Programme Outcomes (PO)

B. Sc. – Botany Programme

Upon successful completion of B. Sc. Botany student will be able:

- To implement the knowledge of structural organization and economic importance of microbes including Bacteria, Viruses, Mycoplasma, Lichen, Blue Green Algae.
- To apply the knowledge of structural, developmental and economic importance of lower plants including Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperms with practical knowledge.
- To develop skill of Mushroom biotechnology.
- To gain the knowledge of fossils, fossilization under the palaeobotany.
- To identify the plants and taxonomic characters of different families with practical knowledge and know the system of classification.
- To as an entrepreneur by the knowledge of the economic importance and utilization of plants.
- To apply the knowledge of anatomical structure and development of flowering plants.
- To apply the knowledge of the shoot and root system.
- To apply the knowledge of the structure, development and reproduction in flowering plants.
- To implement the knowledge of plant and environment.
- To apply the knowledge of the ecology and ecosystem with the practical Knowledge.
- To apply the knowledge of the physiology of plants with practical knowledge.
- To gain the knowledge of the growth and development in plants.
- To apply the knowledge of analytical technology, plant tissue culture, plant pathology, experimental embryology, elementary biostatistics, environmental pollution and conservation.
- To gain the knowledge of the structure, molecular aspects and function of plant cell including plasma membrane, cell wall and different cell organelles.
- To apply the knowledge of the genetics including chromosomal organization, DNA, RNA, Gene expression, Protein synthesis, Proteins, Mutation as well as Mendel's Law.
- To apply the knowledge of the principles, techniques and application of genetic engineering, biotechnology and biochemistry.

Overall programme outcomes are to gain scientific knowledge, critical thinking, persistent learning, ethical, social, environmental and professional understanding and

to develop innovative ideas, leadership and entrepreneur skills for the recognition at local, national and global level.

Programme Specific Outcomes (PSO)

B. Sc. – Botany Programme

B. Sc. Part-I

Paper-I-Bacteria, Viruses, Fungi, Lichen and Algae

- To develop understanding about the basic microbial characteristics, structure, reproduction and economic importance of Bacteria, Virus, Mycoplasma, Lichen and blue green algae.
- To know the classification, characteristic features, life history and economic importance of algae with practical knowledge.
- To know the General account, classification, characteristic features, structure, life history and economic importance of fungi with practical knowledge.
- To develop skill of mushroom technology

B. Sc. Part-I

Paper-II-Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany

- To know the classification, characteristic features, structure and life cycle of Bryophytes, Pteridophytes and Gymnosperms with practical knowledge.
- To understand the fossils, fossilization under the palaeobotany and fossil gymnosperms.

B. Sc. Part-II

Paper-I- Plant taxonomy, Economic botany, Plant anatomy and Embryology

- The specific outcome of this programme is to identify the plants and taxonomic characters of different families with practical knowledge and knowledge of system of classification.
- To learn the knowledge of the economic importance and utilization of plants
- To learn the knowledge of anatomical structure and development of flowering plants.
- To gain the knowledge of the shoot and root system.
- To learn the knowledge of the structure, development and reproduction in flowering plants.

B. Sc. Part-II

Paper-II- Ecology and Plant physiology

- To learn about the environment, ecology and ecosystem with the practical Knowledge.
- To understand of the physiology of plants with practical knowledge.

- To learn the knowledge of the growth and development in plants.

B. Sc. Part-III

Paper-I- Analytical technology, plant pathology, experimental embryology, elementary biostatistics, environmental pollution and conservation

- To develop skills of analytical technology and plant tissue culture.
- To learn about plant pathology including epidemiology and etiology of different plant diseases.
- To learn about environmental pollution and conservation.
- To understand the practical feasibility of the elementary biostatistics.

B. Sc. Part-III

Paper-II- Genetics, Molecular biology, Biotechnology and Biochemistry

- To learn of the structure, molecular aspects and function of plant cell including plasma membrane, cell wall and different cell organelles.
- To know the process of cell division with practical related to it.

- To understand genetics including chromosomal organization, DNA, RNA, Gene expression, Protein synthesis, Proteins as well as Mendel's Law.
- To learn the principles, techniques and application of genetic engineering, biotechnology.
- To gain knowledge about proteins, carbohydrates, fat and enzymes with practicals.

Course Outcomes (CO)

B. Sc. Part-I

Paper-I-Bacteria, Viruses, Fungi, Lichen and Algae

Upon completion of this course students will be able:

- To gain the knowledge about the basic microbial characteristics, structure, reproduction and economic importance of Bacteria, Virus, Mycoplasma, Lichen and blue green algae..
- To acquire the knowledge of classification, characteristic features, life history and economic importance of algae with practical knowledge.
- To know the General account, classification, characteristic features, structure, life history and economic importance of fungi with practical knowledge.
- To develop skills of mushroom technology.

B. Sc. Part-I

Paper-II-Bryophytes, Pteridophytes, Gymnosperms and Palaeobotany

Upon completion of this course students will be able:

- To know the classification, characteristic features, structure and life cycle of Bryophytes with practical knowledge.
- To know the classification, characteristic features, structure and life cycle of Pteridophytes with practical knowledge.
- To know the classification, characteristic features, structure and life cycle of Gymnosperms with practical knowledge.
- To acquire knowledge the fossils, fossilization under the palaeobotany and fossil gymnosperms.

B. Sc. Part-II

Paper-I- Plant taxonomy, Economic botany, Plant anatomy and Embryology

Upon completion of this course students will be able:

- To identify the plants and taxonomic characters of different families with practical knowledge and knowledge of system of classification.
- To learn the knowledge of the economic importance and utilization of plants
- To gain the knowledge of anatomical structure and development of flowering plants.
- To study the knowledge of the shoot and root system.
- To acquire the knowledge of the structure, development and reproduction in flowering plants.

B. Sc. Part-II

Paper-II- Ecology and Plant physiology

Upon completion of this course students will be able:

- To gain the knowledge of the environment, ecology and ecosystem with the practical Knowledge.
- To acquire complete knowledge about plant physiology with practical knowledge and also can engaged in research work.

B. Sc. Part-III

Paper-I- Analytical technology, plant pathology, experimental embryology, elementary biostatistics, environmental pollution and conservation

Upon completion of this course students will be able:

- To gain the knowledge and skills of analytical technology and
- To gain the knowledge and skills of plant tissue culture.
- To learn about plant pathology including epidemiology and etiology of different plant diseases.
- To acquire knowledge about environmental pollution and conservation.
- To understand the practical feasibility of the elementary biostatistics.

B. Sc. Part-III

Paper-II- Genetics, Molecular biology, Biotechnology and Biochemistry

Upon completion of this course students will be able:

- To gain the knowledge of the structure, molecular aspects and function of plant cell including plasma membrane, cell wall and different cell organelles.
- To know the process of cell division with practical related to it.
- To understand genetics including chromosomal organization, DNA, RNA, Gene expression, Protein synthesis, Proteins as well as Mendel's Law.
- To acquire knowledge relevant to the principles, techniques and application of genetic engineering, biotechnology.
- To gain the knowledge of proteins, carbohydrates, fat and enzymes with practicals.

Programme Outcomes (PO)

M. Sc. – Botany Programme

Programme outcomes of M. Sc. Botany are to gain scientific knowledge, critical thinking, persistent learning, ethical, social, environmental and professional understanding and to develop innovative ideas, leadership and entrepreneur skills for the recognition at local, national and global level, these are as follows:

M. Sc. Semester I

Paper-I-Cell Biology of Plants

- To gain the knowledge of structural organization of plant cell, cell wall and plasma membrane as well as cell organelles.
- To acquire the knowledge of the cell division and cell cycle.
- To gain the knowledge of the apoptosis and cytology of cancer.

M. Sc. Semester I

Paper-II-Cytology, Genetics and Cytogenetics

- To gain the knowledge of structural organization of chromosome.
- To acquire the knowledge of the genetics of prokaryotes and eukaryotes.
- To gain the knowledge of the detail of genetic recombination and genetic mapping.
- To acquire the knowledge of the molecular basis of DNA.

M. Sc. Semester I

Paper-III-Molecular Biology of Plants

- To acquire the knowledge of structural organization of DNA and RNA.
- To gain the knowledge of the molecular basis of protein synthesis.
- To acquire the knowledge of the techniques related to molecular biology.

M. Sc. Semester I

Paper-IV-Biology and Diversity of Viruses, Bacteria, Algae and Fungi

- To gain the knowledge of structural organization and economic importance of viruses, bacteria, cyanobacteria and phytoplasma.
- To acquire the knowledge of the classification, structure and reproduction of algae.
- To acquire the knowledge of the classification, structure and reproduction of fungi.

M. Sc. Semester II

Paper-I-Taxonomy and Diversity of Bryophytes, Pteridophytes and Gymnosperms

- To gain knowledge about classification, structural organization, reproduction and economic importance of Bryophytes, Pteridophytes and Gymnosperms.

M. Sc. Semester II

Paper-II-Taxonomy and Diversity of Angiosperms

- To acquire the knowledge of classification of angiosperms.
- To gain knowledge about the dicotyledonous families.
- To acquire the knowledge of the monocotyledonous families.
- To gain knowledge about the taxonomic evidences.

M. Sc. Semester II

Paper-III-Plant Growth and Development

- To gain knowledge of seed germination and seedling growth.
- To acquire the knowledge of the leaf growth and differentiation.
- To gain knowledge of the Root System and development.
- To acquire the knowledge of the shoot system and development.

M. Sc. Semester II

Paper-IV-Reproduction and embryology of Angiosperms

- To acquire the knowledge of reproduction and embryology of angiosperms.
- To gain knowledge of the seed development and fruit growth and maturation.
- To acquire the knowledge of the seed dormancy, bud dormancy, senescence and programmed cell death.

M. Sc. Semester III

Paper-I-Plant Ecology

- To gain knowledge of ecosystem organization.
- To acquire the knowledge of vegetative organization and development.
- To gain knowledge of the ecology including climatic factors, soil, water and air.
- To acquire the knowledge of the biological diversity.
- To gain knowledge of the climatic changes and ecological stability.

M. Sc. Semester III

Paper-II-Plant Utilization and Conservation

- To acquire the knowledge of the plant diversity and sustainable development.
- To gain knowledge of the origin, evolution cultivation of plants with their utilization.
- To acquire the knowledge of the strategies of conservation.

M. Sc. Semester III

Paper-III-Plant Physiology

- To gain knowledge of the plant physiology.
- To acquire the knowledge of the stress physiology.

M. Sc. Semester III

Paper-IV-Plant Metabolism

- To acquire the knowledge of the process of energy production.
- To gain knowledge of the mechanism of signal transduction.
- To acquire the knowledge of the biosynthesis of starch, sucrose and lipid with its metabolism.
- To gain knowledge of the process of flowering , growth regulators.

M. Sc. Semester IV

Paper-I-Biotechnology and Genetic Engineering of Plants

- To gain knowledge of the Biotechnology of plants and its applications.
- To acquire the knowledge of the genetic engineering of plants and its applications.

M. Sc. Semester IV

Paper-II-Biotechnology and Genetic Engineering of Microbes

- To acquire the knowledge of the Biotechnology and genetic engineering of microbes and its applications.

- To gain knowledge of the genetic engineering of microbes and its applications in different industries.

M. Sc. Semester IV

Paper-III-Molecular Plant Pathology

- To gain knowledge of the plant pathology including different types of pathogens, plant diseases, pathogenesis, defense mechanism.
- To acquire the knowledge of the effect of environment on diseases development, epidemiology and disease forecasting.

M. Sc. Semester IV

Paper-IV-Plant Disease and Control Mechanism

- To acquire the knowledge of the plant diseases due to different types of pathogens.
- To gain knowledge of the principles of plant disease control and plant quarantine.

Programme Specific Outcomes (PSO)
M.Sc. Botany Programme

M. Sc. Semester I

Paper-I-Cell Biology of Plants

- Understanding structural organization of plant cell.
- Knowing the structural organization and function of Plasma membrane, cell wall, plasmodesmata.
- Understanding structural organization and function of different cell organelles.
- Know the process of cell cycle and cell division with practical knowledge.
- Know the mechanism of apoptosis and cytology of cancer.

M. Sc. Semester I

Paper-II-Cytology, Genetics and Cytogenetics

- Understanding structural organization of chromosome.
- Knowing the different types of chromosomal alteration.
- Understanding the structure of gene and gene expression in prokaryotes and eukaryotes.
- Knowing the detail of mutation, genetic recombination and genetic mapping.
- Understanding the molecular basis of DNA.

M. Sc. Semester I

Paper-III-Molecular Biology of Plants

- Understanding structural organization of DNA and RNA.
- Knowing the process of protein synthesis in detail.
- Understanding the techniques related to molecular biology.

M. Sc. Semester I

Paper-IV-Biology and Diversity of Viruses, Bacteria, Algae and Fungi

- Understanding structural organization and economic importance of viruses, bacteria, cyanobacteria and phytoplasma with practical.
- Knowing classification, structural organization, reproduction and economic importance of algae in detail with practical.
- Understanding classification, structural organization, reproduction and economic importance of fungi in detail with practical knowledge.

M. Sc. Semester II

Paper-I-Taxonomy and Diversity of Bryophytes, Pteridophytes and Gymnosperms

- Understanding classification, structural organization, reproduction and economic importance of bryophytes with practical.
- Acquiring knowledge of classification, structural organization, reproduction and economic importance of Pteridophytes with practical.
- Understanding classification, structural organization, reproduction and economic importance of gymnosperms with practical.

M. Sc. Semester II

Paper-II-Taxonomy and Diversity of Angiosperms

- Understanding different system classification of angiosperms.
- Acquiring knowledge of taxonomic hierarchy, plant nomenclature and identification.
- Understanding the dicot families in detail economic importance with practical knowledge.
- Acquiring knowledge of the monocot families in detail with economic importance with practical knowledge.
- Understanding the evidences related to taxonomy.

M. Sc. Semester II

Paper-III-Plant Growth and Development

- Acquiring knowledge of the details of seed germination and seedling growth with practicals.
- Understanding the detail of leaf growth ant differentiation with practicals
- Understanding the root system and development with practicals.
- Acquiring knowledge of the shoot system and development with practical.

M. Sc. Semester II

Paper-IV-Reproduction and embryology of Angiosperms

- Understanding the details reproduction in angiosperms with practicals.
- Acquiring knowledge of the detail of embryology with practicals.
- Understanding the seed development and fruit growth and maturation with practical knowledge.
- Understanding the process of seed dormancy and bus dormancy.
- Understanding the knowledge of senescence and programmed cell death.

M. Sc. Semester III

Paper-I-Plant Ecology

- Understanding the ecology and ecosystem in detail.
- Acquiring knowledge of the detail of vegetation organization and development.
- Understanding the different biotic factors and climatic factors soil, air and water related to ecology.
- Acquiring knowledge of the biological diversity and its conservation.
- Understanding the knowledge of climatic changes and ecological stability.

M. Sc. Semester III

Paper-II-Plant Utilization and Conservation

- Understanding the plant diversity and sustainable development.
- Knowing the detail of origin, evolution, cultivation of plants with their utilization.

- Understanding the biological diversity and its conservation techniques and agencies related to it.

M. Sc. Semester III

Paper-III-Plant Physiology

- Understanding the plant physiology including translocation of water, solutes and membrane transport.
- Acquiring knowledge of the detail of photosynthesis and carbon assimilation.
- Understanding the sensory photobiology
- Understanding the physiology of respiration.
- Knowing the stress physiology.

M. Sc. Semester III

Paper-IV-Plant Metabolism

- Understanding the process of energy production through ATP.
- Understanding the detail of signal transduction and its mechanism.
- Acquiring knowledge of the biosynthesis and metabolism of starch, sucrose and lipids with practical knowledge.
- Knowing the process of flowering and its regulation.
- Understanding the plant growth regulators with mechanism of action with practicals.

M. Sc. Semester IV

Paper-I-Biotechnology and Genetic Engineering of Plants

- Understanding the concepts, principles and application of biotechnology.
- Acquiring knowledge of the plant cell and tissue culture and its applications with skill.
- Understanding the concepts, principles and applications of plant genetic engineering.

M. Sc. Semester IV

Paper-II-Biotechnology and Genetic Engineering of Microbes

- Understanding the concepts, principles and application of recombinant DNA technology and its application.
- Understanding the genomics and proteomics.
- Acquiring the knowledge of the concepts, principles of microbial genetic manipulation.
- Knowing the details of application of genetic improvement of industrial microbes.

M. Sc. Semester IV

Paper-III-Molecular Plant Pathology

- Acquiring the knowledge of the concepts and principles of plant pathology including plant and pathogen relationship.
- Understanding the plant disease inciting organisms with practical knowledge.
- Understanding the process of pathogenesis and disease symptoms with practical knowledge
- Knowing the details of defense mechanism.
- Knowing the details of effect of environment of disease development, epidemiology and disease forecasting.

M. Sc. Semester IV

Paper-IV-Plant Disease and Control Mechanism

- Acquiring the knowledge of the diseases due to fungi and its control with practical knowledge.
- Understanding the diseases due to bacteria and its control with practical knowledge.
- Acquiring the knowledge of the diseases due to viruses and its control with practical knowledge.
- Understanding the diseases due to mycoplasma and its control with practical knowledge.
- Acquiring the knowledge of the diseases due to nematodes and its control with practical knowledge.
- Understanding the non parasitic disease.
- Knowing the principles of plant disease control and plant quarantines.

Course Outcomes (CO)
M.Sc. Botany Programme

M. Sc. Semester I

Paper-I-Cell Biology of Plants

Upon completion of this course students will be able:

- To know about structural organization of plant cell.
- To understand the structural organization and function of Plasma membrane, cell wall, plasmodesmata.
- To learn about structural organization and function of different cell organelles.
- To know the process of cell cycle and cell division with practical knowledge.
- To gain knowledge about the mechanism of apoptosis and cytology of cancer.

M. Sc. Semester I

Paper-II-Cytology, Genetics and Cytogenetics

Upon completion of this course students will be able:

- To learn about structural organization of chromosome.
- To have knowledge about the different types of chromosomal alteration.
- To learn about the structure of gene and gene expression in prokaryotes and eukaryotes.
- To know the detail of mutation, genetic recombination and genetic mapping.
- To understand the molecular basis of DNA.

M. Sc. Semester I

Paper-III-Molecular Biology of Plants

Upon completion of this course students will be able:

- To have knowledge about structural organization of DNA and RNA.
- To learn about the process of protein synthesis in detail.
- To understand the techniques related to molecular biology.

M. Sc. Semester I

Paper-IV-Biology and Diversity of Viruses, Bacteria, Algae and Fungi

Upon completion of this course students will be able:

- To learn about the structural organization and economic importance of viruses, bacteria, cyanobacteria and phytoplasma with practical.
- To understand the classification, structural organization, reproduction and economic importance of algae in detail with practical.
- To have knowledge about classification, structural organization, reproduction and economic importance of fungi in detail with practical knowledge.

M. Sc. Semester II

Paper-I-Taxonomy and Diversity of Bryophytes, Pteridophytes and Gymnosperms

Upon completion of this course students will be able:

- To learn about the classification, structural organization, reproduction and economic importance of bryophytes with practical.
- To know about the classification, structural organization, reproduction and economic importance of pteridophytes with practical.
- To have knowledge about classification, structural organization, reproduction and economic importance of gymnosperms with practical.

M. Sc. Semester II

Paper-II-Taxonomy and Diversity of Angiosperms

Upon completion of this course students will be able:

- To understand different system classification of angiosperms.
- To have knowledge about taxonomic hierarchy, plant nomenclature and identification.
- To learn about the dicot families in detail economic importance with practical knowledge.
- To have knowledge about the monocot families in detail with economic importance with practical knowledge.
- To learn about the evidences related to taxonomy.

M. Sc. Semester II

Paper-III-Plant Growth and Development

Upon completion of this course students will be able:

- To have knowledge about the details of seed germination and seedling growth with practicals.
- To learn about the detail of leaf growth ant differentiation with practicals
- To know the root system and development with practicals.
- To know the shoot system and development with practical.

M. Sc. Semester II

Paper-IV-Reproduction and embryology of Angiosperms

Upon completion of this course students will be able:

- To know the details reproduction in angiosperms with practicals.
- To have knowledge about the detail of embryology with practicals.
- To understand the seed development and fruit growth and maturation with practical knowledge.
- To learn about the process of seed dormancy and bus dormancy.
- To have complete knowledge of senescence and programmed cell death.

M. Sc. Semester III

Paper-I-Plant Ecology

Upon completion of this course students will be able:

- To gain the knowledge about the ecology and ecosystem in detail.
- Understanding the detail of vegetation organization and development.
- To understand the different biotic factors and climatic factors soil, air and water related to ecology.
- To gain the knowledge of the biological diversity and its conservation.
- To understand the knowledge of climatic changes and ecological stability.

M. Sc. Semester III

Paper-II-Plant Utilization and Conservation

Upon completion of this course students will be able:

- To understand the plant diversity and sustainable development.
- To gain the knowledge of origin, evolution, cultivation of plants with their utilization.
- To learn about the biological diversity and its conservation techniques and agencies related to it.

M. Sc. Semester III

Paper-III-Plant Physiology

Upon completion of this course students will be able:

- To understand the plant physiology including translocation of water, solutes and membrane transport.
- To learn about the detail of photosynthesis and carbon assimilation.
- To understand the sensory photobiology
- To know the physiology of respiration.
- To know about the stress physiology.

M. Sc. Semester III

Paper-IV-Plant Metabolism

Upon completion of this course students will be able:

- To understand the process of energy production through ATP.
- To learn and understand the details of signal transduction and its mechanism.
- To know the biosynthesis and metabolism of starch, sucrose and lipids with practical knowledge.
- To gain the knowledge of the process of flowering and its regulation.
- To understand the plant growth regulators with mechanism of action with practicals.

M. Sc. Semester IV

Paper-I-Biotechnology and Genetic Engineering of Plants

Upon completion of this course students will be able:

- To learn and understand the concepts, principles and application of biotechnology.
- To gain the knowledge the plant cell and tissue culture and its applications.
- Understanding the concepts, principles and applications of plant genetic engineering.

M. Sc. Semester IV

Paper-II-Biotechnology and Genetic Engineering of Microbes

Upon completion of this course students will be able:

- To learn and understand the concepts, principles and application of recombinant DNA technology and its application.
- To gain the knowledge the genomics and proteomics.
- To understand the concepts, principles of microbial genetic manipulation.
- To know the details of application of genetic improvement of industrial microbes.

M. Sc. Semester IV

Paper-III-Molecular Plant Pathology

Upon completion of this course students will be able:

- To learn and understand the concepts and principles of plant pathology including plant and pathogen relationship.
- To gain the knowledge the plant disease inciting organisms with practical knowledge.
- To learn and understand the process of pathogenesis and disease symptoms with practical knowledge
- To understand the details of defense mechanism.
- Toknow the details of effect of environment of disease development, epidemiology and disease forecasting.

M. Sc. Semester IV

Paper-IV-Plant Disease and Control Mechanism

Upon completion of this course students will be able:

- To learn and understand the diseases due to fungi and its control with practical knowledge.
- To learn and understand the diseases due to bacteria and its control with practical knowledge.
- To learn and understand the diseases due to viruses and its control with practical knowledge.
- To learn and understand the diseases due to mycoplasma and its control with practical knowledge.
- To learn and understand the diseases due to nematodes and its control with practical knowledge.
- To learn about the non parasitic disease.
- To gain the knowledge of the principles of plant disease control and plant quarantines.