the production of rubber, spices, beverages and medicinal plants.</p> <p>CO-8. Understand the basic aspects of ethnobotany, its branches and importance.</p> |
| <p>BO-603: Laboratory Course</p> | <p>CO-1.: Understand the technique for testing seed viability</p> <p>CO-2.: Know the principle and working of different instruments</p> |

CO-3.: Know the structure of various vectors used in recombinant DNA technology

CO-4.: Know the role and effects of various plant growth regulators

CO-5.: Know the steps involved in genetic engineering

CO-6.: Study of morphological and anatomical adaptive characters of plants belonging to various ecological categories

CO-7.: Study of morphological characters of various modified parts of the plants

DEPARTMENT OF CHEMISTRY

Programme Outcome: B.Sc. Chemistry

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| Department of Chemistry | After successful completion of three year degree program in Chemistry a student should be able to: |
| Programme Outcomes (POs) | <p>PO-1.: Develop scientific temperament amongst the students and outside the scientific community.</p> <p>PO-2.: Understand, demonstrate and solve the basic concepts of all disciplines of Chemistry.</p> <p>PO-3.: Think methodologically, independently and come-out to a logical conclusion.</p> <p>PO-4.: Use modern techniques, decent equipment and Chemistry software.</p> <p>PO-5.: Create overall impact of chemistry subject on the environment and the society.</p> <p>PO-6.: To know the effects of hazardous chemicals on environment and the living beings.</p> <p>PO-7.: Develop employment skills through the knowledge of chemistry.</p> <p>PO-8.: Development of employment building ability</p> |
| Programme Specific Outcomes (PSOs) | <p>PSO-1.: Know basic idea of chemistry through theory and practical.</p> <p>PSO-2.: Handle some common laboratory apparatus/equipment properly.</p> <p>PSO-3.: Explain stereochemistry, structure, reactivity, nomenclature and mechanism of the chemical reaction.</p> <p>PSO-4.: Identify the spontaneity (Feasibility) of various chemical reactions.</p> <p>PSO-5.: Develop research oriented skills.</p> <p>PSO-6.: Use properly some common chemicals in daily life.</p> <p>PSO-7.: Application of knowledge in the day to day life</p> <p>PSO-8.: Inculcation of research aptitude in the minds of students</p> |
| Course Outcomes (COs) | B. Sc. Chemistry (28) |

| B.Sc. I, Semester I | |
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| Course | Outcomes |
| | After completion of the course the students should be able to |
| CH-101: Inorganic Chemistry | <p>CO-1.: Know about the basic terms and laws involve in Quantum Mechanics</p> <p>CO-2.: Know about the bonds and energy terms involved during the compound formation</p> <p>CO-3.: Effect of different bonding on different physical properties of the material and more about Noble gases</p> <p>CO-4.: Know about the structure and different properties of p-block elements</p> |
| CH-102: Physical Chemistry | <p>CO-1.: Explain scientifically the properties of solid, liquid and gaseous states of matter.</p> <p>CO-2.: Write the equation explaining the state of matter.</p> <p>CO-3.: Differentiate between different types of crystals and techniques of their internal structure determination.</p> <p>CO-4.: Correlate the different properties of liquid used in day to day life.</p> <p>CO-5.: Use adsorbent for purification purposes.</p> <p>CO-6.: Know the use of catalyst to accelerate the rate of chemical reaction.</p> |
| CH-103: Laboratory Course | <p>CO-1.: Understand the binary inorganic mixture, acidic and basic radicals.</p> <p>CO-2.: Know the group reagent and classification of radicals.</p> <p>CO-3.: Understand why different liquids move with different velocity.</p> <p>CO-4.: Use different apparatus for determination of some common laboratory parameters like Viscosity, Surface Tension, Refractive index etc.</p> <p>CO-5.: Prepare liquid mixtures of different compositions.</p> <p>CO-6.: Construct crystal models and understand the surface phenomenon adsorption.</p> |
| B.Sc. I, Semester II | |
| Course | Outcomes |

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| | After successful completion these courses in students should be able to: |
| CH-201: Organic Chemistry | <p>CO-1.: Know meaning of hybridization, bond angles and bond energies.</p> <p>CO-2.: Understand the mechanism of organic reactions.</p> <p>CO-3.: Know the concept of isomerism and its types.</p> <p>CO-4.: Know the nomenclature, preparation and chemical properties alkanes, cycloalkanes, alkenes and dynes.</p> <p>CO-5.: Understand the concept of aliphatic and aromatic hydrocarbons and their reactions.</p> <p>CO-6.: Know the concept of aromaticity.</p> |
| CH-202: Physical Chemistry | <p>CO-1.: Know the different terms involved in thermodynamics and energy changes involved in a chemical reaction.</p> <p>CO-2.: Solve the numerical problems based on thermodynamics and chemical kinetics.</p> <p>CO-3.: Have an idea about phase, component and degree of freedom; and separation process based on phase rule.</p> <p>CO-4.: Understand the conduction of electric current in solutions.</p> <p>CO-5.: Have an idea about rate, order, molecularity, activation energy and mechanism of chemical reaction.</p> |
| CH-203: Laboratory Course | <p>CO-1.: Detect extra elements, functional groups and M.P./B.P. in organic compounds.</p> <p>CO-2.: Prepare some common organic compounds.</p> <p>CO-3.: Determine energy involved in some common reactions like heat of ionization and heat of solution.</p> <p>CO-4.: Understand the effect of temperature on solubility of compounds.</p> <p>CO-5.: Construct the phase diagram and can explain separation of phases.</p> <p>CO-6.: Use instruments for determination of strength of a solution.</p> <p>CO-7.: Experimentally determine the rate of common chemical reactions.</p> |
| B.Sc. II, Semester III | |
| Course | Outcomes |
| | After successful completion these courses in students should be able to: |

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| CH-301: Inorganic Chemistry | <p>CO-1.: Know about detail concept involved in VSEPR and Molecular orbitals theory</p> <p>CO-2.: Know about Chemistry of elements of first, second and third transition series</p> |
| CH-302: Organic Chemistry | <p>CO-1.: Know the directing influence of –OH and NO₂ group on benzene nucleus</p> <p>CO-2.: Know the classification and distinction between primary secondary and tertiary alcohol</p> <p>CO-3.: To know structure and bonding in carbonyl group</p> <p>CO-4.: Acidity of COOH group and effect of electron donating and withdrawing group</p> |
| CH-303: Laboratory Course | <p>CO-1.: Understand the redox titration and determine the specific contents in the commercially available product like vinegar etc.</p> <p>CO-2.: Know the role of alkali in human physiology.</p> <p>CO-3.: Understand the meaning of complexometric titration and hardness of Water so that able to know which kind of water should be used for drinking.</p> <p>CO-4.: Know some important steps involved for complete analysis of an organic compound.</p> |
| B.Sc. II, Semester IV | |
| Course | Outcomes |
| | After successful completion these courses in students should be able to: |
| CH-401: Inorganic Chemistry | <p>CO-1.: Know difference between double salts and coordination compound</p> <p>CO-2.: Know structural and stereoisomerism in 4 and 6 coordination complexes</p> <p>CO-3.: Know definition of organometallic compound and their synthetic application in nanoparticles, polymers and various organic reactions</p> <p>CO-4.: Know structure and function of in biological system</p> |
| CH-402: Physical Chemistry | <p>CO-1.: Know the work-energy relationship and spontaneity of a process.</p> <p>CO-2.: Know the redox reactions involved in cell reaction.</p> <p>CO-3.: Solve the numerical and calculate e.m.f. of a cell.</p> |

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| | <p>CO-4.: Understand the mass-energy relationship involved in nuclear reactions</p> <p>CO-5.: Differentiate between polar and nonpolar molecules</p> <p>CO-6.: Have an idea about the transitions which can occur on interaction of radiation with matter.</p> |
| CH-403: Laboratory Course | <p>CO-1.: Perform gravimetric estimation.</p> <p>CO-2.: Know a new technique of separation paper chromatography.</p> <p>CO-3.: Determine strength of mixture of acid with the help of instruments like conductometer and potentiometer.</p> <p>CO-4.: Determine experimentally some physical parameters like solubility, solubility product, dissociation constant heat of solution and lattice energy.</p> <p>CO-5.: Understand the miscibility of a solute in two different solvents and its molecular state after mechanical mixing.</p> |
| B.Sc. III, Semester V | |
| Course | Outcomes |
| | After successful completion these courses in students should be able to: |
| CH-501: Organic Chemistry | <p>CO-1.: Know about various reaction involve in Amines and their basicity</p> <p>CO-2.: Know structures, Electrophilic and Nucleophilic substitution reactions in various heterocyclic</p> <p>CO-3.: Quantitative estimation of carbon, hydrogen, nitrogen, sulphur an Halogens and synthetic application of Organomagnesium</p> <p>CO-4.: Understand about the spectroscopy</p> |
| CH-502: Physical Chemistry | <p>CO-1.: Understand the difference between classical and quantum chemistry.</p> <p>CO-2.: Know the concept of wave function and formation of molecular orbitals.</p> <p>CO-3.: Use different methods of expressing concentration like normality, molarity, molality, mole fraction etc.</p> <p>CO-4.: Differentiate diamagnetic, paramagnetic and ferromagnetic substances.</p> |

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| | CO-5.: Have an idea about photochemical reactions, quantum yield and Raman spectroscopy. |
| CH-503: Laboratory Course | <p>CO-1.: Estimate some common functional groups like aldehydes, ketones, amide, nitro, carboxylic etc. in an organic compound.</p> <p>CO-2.: Understand the soap formation reaction.</p> <p>CO-3.: Understand and determine refractive index.</p> <p>CO-4.: Understand the meaning of optically active compound and determine its specific rotation.</p> <p>CO-5.: Determine molecular weight of polymer and parachor value of different element present in an organic compound.</p> <p>CO-6.: Know the role of activation energy and catalyst in a chemical reaction.</p> |
| B.Sc. III, Semester VI | |
| Course | Outcomes |
| | After successful completion these courses in students should be able to: |
| CH-601: Inorganic Chemistry | <p>CO-1.: Know about Crystal field theory and the stability of complexes</p> <p>CO-2.: Know about Magnetic Properties of Transition Metal Complexes</p> <p>CO-3.: Know about analysis technique like Colorimeter and Spectrophotometer and different Separation Techniques</p> <p>CO-4.: Know about Silicones, Phosphonitrilic halide polymers</p> |
| CH-602: Organic Chemistry | <p>CO-1.: Know principal and applications in the structure elucidation</p> <p>CO-2.: Know active methylene compounds and there synthetic application</p> <p>CO-3.: Definition of Amino Acids, Peptides, Proteins & Nucleic Acids</p> <p>CO-4.: Know the basic about Dyes, drugs and synthetic polymers</p> |
| CH-603: Laboratory Course | <p>CO-1.: Prepare some common inorganic complexes and explains their characteristic properties.</p> <p>CO-2.: Perform colorimetric estimation.</p> <p>CO-3.: Separate binary mixtures of organic compounds.</p> <p>CO-4.: Identify organic compound using suitable steps and prepare their derivatives.</p> |

DEPARTMENT OF COMPUTER SCIENCE

Programme Outcomes: B.Sc. Computer Science

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| Department of Computer Science | After successful completion of three year degree program in Chemistry a student should be able to: |
| Programme Outcomes (POs) | <p>PO-1.: Serve as the System Administrators with thorough knowledge of DBMS.</p> <p>PO-2.: Serve as the IT Officers in Banks and cooperative societies.</p> <p>PO-3.: Work as DTP Operator in small-scale industries.</p> <p>PO-4.: Serve as the Web Designers with latest web development technologies.</p> <p>PO-5.: Serve as the Computer Engineers with enhanced knowledge of computers and its building blocks.</p> <p>PO-6.: Improve their computer literacy, basic understanding of operative systems and a working knowledge of software commonly used in academic and professional environments.</p> <p>PO-7.: Use the Systems Analysis Design paradigm to critically analyse a problem.</p> |
| Programme Specific Outcomes (PSOs) | <p>PSO-1.: Apply fundamental principles and methods of Computer Science to a wide range of applications.</p> <p>PSO-2.: Prepare for continued professional development.</p> <p>PSO-3.: Design, correctly implement and document solutions to significant computational problems.</p> |
| Course Outcome (COs) | B.Sc. Computer Science (37) |
| B. Sc. I, Semester I | |
| Course | Outcomes |
| | After completion of the course the students should be able to |

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| CS-101: Programming in C | CO-1.: Explain about the basic concepts of program development statements and its syntax. CO-2.: Explain various types of arrays and its structure. CO-3.: Discuss about the various types of Functions and string handling mechanisms. CO-4.: Explain the Concepts of structures and Unions. |
| CS-102: Fundamentals of Information Technology | CO-1.: Describe all fundamental details in computer system. CO-2.: Explain details in network system. CO-3.: Explain Hardware details in computer system. |
| CS-103: Laboratory Course | CO-1.: Program to reverse the digit CO-2.: Program to reverse the array CO-3.: Program to Compute Fibonacci series CO-4.: Program to accept number and display it in words CO-5.: Program to find if a given number is prime or not. |
| B.Sc. I, Semester II | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| CS-201: Object Orientated programming using C++ | CO-1.: Explain the top-down and bottom-up programming approach. CO-2.: Learn the concept of inheritance and apply real world problems. CO-3.: Learn to design of handling large data set using File I/O. CO-4.: Know Exception Handling. CO-5.: Study differentiation between Destructor in Derived Classes. |
| CS-202: System Analysis and Design | CO-1.: Learning of testing in software. CO-2.: Know how to design concept in software development. CO-3.: Learn fundamental concept in SDLC |

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| | <p>CO-4.: Know different system analysis types.</p> <p>CO-5.: Understand Software Reliability and Quality Management.</p> <p>CO-6.: Understand characteristics of Software Maintenance.</p> |
| CS-203: Laboratory Course | <p>CO-1.: Learn the usage of Constructor and Destructor</p> <p>CO-2.: Understand the use of operators overloading</p> <p>CO-3.: Determine the Program whether the input is +ve or –ve</p> <p>CO-4.: Know usage of normal virtual function</p> |
| B. Sc. II, Semester III | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| CS-301: Data Structures | <p>CO-1.: Understand merits and demits in data structure.</p> <p>CO-2.: Learn concept of algorithm related in DS.</p> <p>CO-3.: Understand stack queue and linked list.</p> <p>CO-4.: Understand BSF, DFS Method.</p> <p>CO-5.: Learn Hashing Technique</p> <p>CO-6.: Know Sort in details.</p> |
| CS-302: Operating Systems | <p>CO-1.: Understand the basic components of an operating system</p> <p>CO-2.: Learn the concepts of processes and threads</p> <p>CO-3.: Understand mutual exclusion principles</p> <p>CO-4.: Know the details of major operating system concepts</p> |
| CS-303: Laboratory Course | <p>CO-1.: Construction of program to insert a node at the beginning.</p> <p>CO-2.: Evaluation of postfix expression.</p> <p>CO-3.: Preparation of program to sort an array using Selection sort.</p> |

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| | <p>CO-4.: Preparation of program to traverse post order of a binary tree.</p> <p>CO-5.: Understand program to traverse in order of a binary tree.</p> <p>CO-6.: Preparation of program to search a value in the given linked list.</p> |
| B. Sc. II, Semester IV | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| CS-404: Java Programming | <p>CO-1.: Understand the basics Java language syntax.</p> <p>CO-2.: Explain semantics of Java programs.</p> <p>CO-3.: Learn the concepts of variables, conditional and iterative execution methods etc.</p> <p>CO-4.: Understand the programming concepts for applet and graphics.</p> |
| CS-402: Linux Operating System | <p>CO-1.: Know the basic components of an operating system.</p> <p>CO-2.: Learn the concepts of processes, threads</p> <p>CO-3.: Know multi-tasking and outline standard scheduling algorithms.</p> <p>CO-4.: Understand the details of major operating system concepts</p> |
| CS-403: Laboratory Course | <p>CO-1.: Learn program for declaration of class.</p> <p>CO-2.: Learn program to implement graphic class.</p> <p>CO-3.: Learn a program to demonstrate the Animation in Java.</p> <p>CO-4.: Learn to write an applet that display a choice menu of three buttons</p> <p>CO-5.: Programme writing to create a multiple selection list.</p> |

| B. Sc. III, Semester V | |
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| Course | Outcomes |
| | After completion of the course the students should be able to |
| CS-501: Visual Basic Programming | CO-1.: Understand program building block control statements CO-2.: Know the functionality and properties of GUI based ActiveX Control. CO-3.: Understand graphics handling related control and properties CO-4.: Understand Handling Errors. CO-5.: Know General Methods for Passing Arguments to a Procedure. |
| CS-502: Database Management System | CO-1.: Understand the fundamentals of File processing and database processing system. CO-2.: Know various data model and its application CO-3.: Understand various normal forms and its role in DBMS. CO-4.: Learn the fundamental concepts of SQL programs |
| CS-503: Laboratory Course | CO-1.: Learn to design a form for speed control program using scrollbars CO-2.: Learn to create a database pay.mdb using Visual Database Manager with fields code number CO-3.: Learn to create table pay.mdb using Visual Data Manager. CO-4.: Learn to calculate class wise passing percentage CO-5.: Learn to develop a menu driven application |
| B. Sc. III, Semester VI | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| CS-601: Compiler Construction | CO-1.: Understand different lexical analysis. CO-2.: Learn the concept of compiler. CO-3.: Learn partial construction in details. CO-4.: Understand Code Optimization. CO-5.: Learn about Derivations and parse trees. |

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| CS-602: SQL and PL/SQL | <p>CO-1.: Know PL/SQL language.</p> <p>CO-2.: Understand SQL Language</p> <p>CO-3.: Learn ORACLE 10i.</p> <p>CO-4.: Understand trigger concept in SQL.</p> <p>CO-5.: Know type of Triggers</p> <p>CO-6.: Understand the list problems in functions</p> <p>CO-7.: Learn about Disabling and Dropping Triggers.</p> |
| CS-603: Laboratory Course | <p>CO-1.: Learn modification of table structure by adding the new field price.</p> <p>CO-2.: Understand DCL and TCL statements.</p> <p>CO-3.: Know writing a PL/SQL block.</p> <p>CO-4.: Learn creating Trigger.</p> <p>CO-5.: Learn creating Function.</p> <p>CO-6.: Learn creating Procedure</p> <p>CO-1.: Understand a Cursor to fetch all rows of table invoice</p> |

DEPARTMENT OF MATHEMATICS

Programme Outcome: B.Sc. Mathematics

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| Department of Mathematics | After successful completion of three year degree program in Chemistry a student should be able to: |
| Programme Outcomes (POs) | <p>PO-1.: To develop the skill to think in a critical manner.</p> <p>PO-2.: Formulate & develop mathematical argument in a logic manner.</p> <p>PO-3.: To understand, formulate & use quantitative models arising in social sciences, business & other context.</p> <p>PO-4.: To understand current research & development in the subject.</p> <p>PO-5.: Develop proficiency in the analysis of complex physical problem & the use of mathematical techniques to solve them.</p> <p>PO-6.: Provide a synthetic understanding of the concept & theories of Mathematics and their applications in the real world to an advanced level and enhanced career prospects at large.</p> <p>PO-7.: Use the language of mathematics in the physical world confidently to deal with problems.</p> <p>PO-8.: Central role of mathematics vectors & add vectors.</p> <p>PO-9.: Solve linear equations & inequalities</p> <p>PO-10.: Students should be able to recall basic facts about mathematics and should be able to display knowledge of conventions such as notations, terminology & recognize basic geometrical figures and graphical displays, state important facts resulting from their studies.</p> <p>PO-11.: Mathematics in the physical world confidently to deal with problems.</p> <p>PO-12.: Central role of mathematics in the study and understanding science and technology</p> |

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| Programme Specific Outcomes (PSOs) | <p>PSO-1.: To understand various concepts of mechanics.</p> <p>PSO-2.: To study classical mechanics terms in mathematical way.</p> <p>PSO-3.: Understand integral calculus and special functions of various engineering problem and to know the application of some basic mathematical methods via all these special functions.</p> <p>PSO-4.: In biology & economics, D.E.'s are used to model the behaviour of complex systems.</p> <p>PSO-5.: Use the properties of real numbers to simplify and evaluate expressions.</p> <p>PSO-6.: Solve systems of linear equations by graphing, substitution, and addition.</p> <p>PSO-7.: Use trigonometry to find the components of vectors and add vectors.</p> |
| Course Outcome (COs) | <p align="center">B.Sc. Mathematics (26)</p> |
| <p align="center">B. Sc. I, Semester I</p> | |
| <p align="center">Course</p> | <p align="center">Outcomes</p> |
| | <p>After completion of the course the students should be able to</p> |
| <p>MT-101: Algebra and Trigonometry</p> | <p>CO-1.: Understanding matrix & its elementary operations.</p> <p>CO-2.: Understanding D’Moivre’s theorem and its applications in solving tedious problems in geometry.</p> <p>CO-3.: Solve various problems on properties of integers and use the basic concepts of divisibility, congruence & their applications in basic algebra.</p> <p>CO-4.: Solve system of homogeneous and non-homogenous linear of m equations in n variables by using concept of rank of matrix, finding Eigen values & Eigen vectors</p> <p>CO-5.: Solve the problems of lines in three dimension, planes, spheres and cylinders and how geometry is related to algebra by using their algebraic equations.</p> |

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| MT-102: Calculus | <p>CO-1.: Understanding concept of integration & differentiations of function with real variables.</p> <p>CO-2.: Studying science of physical changes</p> <p>CO-3.: Understanding definite integration & its applications</p> <p>CO-4.: Identification & application of the intermediate value theorem, mean value theorem & L'Hospital's rule.</p> |
| B.Sc. I, Semester II | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| MT-201: Geometry, Differential and Difference Equations | <p>CO-1.: Understanding that how to calculate distance between two points.</p> <p>CO-2.: Mathematical equations of sphere, circle, cone, cylinder.</p> <p>CO-3.: Understanding the concepts & advance topics related to two & three dimensional geometry.</p> <p>CO-4.: Understand first order exact differential equations, first order LDE and Bernoulli's D.E & first order higher degree equations.</p> <p>CO-5.: Understanding Difference Equations & its application.</p> |
| MT-202: Vector Calculus and Improper Integrals | <p>CO-1.: Understanding scalar & vector fields.</p> <p>CO-2.: Rate of change of vector quantity i.e. to know velocity, acceleration.</p> <p>CO-3.: Understand concept of gradient, divergence and curl.</p> <p>CO-4.: Understand integral calculus and special functions of various engineering problem and to know the application of some basic mathematical methods via all these special functions(beta and gamma).</p> <p>CO-5.: Understand purpose and functions of the gamma and beta functions.</p> <p>CO-6.: Understand solenoidal, irrotational, line integral, work done and it is widely used in physics and mechanics.</p> |

| B. Sc. II, Semester III | |
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| Course | Outcomes |
| | After completion of the course the students should be able to |
| MT-301: Advanced Calculus, Sequence and Series | <p>CO-1.: Understand mean value theorem</p> <p>CO-2.: Understand maxima & minima of function, saddle point & Lagrange's multiplier method.</p> <p>CO-3.: Understand sequence, bounded & monotonic sequence, Cauchy sequence, Cauchy convergence criterion.</p> <p>CO-4.: Determine if a geometric series is convergent or divergent.</p> |
| MT-302: Differential Equations and Group Homomorphism | <p>CO-1.: Understand Legendre's equations, their properties, Recurrence relations and generating functions also understand the Bessel's the Orthogonality property of a function</p> <p>CO-2.: Physical problems of many field lead to these type of functions.</p> <p>CO-3.: Know Laplace Transform of some Elementary functions, Laplace transform of derivatives & integrals</p> <p>CO-4.: Understand shifting theorem, convolution theorem.</p> <p>CO-5.: Find out Fourier transform, Fourier Sine and Cosine transform</p> <p>CO-6.: Understand the concept of Normal subgroup, Quotient Group, Cyclic Group, Group Homomorphism and Isomorphism.</p> <p>CO-7.: Understand fundamental theorem of homomorphism.</p> |
| B. Sc. II, Semester IV | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| MT-401: Partial Differential Equations and | <p>CO-1.: Understand how to solve linear Partial Differential with \ different methods.</p> |

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| Calculus of variation | <p>CO-2.: Understand Lagrange’s equation, Charpit’s method and Jacobi’s method.</p> <p>CO-3.: Understand Pfaffian DE and able to solve Pfaffian DE in three variables.</p> <p>CO-4.: Learn the Euler’s DE and its applications.</p> <p>CO-5.: Find out integral surface passing through given curve.</p> |
| MT-402: Mechanics | <p>CO-1.: Study the concepts of coplanar forces, virtual work, catenary and their mathematical expressions.</p> <p>CO-2.: Velocities and accelerations along radial, transverse, tangential and normal directions.</p> <p>CO-3.: Study of simple harmonic motion.</p> <p>CO-4.: Study mechanics of particle and system of particles.</p> <p>CO-5.: Study classical mechanics terms in mathematical way.</p> <p>CO-6.: Concepts of central orbits, constraints, virial theorem in mathematical form.</p> <p>CO-7.: Conservation theorem of linear momentum, angular momentum, Energy etc.</p> |
| B. Sc. III, Semester V | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| MT-501: Analysis | <p>CO-1.: Study how to compute sums, products, quotients, conjugate, modulus, and argument of complex numbers.</p> <p>CO-2.: Understand the significance of differentiability for complex functions and be familiar with the Cauchy-Riemann equations.</p> <p>CO-3.: Learn Fourier series and its applications in electrical engineering, vibrating acoustics, optics, signal processing, quantum mechanics, electrodynamics etc.</p> <p>CO-4.: Understand mapping of elementary function.</p> <p>CO-5.: Understand integrals along a path in the complex plane and</p> |

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| | understand the statement of Cauchy's Theorem. |
| MT-502: Metric space, complex integration and Algebra | <p>CO-1.: Understand functions between sets; equivalent sets; finite, countable and uncountable sets.</p> <p>CO-2.: Calculate the limit superior, limit inferior, and the limit of a sequence</p> <p>CO-3.: Determine if subsets of a metric space are open, closed, connected, bounded, totally bounded and/or compact.</p> <p>CO-4.: Learn the concept of completeness, compactness and connectedness.</p> <p>CO-5.: Learn concept of Ring, Integral domain, Ring homomorphism</p> <p>CO-6.: Wide used in computer science and IT.</p> <p>CO-7.: Apply knowledge of residues in complex Integration.</p> <p>CO-8.: Wide used in fluid mechanics and electrical engineering.</p> |
| B. Sc. III, Semester VI | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| MT-601: Abstract Algebra | <p>CO-1.: Learn Concept of Group Automorphisms, function, one-to-one and onto function, homomorphism, isomorphism, and automorphism.</p> <p>CO-2.: Study concepts of vector spaces such as independence, basis, dimensions etc.</p> <p>CO-3.: Study of matrix associated with linear map and linear map associated with a matrix.</p> <p>CO-4.: Learn uses in electrical engineering, computer science.</p> |
| MT-602: Special Theory of relativity | <p>CO-1.: Study Newtonian mechanics, Galilean transformation, Michelson- morley experiment</p> <p>CO-2.: Learn concept of relativity, Lorentz and Galilean</p> |

transformations.

CO-3.: Learn concepts of length contraction, time dilation.

CO-4.: Find out tensors.

CO-5.: Learn transformation formula for momentum and energy

CO-6.: Understand the special theory of relativity and related topics.

DEPARTMENT OF PHYSICS

Programme Outcome: B.Sc. Physics

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| Department of Physics | After successful completion of three year degree program in Physics a student should be able to: |
| Programme outcomes (POs) | <p>PO-1.: Explanation of major concepts in all discipline of Physics.</p> <p>PO-2.: Enhancement of the student's academic abilities and transferable skills which will give them knowledge of Physics which is useful.</p> <p>PO-3.: Solve various problems and also think methodically, independently, and draw the logical conclusions which define the basic laws involved in Physics.</p> <p>PO-4.: To understand the concepts and significance of the various physical phenomena in Physics theoretically and practically.</p> <p>PO-5.: To create an awareness of the impact of the Physics on the society</p> <p>PO-6.: To apply the theories learnt and the skills acquired to solve real time problems.</p> <p>PO-7.: To inoculate the scientific temperament in the students and outside the scientific community.</p> <p>PO-8.: Use modern scientific techniques and decent equipment in Physics</p> <p>PO-9.: Awareness regarding nuclear hazard and electronic wastage.</p> |
| Programme Specific Outcomes (PSOs) | <p>PSO-1.: Gain the knowledge of Physics through theory and practical for the better understanding.</p> <p>PSO-2.: Understand the good laboratory practices and safety of electronic other devices</p> <p>PSO-3.: Develop research oriented skills in Physics.</p> <p>PSO-4.: Make aware and handling of the sophisticated instruments/ equipment carefully</p> |

| Course Outcomes (COS) | B. Sc. Physics (27) |
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| B.Sc. I, Semester I | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| PH-101: Properties of Matter and Mechanics | <p>CO-1.: Learn the basics concepts of elasticity, Hook's law elastic Constants and relation between them, cantilever supported at one end and both end, tosinal pendulum and Maxwell needle.</p> <p>CO-2.: Understand the concepts of viscosity and their applications in various real problems like use of Bernoullies theorem in airplane and atomizer.</p> <p>CO-3.: Understand the concept of surface tension by Jager's Method, Quincke's and capillary rise method.</p> <p>CO-4.: Understand the basic laws of Mechanics.</p> <p>CO-5.: Understand the concepts of conservation of energy, momentum and elastic and inelastic collisions and moment of inertia</p> |
| PH-102: Electrostatics, Time varying fields and Electric Currents | <p>CO-1.: Learn extended knowledge about electrostatics, viz. Columbs law, Electric field intensity, Electric potential, Electric field intensity, Electric dipole, Electric dipole moment, Electric field intensity due to an electric dipole, Electric field as a negative gradient of potential, Conservative nature of the electric field.</p> <p>CO-2.: Understand the concepts of dielectrics, parallel capacitor and relation between three P, E and D.</p> <p>CO-3.: Understand the fundamental laws of time varying fields</p> <p>CO-4.: Understand Faradays laws, Lenz's law, self and mutual induction, Transformer, and its construction and working.</p> <p>CO-5.: Understand basic concept of Current and its basic laws like Ohms law and Kirchoff's law, Decay of charge in LCR circuits.</p> <p>CO-6.: Study the application of complex number in solving an a.c. circuit by J operator method and series resonance of LCR circuits and power factor in ac circuits.</p> |

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| PH-103: Laboratory Course | CO-1.: Study of Young's modulus by bending of beam CO-2.: Understanding surface tension of liquid by Quinck's method CO-3.: Determination of moment of inertia of a fly-wheel CO-4.: Study of frequency of A.C. mains by sonometer CO-5.: Study verification of Kirchhoff's law using electrical network CO-6.: Study the least count various instruments and error analysis CO-7.: Study of transformer |
| B.Sc. I, Semester II | |
| Course | Outcomes |
| PH-201: Oscillations, Kinetic theory of gases and Thermodynamics | <p>After completion of the course the students should be able to</p> CO-1.: Get knowledge of free oscillations, linear and angular SHM, CO-2.: Study the damped oscillations and its differential equations, energy equation and power dissipation. CO-3.: Get knowledge of forced oscillations, its differential equations, sharpness of resonance and its power dissipation CO-4.: Study the kinetic theory of gaseous including Boyle's law, equipartition of energy and estimate molecular diameter and mean free path. CO-5.: Study the transport phenomenon of gaseous such as transport of mass, momentum, energy and their relationship. CO-6.: Study of Vanderwall's gas equation and critical constant. CO-7.: Study the sue of tools needed to formulate problems in the thermodynamics of gases CO-8.: Understand the central concepts and basic formalisms of specific heat, entropy and laws of thermodynamics. |
| PH-202: Gravitation, Astrophysics, Magnetism and Magneto statics | CO-1.: Understand the basic ideas of gravitation and it laws. CO-2.: Aware about the knowledge of Astrophysics including solar system and universe. CO-3.: Learn various scientific methods to measure the size of planet, mass of the sun and planets. |

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| | <p>CO-4.: Understand an extended knowledge about magnetic properties like diamagnetic, paramagnetic, ferromagnetic, antiferromagnetics and ferrits</p> <p>CO-5.: Understand the concept of Magnetostatics and its laws and applications.</p> |
| PH-203: Laboratory Course | <p>CO-1.: Study the acceleration due to gravity by compound pendulum</p> <p>CO-2.: Determination of acceleration due to gravity by Kater's pendulum</p> <p>CO-3.: Learn about Lissajous's figure</p> <p>CO-4.: Verification of Stefan's law of radiation by using an incandescent lamp</p> <p>CO-5.: Study of thermal conductivity of a bad conductor by Lee's disc method</p> <p>CO-6.: Study of input and output characteristics of CE mode amplifier</p> |
| B.Sc. II, Semester III | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| PH-301: Sound waves, Applied acoustic, Ultrasonic and Power supply | <p>CO-1.: To study the waves in media including harmonics, quality of sound.</p> <p>CO-2.: Understanding the nature of waves in human ear, limit of human audibility, temperaments and musical instruments.</p> <p>CO-3.: To understand the applied knowledge of acoustics including transducers, recording and reproduction of sound, reverberation,</p> <p>CO-4.: Understanding the factors affecting acoustics of building and requirement of good acoustics.</p> <p>CO-5.: To get acquainted with the knowledge of ultrasonic waves containing properties and conduction of ultrasonic waves.</p> <p>CO-6.: To study the Piezoelectric effect and magnetostriction effect, and application ultrasonic waves.</p> <p>CO-7.: To understand the basic concept of power supply such as half wave and full wave rectifier</p> |

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| | <p>CO-8.: To understand the concept of regulated and unregulated power supply.</p> |
| <p>PH-302: Physical optics and Electromagnetic waves</p> | <p>CO-1.: To understand the interference of the light including thin film, Newton's ring, Michelson interferometer and their applications.</p> <p>CO-2.: To study the diffraction of light and its type such as Fresnel's and Fraunhofer diffraction.</p> <p>CO-3.: To know the idea of diffraction grating and its application.</p> <p>CO-4.: To impart knowledge of polarization of light and types of polarization, production of polarization.</p> <p>CO-5.: To provide knowledge of uniaxial, biaxial positive and negative crystals.</p> <p>CO-6.: To understand the electromagnetic waves containing Maxwell's equations, Poynting Vector and theorem, characteristics impedance of dielectrics and transverse nature of E.M. waves.</p> |
| <p>PH-303: Laboratory Course</p> | <p>CO-1.: To study the speed of waves on stretched string</p> <p>CO-2.: To study the frequency of A.C. mains with the help of sonometer</p> <p>CO-3.: To know the unknown frequency and to verify the law of inverse variation of frequency by Helmholtz resonator.</p> <p>CO-4.: To study the Zener Diode voltage regulating characteristics.</p> <p>CO-5.: To study the wavelength of light by using plane transmission.</p> <p>CO-6.: To study the dispersive power of prism,</p> <p>CO-7.: To understand the resolving power of prism.</p> <p>CO-8.: To study the characteristics of loud Speaker.</p> |
| <p>B.Sc. II, Semester IV</p> | |
| <p>Course</p> | <p>Outcomes</p> |
| | <p>After completion of the course the students should be able to</p> |
| <p>PH-401: Solid state Physics, X-ray and Laser</p> | <p>CO-1.: To gain knowledge of classification materials and its properties,</p> <p>CO-2.: To study seven crystal systems and their lattice parameters. Symmetry, Miller indices and interplanar distance.</p> <p>CO-3.: To understand the energy spectrum, characteristics of the X-ray its production,</p> |

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| | <p>CO-4.: To study the types of X-ray spectrum: continues and characteristics spectrum.</p> <p>CO-5.: To understand the applications of x-ray in daily life and medical industry.</p> <p>CO-6.: To know the concept of reciprocal lattice, and to understand the principle and various techniques of x-ray diffraction: Brag’s diffraction, Laue’s theory of x-ray diffraction</p> <p>CO-7.: To know the history of laser and its basic concepts, and to study the characteristics of the LASER.</p> <p>CO-8.: To understand the principle and working of different types of LASER and their applications in technology. Also to learn safety precautions and measures while handling lasers.</p> <p>CO-9.: To learn the determination of crystal structure of unknown materials and determination of lattice parameters from given x-ray data, and Laser diffraction from grating.</p> |
| <p>PH-402: Solid state electronics, and Molecular physics</p> | <p>CO-1.: Understanding basic concepts of solid state electronics, consisting of LED, solar cell,</p> <p>CO-2.: To study the basic of transistor and its characteristics in CE & CB mode and their graphical analysis.</p> <p>CO-3.: To understand the principle, construction, working and characteristics of FET, JFET and MOFET</p> <p>CO-4.: To know the types of vibrational and rotational energies,</p> <p>CO-5.: To study the diatomic molecules as harmonic and anharmonic oscillator, rotational-vibrational spectra, Born Oppenheimer approximation.</p> <p>CO-6.: To understand the Raman effect and to know the Raman spectra and its applications,</p> <p>CO-7.: To know the basic idea of NMR and ESR spectra and their applications.</p> <p>CO-8.: To learn the experiments of Input, out characteristics and transfer characteristics of transistor as CE, CB mode amplifier.</p> |

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| <p>PH-403: Laboratory Course</p> | <p>CO-1.: To study diode characteristics in forward bias and reverse bias mode.</p> <p>CO-2.: To study the input and output characteristics of transistor in CE mode and CB mode.</p> <p>CO-3.: To study the characteristics of J- FET and determination of its parameter.</p> <p>CO-4.: To study characteristics of green and red LED and determine the Plank's constant from this characteristics.</p> <p>CO-5.: To determine the wavelength of elements from line emission spectra.</p> <p>CO-6.: To determine the lattice parameter by analysis of X-ray powder photograph.</p> <p>CO-7.: To study the wavelength of given LASER by using plane transmission.</p> <p>CO-8.: To understand the variation of gain of CE amplifier</p> |
| <p>B.Sc. III, Semester V</p> | |
| <p>Course</p> | <p>Outcomes</p> |
| <p>PH-501: Atomic physics, free electron theory and Statistical physics</p> | <p>After completion of the course the students should be able to</p> <p>CO-1.: To learn basic concepts of atomic physics,</p> <p>CO-2.: To study the spinning of electron, Stern-Gerlch experiment Pauli's exclusion principal, Hunds rule,</p> <p>CO-3. : To understand Zeeman effect and Stark effect.</p> <p>CO-4.: To know the basic concepts of free electron theory, electrical and thermal conductivity, Fermi energy and Fermi temperature.</p> <p>CO-5.: Understanding the classification of materials on the basis of Band theory as Metal, Semiconductor, and insulator.</p> <p>CO-6.: To study Hall effect, electron band in solids.</p> <p>CO-7.: To know the elementary concepts of statistical physics like μ-space, Gamma space, probability distribution, thermodynamic probability, principle of a priori probability, Boltzmann's entropy relation,</p> |

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| | <p>CO-8.: To understand statistical distribution of system of particles</p> <p>CO-9.: To study statistical ensembles, and to understand the quantum statistics.</p> <p>CO-10.: To study Bose-Einstein condensation. Fermi-Dirac distribution and its application to free electrons in a metal.</p> |
| <p>PH-502: Quantum mechanics, Nanomaterials and Nanotechnology</p> | <p>CO-1.: To understand the basic concept of quantum mechanics including Compton Effect, Wave particle duality, de Broglie's hypothesis, Heisenberg's uncertainty principle</p> <p>CO-2.: To study the Schrodinger's Time dependent and time independent equations, physical significance of wave function ψ, Particle in a box, and also application to free particle in a one and three dimension.</p> <p>CO-3.: To know difference between nonmaterial and bulk materials, Bottom up and top down approaches, size dependent physical properties.</p> <p>CO-4.: To understand different methods of nanomaterial synthesis,</p> <p>CO-5.: To study different methods of particle size analysis Debye-Scherer's formula and BET.</p> <p>CO-5.: To understand characterization techniques like SEM and TEM and applications of nano-materials.</p> |
| <p>PH-503: Laboratory Course</p> | <p>CO-1.: To study the determination of the 'e', charge on electron by using plank's constant from given experimental board.</p> <p>CO-2.: To study the measurement of AC voltage using CRO and calculate its deflection sensitivity.</p> <p>CO-3.: To study the determination of unknown frequency by CRO.</p> <p>CO-4.: To study the determination of self and mutual inductance by bridge rectifier method</p> <p>CO-5.: To learn determination of energy band gap of semiconductor diode.</p> <p>CO-6.: To study the random decay of nuclear disintegration and also to determine the decay constant using one coloured dice.</p> <p>CO-7.: To study the statistical distribution from given data and to find Most probable value M_p, Average value M and RMS value M_{rms}</p> |

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| | CO-8.: To study the determination of average grain size of a particle from x-ray diffraction spectra (XRD) using Debye Scherrer formula. |
| B.Sc. III, Semester VI | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| PH-601: Relativity, Nuclear physics and Bio Physics | <p>CO-1.: To study the theory of relativity and its concepts like Frame of reference, Inertial and non-inertial frames, Galilean transformation equations, Galilean invariance, Michelson-Morley experiment, Postulates of the special theory of relativity, Lorentz transformations, Length contraction, Time dilation, Velocity addition theorem, Variation of mass with velocity, Mass energy equivalence.</p> <p>CO-2.: To understand the basic of nuclear physics including accelerators and detectors G M counter, Wilson cloud chamber, Cyclotron, Linear accelerator,</p> <p>CO-3.: To understand the concept of Alpha decay, β- decay, γ- decay, Energy of γ photon, and also the measurement of energy of Alpha and β particle and end point energy.</p> <p>CO-4.: To acquire the knowledge of Bio Potential-compound action, potentials of the human body, electrocardiogram for heart (ECG), electroencephalogram for brain (EEG), electroretinogram for eye retina (ERG), electromyogram for muscle (EMG) and working mechanism of sonography.</p> <p>CO-5.: To understand the basic principle, construction and working of colorimeters, spectrophotometer, pH-Meter and centrifuge measurement.</p> |
| PH-602: Electronics, Fibre optics, Communication and Digital electronics | <p>CO-1.: To understand the operational amplifier and its parameters,</p> <p>CO-2.: To know the basic idea of IC-741, application of Op-Amp as inverting, non-inverting, Adder, subtractor, integrator and differentiator.</p> <p>CO-3.: To know the concept of feedback, physical consideration of tuned circuits, phase shift oscillator, Hartley oscillator and Colpitts oscillator</p> <p>CO-4.: To study importance of optical fibre and its principal and working application.</p> |

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| | <p>CO-5.: To understand the concepts of Frequency modulation.</p> <p>CO-6.: To study basic concept of digital electronics like binary numbers, basic logic gates, NOR, NAND, Ex-OR, Ex-NOR and their truth table, Half adder, Full adder, Half subtractor and full subtractor, Boolean equations, De Morgan's theorem and its verification</p> <p>CO-7.: To understand characterization techniques like SEM and TEM and applications of nano-materials.</p> |
| <p>PH-603: Laboratory Course</p> | <p>CO-1.: Experimental study of basic gates i.e. AND, OR and Not gate.</p> <p>CO-2.: To study the characteristics of NAND gate and its characteristics and its use as universal gate.</p> <p>CO-3.: To verify De-Morgan's Theorem.</p> <p>CO-4.: Experimental study of Ex-OR gate half adder.</p> <p>CO-5. To study the working of OPAMP as inverting amplifier and non-inverting amplifier.</p> <p>CO-6.: To study OPAMP as adder and or summing amplifier.</p> <p>CO-7.: To study OPAMP as a subtractor.</p> <p>CO-8.: To study the OPAMP as integrator and differentiator.</p> |

DEPARTMENT OF ZOOLOGY

Programme Outcome: B.Sc. Zoology

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| <p>Department of Zoology</p> | <p>After Successful completion of three year degree program in Zoology a student should able to:</p> |
| <p>Program Outcomes (POs)</p> | <p>PO-1.: To make students aware of the of the concepts in animal science</p> <p>PO-2.: Making aware the students about the phylogenic evolution of animal kingdom.</p> <p>PO-3.: Understanding the concept of environment awareness, wildlife, biodiversity and conservation strategies.</p> <p>PO-4.: Building scientific temperament among students.</p> <p>PO-5.: Understanding the principles and laws of inheritance in animal kingdom.</p> <p>PO-6.: To acquire the knowledge of cellular details in animal cells</p> <p>PO-7.: Making students aware of the characteristics of different animals for identification in the field</p> <p>PO-8.: Handling the different instruments and equipment.</p> |
| <p>Department of Zoology</p> | <p>After successful completion of three year degree program in Zoology a student is able to:</p> |
| <p>Program Specific Outcomes (PSOs)</p> | <p>PSO-1.: Able to classify the animals on the basis of morphological characters.</p> <p>PSO-2.: Understand the scientific basis of biodiversity its conservation.</p> <p>PSO-3.: Understand the molecular basis of DNA technology.</p> <p>PSO-4.: Make aware to handle instruments and equipment.</p> <p>PSO-5.: Develop research oriented skill in Zoology.</p> <p>PSO-6.: Understand applied aspects of Zoology,</p> |

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| | PSO-7: To acquire knowledge for the benefits of the society |
| Course Outcomes (COs) | B. Sc. Zoology (32) |
| B.Sc., Semester I | |
| Course | Outcomes |
| | After completion of these course the students should able to |
| ZO-101: Life and Diversity of Animals- Non-chordates (Protozoa to Annelida) | <p>CO-1.: Study the phylogenic evolution of lower non-chordates.</p> <p>CO-2.: Study the external and internal characters of lower non-chordates</p> <p>CO-3.: Study comparative characteristics of lower non-chordates.</p> <p>CO-4.: Study various internal systems of lower non-chordates.</p> <p>CO-5.: Study ecological values of corals</p> <p>CO-6.: Information about economic importance of protozoans.</p> |
| ZO-102: Environment Biology | <p>CO-1.: Understand the concept of Biosphere.</p> <p>CO-2.: Understand importance of renewable energy resources.</p> <p>CO-3.: Understand food chain and food web in ecosystem.</p> <p>CO-4.: Understand flow of energy in ecosystem</p> <p>CO-5.: Understand scope, importance and management of biodiversity.</p> <p>CO-6.: Understand sources, effect and control measure of air, water and noise pollution</p> |
| ZO-103: Laboratory Course | <p>CO-1: Understand taxonomic characters lower non-chordates from museum specimens and classification up to order genus level</p> <p>CO-2.: Understanding the histological structure of lower non-chordates from permanent micro-preparations</p> <p>CO-3.: Study of internal organs of earthworms and Leech by dissecting out.</p> |

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| | <p>CO-4.: To understand the principle and technique of mounting of various organs of lower non chordates.</p> <p>CO-5.: Practical demonstrations of experiments related with environmental biology.</p> <p>CO-6.: Understanding the ecosystem diversity by visiting to a National park or Sanctuary</p> |
| B.Sc. I, Semester II | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| ZO-201: Life and Diversity of Animals- Non-chordates (Arthropoda to Hemichordata) | <p>CO-1.: To study the phylogenic evolution of higher non-chordates.</p> <p>CO-2.: Study of external and internal characteristics of higher non-chordates</p> <p>CO-3.: To know distinguishing characteristics of higher non-chordates.</p> <p>CO-4.: To study different internal systems of higher non-chordates.</p> <p>CO-5.: Understand economic importance of arthropods.</p> |
| ZO-202: Cell Biology | <p>CO-1.: Study detail structure of prokaryotic and eukaryotic cell</p> <p>CO-2.: To study the detail structure and differences between plant cell and animal cell.</p> <p>CO-3.: Study of structure and functions of organelles.</p> <p>CO-4.: To study the concept of cell aging and cytology of cancer.</p> <p>CO-5.: To know the mechanism of cell division.</p> <p>CO-6.: To study the structure and functions of nucleus in eukaryotic cell.</p> |
| ZO-203: Laboratory Course | <p>CO-1.: Study of taxonomic characters of higher non-chordates from museum specimens and classification up to genus</p> <p>CO-2.: Study of histological structure of higher non-chordates from permanent micro-preparations</p> |

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| | <p>CO-3.: Study of different internal organs by dissecting out different organs of internal system in cockroach and <i>Pila</i>.</p> <p>CO-4.: Study of the principles and the technique of mounting of various organs of higher non-chordates.</p> <p>CO-5.: To study the characteristics of different stages of cell divisions and the movement of chromosomes</p> <p>CO-6.: Study of morphological features of different types of chromosomes.</p> |
| B.Sc. II, Semester III | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| ZO-301: Life and Diversity of Animals-Chordates (Protochordata to Amphibia) | <p>CO-1.: Study of phylogenic evolution in lower chordates.</p> <p>CO-2.: Study of external and internal characters of lower chordates</p> <p>CO-3.: Comparative differences among different specimens of lower chordates.</p> <p>CO-4.: To study internal systems of lower chordates.</p> <p>CO-5.: Understanding embryological development in fishes.</p> <p>CO-6.: Understand embryological development in amphibians.</p> |
| ZO-302: Genetics | <p>CO-1.: Practical demonstrations of Mendelian and non-Mendelian inheritance in living organisms.</p> <p>CO-2.: Practical demonstration for lineage and crossing over.</p> <p>CO-3.: To study the concept of gene</p> <p>CO-4.: Practical demonstrations of genetic disorders in human beings</p> <p>CO-5.: To study and understand sex determination in animal phyla.</p> <p>CO-6.: Demonstration of concept of population genetics and applied genetics.</p> |

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| ZO-303. Laboratory Course | <p>CO-1.: Understanding of taxonomic characters of lower chordates from museum specimens and classification up to genus level</p> <p>CO-2.: To study the histology of lower chordates from permanent slides of lower chordates</p> <p>CO-3.: To understand frog embryology from permanent slides</p> <p>CO-4.: Study of various internal structure of culturable fishes by performing dissections</p> <p>CO-5.: To understand the principle and procedure of mounting of various organs of lower chordates.</p> <p>CO-6.: Practical understanding of Mendelian Inheritance.</p> <p>CO-7.: Practical demonstration of basic principles of Hardy-Weinberg Law.</p> |
| B.Sc. II, Semester IV | |
| Course | Outcomes |
| ZO-401.: Life and Diversity of Animals- Chordates(Aves to Mammalia) | <p>After completion of the course the students should be able to</p> <p>CO-1.: Understanding the phylogenic evolution of higher chordates.</p> <p>CO-2.: To understand external and internal characters of higher chordates</p> <p>CO-3.: To compare the reptiles, birds and mammals based on their distinguishing characters.</p> <p>CO-4.: To understand various internal systems of higher chordates.</p> <p>CO-5.: to understand the developmental pattern in reptiles, birds and mammals at embryological level.</p> <p>CO-6.: Understanding basic principles in evolution in animal phyla.</p> <p>CO-7.: To understand the concept of evolutionary process in human</p> |

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| ZO-402: Molecular Biology and Immunology | <p>CO-1.: To understand structure and types of DNA and RNA.</p> <p>CO-2.: Study of the concept of genetic code and mechanism of protein synthesis.</p> <p>CO-3.: To study the concept of gene regulation in prokaryotic</p> <p>CO-4.: To understand the concepts of immunity</p> <p>CO-5.: Understand structure and types of antigen and antibody.</p> <p>CO-6.: Understand concept of autoimmunity and immunodeficiency.</p> |
| ZO-403: Laboratory Course | <p>CO-1.: To understand taxonomic characters of higher chordates from museum specimens and to classify up to genus level</p> <p>CO-2.: To understand histological structure of higher chordates from permanent slides</p> <p>CO-3.: To understand embryological pattern of development of chick from permanent slides.</p> <p>CO-4.: To study the skeleton system in fowl and rabbit.</p> <p>CO-5.: To get acquainted with principle and working of basic laboratory instruments.</p> <p>CO-6.: Practical understanding of immunological system.</p> |
| B.Sc. II, Semester V | |
| Course | Outcomes |
| ZO-501: General Mammalian Physiology I | <p>After completion of the course the students should be able to</p> <p>CO-1.: To understand concept and types of enzymes.</p> <p>CO-2.: Study the structure and functions of digestive glands in mammals.</p> <p>CO-3.: To aware of sources, deficiency and diseases caused due to deficiency of vitamins.</p> <p>CO-4.: To study the respiratory physiology in mammals.</p> <p>CO-5.: To understand the circulatory physiology in mammals.</p> |

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| | CO-6.: To understand the concept of ECG and Blood pressure |
| ZO-502: Applied Zoology I (Aquaculture and Economic Entomology) | <p>CO-1.: To understand the management of pond for fish culture</p> <p>CO-2.: To study the management of pond for prawn and pearl culture</p> <p>CO-3.: To study the control measures of insect pests.</p> <p>CO-4.: To understand the biology, damage and control measures of insect pests.</p> <p>CO-5.: Understanding the applied aspects of Sericulture.</p> <p>CO-6.: To understand the applied aspects of Apiculture and Lac culture.</p> |
| ZO-503: Laboratory Course | <p>CO-1.: Understanding of digestive physiology of mammals.</p> <p>CO-2.: Understanding of respiratory and circulatory physiology of mammals.</p> <p>CO-3.: To study the mammalian physiology from permanent slides</p> <p>CO-4.: To study the structure and locating of endocrine glands in fishes by performing dissection.</p> <p>CO-5.: To identify the edible aspects of aquarium fishes.</p> <p>CO-6.: Identification of insect pests and useful insects.</p> <p>CO-7.: To study the practical management of fishery, sericulture centre or apiary by excursion tour.</p> |
| B.Sc. II, Semester VI | |
| Course | Outcomes |
| | After completion of the course the students should be able to |
| ZO-601: General Mammalian Physiology II | <p>CO-1.: To study the concept of nerve physiology in mammals.</p> <p>CO-2.: To study the concept of muscle physiology in mammals.</p> <p>CO-3.: To study the concept of urine formation in mammals.</p> |

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| | <p>CO-4.: To study the structure and function of endocrine glands in mammals.</p> <p>CO-5.: To study the concept of male reproductive system in mammals.</p> <p>CO-6.: To know the concept of female reproductive system in mammals</p> |
| <p>ZO-602: Applied Zoology II (Bio techniques, Micro technique, Biotechnology, Bioinformatics and Biostatistics)</p> | <p>CO-1.: To study the concepts of sterilization of laboratory equipment and tools</p> <p>CO-2.: To learn about the separation of biomolecules by different bio techniques.</p> <p>CO-3.: To learn the concept of micro technique for preparation of histological slides.</p> <p>CO-4.: To study the basic concepts in recombinant DNA technology.</p> <p>CO-5.: To learn about the basic concepts of Bioinformatics</p> <p>CO-6.: To know the basic concepts of Biostatistics.</p> |
| <p>ZO-603: Laboratory Course</p> | <p>CO-1.: To study the excretory physiology of mammals by performing the experiments.</p> <p>CO-2.: To understand the reproductive physiology of mammals by performing basic experiments.</p> <p>CO-3.: To study the structure of various organs of mammals from permanent slides.</p> <p>CO-4.: To study the location and structure of endocrine glands in fishes by performing dissection.</p> <p>CO-5.: To study the basic techniques in micro-techniques and to prepare permanent slides of various organs.</p> <p>CO-6.: To study mean, mode and median of bio statistical data.</p> <p>CO-7.: To learn the use of internet and software in the bioinformatics</p> |

DEPARTMENT OF LIBRARY SCIENCE

CERTIFICATE COURSE IN LIBRARY AND INFORMATION SCIENCE

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| Department of Library Science | After successful completion of three months certificate course in Library and information Science, a student should able to: |
| Program Outcomes (POs) | <p>PO-1.: Students will know the functioning and composition of library</p> <p>PO-2: The student will acquire fundamental information about the Library and Information Science through theory & practical</p> <p>PO-3.: Students will be able to know use of advance technology in Library & information science</p> |
| Department of Library Science | After successful completion of three months certificate course in Library and information Science a student is able to: |
| Program Specific Outcomes (PSOs) | <p>PSO-1.: To learn the scope and importance of Library and Digital Library</p> <p>POS-2.: To get operative knowledge of Library Software 'OPAC'</p> <p>POS-3.: To help student to understand role of Library</p> <p>POS- 4: To know advance technology in Library and Information science</p> |
| Course Outcomes (COs) | Library and Information Science |
| Certificate Course in Library and Information Science | |
| Course | Outcomes |
| | After completion of these course the students should able to |
| LIS-101: | CO-1.: To learn basics of in Library Science |

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| | <p>CO-2.: To understand the basic role and functioning of Library</p> <p>CO-3.: To know about the biography of Dr. S. R. Ranganathan, The Father Of Library Science In India</p> <p>CO-4.: To know the system of classification and Cataloguing</p> <p>CO-5.: To learn about the Library Cataloguing Procedure</p> <p>CO-6.: To learn the Library Classification Procedure</p> <p>CO-7.: To learn the use and application of Library Software</p> <p>CO-8.: To know the use of OPAC</p> <p>CO-9.: To understand different library E-Resources</p> |
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DEPARTMENT OF BOTANY

CERTIFICATE COURSE IN MUSHROOM CULTIVATION

Course Outcomes: Certificate Course in Mushroom Cultivation

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| Department of Botany | After successful completion of three months certificate course in Mushroom Cultivation, a student should able to: |
| Program Outcomes (POs) | PO-1.: Students will get the practical knowledge of identification of edible and non-edible mushroom species PO-2: Students will acquire the knowledge of chemical composition and nutrient content of edible mushroom PO-3.: Students will be able to cultivate the edible mushroom |
| Programme Specific Outcomes (PSOs) | PSO-1: Students will be able to earn money by cultivation of various edible species of mushroom PSO-2: Students will get the skill to start their own business |
| Course | After successful completion of three months certificate course in Mushroom Cultivation student is able to: |
| Certificate Course in Mushroom Cultivation | CO-1.: Students will be able to identify edible and non-edible mushroom species CO-2.: To get aware about the significance and economic as well as nutritional value of mushroom. CO-3.: To understand the characteristics features and structure of mushroom. CO-4.: Students get the basic knowledge of cultivation practices including establishment of culture room, controlling of temperature, light, humidity, etc. |

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| | <p>CO-5.: To overcome the problems encountered during mushroom cultivation.</p> <p>CO-6.: To make them able to describe the life cycle of mushroom and cultivation of Button and Oyster mushroom.</p> <p>CO-7.: To make them aware about the basic requirements of mushroom cultivation</p> <p>CO-8.: To develop skill for substrate preparation, spawning and casing, crop management and harvesting.</p> <p>CO-9. To provide information about harvesting technique and time</p> <p>CO-10.: To provide practical information of drying, grading, packing and storage, marketing and transportation.</p> <p>CO-11.: Students able be able to earn money by generating self-employment</p> |
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DEPARTMENT OF ZOOLOGY

CERTIFICATE COURSE IN APICULTURE

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| Department of Zoology | After successful completion of three months certificate course in Apiculture, a student should able to: |
| Program Outcomes (POs) | <p>PO-1.: Students will know the importance of honeybees in agro-ecosystem</p> <p>PO-2: The student will acquire fundamental information about the rearing and management of honeybees through theory and practical modules</p> <p>PO-3.: Students will be able to know the importance of bees for enhancing the income of farmers and youths.</p> |
| Department of Zoology | After successful completion of three months certificate course in Apiculture a student is able to: |
| Program Specific Outcomes (PSOs) | <p>PSO-1.: To learn the scope and importance of beekeeping in local region</p> <p>POS-2.: To get practical knowledge of beekeeping</p> <p>POS-3.: To help student to understand role of bees in enhancing employment among rural masses.</p> |
| Course Outcomes (COs) | Zoology |
| Certificate Course in Apiculture | |
| Course | Outcomes |
| | After completion of the certificate course the students should able to: |
| CCA-101: | <p>CO-1.: To learn basics practice of beekeeping</p> <p>CO-2.: To understand the biology of honeybees</p> |

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| | <p>CO-3.: To get acquainted with equipment used in honeybee rearing</p> <p>CO-4.: To know the basics of management practices of honeybees</p> <p>CO-5.: To learn about the basics of apiary establishment</p> <p>CO-6.: To learn the role of honeybees in crop pollination</p> <p>CO-7.: To learn the incidences and management of diseases of honeybees</p> <p>CO-8.: To learn the incidences and management of pests of honeybees</p> <p>CO-9.: To understand the scope of beekeeping as a as rural enterprise</p> |
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DEPARTMENT OF ZOOLOGY

CERTIFICATE COURSE IN SERICULTURE

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| Department of Zoology | After successful completion of three months certificate course in Sericulture, a student should able to: |
| Program Outcomes (POs) | <p>PO-1.: Students will know the importance of Sericulture in enhancing the income of farmers</p> <p>PO-2: The student will acquire fundamental information about the rearing and management of silkworm to produce quality cocoons through theory & practical</p> <p>PO-3.: Students will be able to know the importance of silk industry to generate employment in rural and sub urban part of India</p> |
| Department of Zoology | After successful completion of three months certificate course in Sericulture a student is able to: |
| Program Specific Outcomes (PSOs) | <p>PSO-1.: To learn the scope and importance of Sericulture in local region</p> <p>POS-2.: To get practical knowledge of mulberry cultivation and silkworm rearing</p> <p>POS-3.: To help student to understand role of Sericulture in enhancing employment.</p> |
| Course Outcomes (COs) | Zoology |
| Certificate Course in Sericulture | |
| Course | Outcomes |
| | After completion of these course the students should able to: |
| CCS-102: | CO-1.: To learn basics of Mulberry cultivation and silkworm rearing |

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| | <p>CO-2.: To understand the biology of silkworm</p> <p>CO-3.: To get acquainted with the equipment in silkworm rearing</p> <p>CO-4.: To know the basics of young age larvae management</p> <p>CO-5.: To know the basics and types of late age larvae management.</p> <p>CO-6.: To learn the incidences and management of diseases and pests of mulberry plant</p> <p>CO-7.: To learn the incidences and management of diseases and pests of silkworm.</p> <p>CO-8.: To understand the basics of post cocoon operations in Sericulture</p> |
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