

DEPARTMENT OF BOTANY

Subject: Botany

Semester-Ist

Paper: Biodiversity (Microbes, Fungi & Archegoniate)

Learning Objectives and Learning Outcomes

Learning objectives:

To acquaint students with the basic concepts of microbial diversity of bacteria, virus and microbes. To study systematic position, structure and function of Algae and fungi. To complement the students with the basic knowledge and diversity of Plants. To understand the life cycle patterns of Algae and fungi, to study the useful and harmful bacteria and virus, students will be able to understand the basic knowledge of plants. To study salient features of Archegoniate, to study the life cycle of selected genera, to study economic and ecological importance of Archegoniate.

Learning Outcome:

After successful completion of this course students are expected to:

Understand the basic microbial structure and study the comparative characteristics of prokaryotes and eukaryotes and also understand the structural similarities and differences among various physiological groups of bacteria/ archegoniate. Know general bacteriology and microbial aspects pertinent to bacteria, fungi and algae. To understand the life cycle patterns of Algae and Fungi, to study the useful and harmful bacteria and virus.

After successful completion of this course students are expected to:

To study the economic importance of bryophytes, pteridophytes and gymnosperms.

COURSE TITLE: PLANT ECOLOGY AND TAXONOMY

(B.Sc. Botany CBCS Syllabus)

Semester: II

Learning objectives

- To understand students the basic concept of Ecology
- To have an insight in to Soil Profile
- To understand the different States of Water in the Environment
- To make them understand the different Types pf Precipitation
- To understand the concept of light and its Relation to Plants
- To understand the concept of Temperature and its Relation to Plants
- To make students aware about the Ecological Adaptation of Hydrophytes, Xerophytes and Mesophytes
- To give a general idea about the characteristics of a Plant Community
- To give an idea about the Characters used in Community Structure
- To make them understand the concept of Ecotone and Edge Effect
- To make them understand the concept of Ecological Succession, the Processes involved in it and the Types of Ecological Succession
- To understand them the Structure and functions of Ecosystem
- To know the Energy Flow in an Ecosystem
- To understand the Trophic Organization in an Ecosystem
- To understand the Food Chains and Food Webs in an ecosystem
- To have an insight in to Ecological Pyramids
- To understand the Productivity of Ecosystem
- To make students understand the Cycling of Carbon, Nitrogen, Phosphorus
- To make students aware about the Principle Biogeographical Regions of the World
- To understand them the Concept of Endemism
- To give a general idea about Plant Taxonomy
- To understand the students the Components of Taxonomy
- To make them aware about the Types of Classification
- To make students understand the Bentham and Hooker System of Classification and its merits and demerits
- To make students understand Angiosperm Phylogeny Group (APG) and its merits and demerits
- To give an idea of Numerical Taxonomy and make them understand its Principles
- To give a general concept Operational Taxonomic Units
- To understand the Character Coding and Weighing and its applications
- To give an insight in to Cluster Analysis
- To understand the concepts of Phenograms and Cladograms
- To understand the concept and history of Herbarium and its Purpose
- To make them understand the Methods of Making Herbarium Sheets
- To make the students aware about Important Herbaria of India and World

- To understand the concept and history of Botanic Gardens
- To give an insight into the Criteria for Recognition as a Botanical Garden
- To make the students aware about the Important Botanic Gardens of India and World
- To give a brief account of Flora and Its Types
- To make them understand the Keys and Its Types-Single Access and Multi-Access Keys
- To give a general idea about the taxonomic evidences.
- To understand the Cytological, Phytochemical and the Evidences from Molecular Biology in Relation to Taxonomy
- To give a general idea about Taxonomic Hierarchy
- To understand various Taxonomic Ranks and Categories and Taxonomic Groups
- To give a general concept of ICBN and its Principles
- To understand the Binomial System of Nomenclature
- To make them understand the concepts like Typification, Author Citation, Valid Publication, Principal Of Priority

PLANT ANATOMY AND EMBRYOLOGY Course

COURSE TITLE: PLANT ANATOMY AND EMBRYOLOGY

Semester: III

Learning Objectives

- To understand the basic body plan of a flowering plant.
- To understand the fundamental parts of the plant body.
- To understand the cell types and tissues of a plant.
- To understand plant tissues and their various types.
- To understand simple and permanent tissues.
- To know about the types of Simple tissues.
- To give students idea about parenchyma and collenchyma.
- To understand them about sclerenchyma tissue and its types.
- To understand the functions of simple tissues.
- To know about the types of Complex tissues.
- To understand them the structure of xylem and its various components.
- To understand them the structure of phloem and its various components.
- To understand the functions of xylem and phloem.
- To make them understand the tissue system of a plant.
- To make them aware about the types of tissue systems.
- To understand them about the epidermal or tegumentary tissue system.
- To understand them about ground or fundamental tissue system.
- To make them aware about the vascular tissue system.
- To give students the general idea about the meristems.
- To aware them about initials and derivatives.
- To learn about the various types of the meristem.
- To know about the root apical meristem.
- To gain an insight into various theories of root apical meristem.
- To understand them the Korper-Kappe Concept and Quiescent Centre concept.
- To aware students about the apical meristems
- To understand them the vegetative shoot apex.
- To know about the shoot apical meristem.
- To gain an insight into various theories of shoots apical meristem.
- To give students general idea about the origin of root.
- To understand the basic difference between monocots and dicots.
- To understand students the general characteristics of a root.
- To understand the anatomical characteristics of the root.
- To know the basic structure of the root.

- To understand the anatomy of a typical monocot root.
- To learn about dicot roots.
- To understand students the general characteristics of a root.
- To understand the anatomical characteristics of the root.
- To study the anatomy of a typical Dicot root.
- To give students general idea about the origin of stem.
- To understand them the primary difference between monocotyledonous and dicotyledonous stems.
- To understand them the variations in the structure of stem.
- To make them aware about the anatomical structure of a typical monocot stem.
- To understand students the secondary growth in monocots.
- To make students aware about root-stem transitions.
- To know the basic structure of the stem.
- To understand them the anatomical structure of atypical dicot stem.
- To understand them the secondary growth in dicot stem.
- To understand the basic structure of the leaf.
- To describe the anatomical structure of a typical monocot leaf.
- To understand the anatomical structure of a petiole.
- To understand students the anatomy of phyllode.
- To understand the basic structure of leaf.
- To describe the anatomical structure of dicot leaf.
- To understand the anatomical structure of a petiole.
- To understand students the anatomy of phyllode.
- To understand them about abscission of leaves.
- To give a general idea about the cambium.
- To know the origin of cambium.
- To understand the cellular structure of the vascular cambium.
- To know the types of vascular cambium.
- To understand the functions of the vascular cambium.
- To know about the secondary growth.
- To know about the lateral meristems.
- To know about the secondary growth in non-woody plants.
- To give them understand the abnormal secondary growth.
- To know about the secondary growth in dicot root.
- To understand them the growth in the stelar region of the root.
- To understand them the growth in the extra-stelar region of the root.
- To know about the secondary growth in typical dicot stem.
- To understand them the growth in the stelar region of the stem.

- To understand them the growth in the extra-stelar region of the stem.
- To make them understand the formation and activity of cambium.
- To understand them the growth rings.
- To give a general account of wood.
- To describe the structure of wood.
- To understand them the physical properties of wood.
- To understand them about hard wood and soft wood.
- To know them about chemistry of wood.
- To understand them the domestic and commercial uses of wood.
- To understand the description of cuticle.
- To make them aware about the composition of cuticle.
- To understand the students about the structure of cuticle.
- To make them aware about the evolution of cuticle.
- To understand them the functions of cuticle.
- To understand the description of epidermis.
- To know about the structure of epidermis.
- To understand them about guard cells.
- To make them aware about cell differentiation in epidermis.
- To discuss the functions of epidermis
- To give a general idea about stomata.
- To know the various types of stomata.
- To understand the general structure of stomata.
- To understand the mechanism of opening and closing of stomata.
- To know the various factors affecting the stomatal movement.
- To understand the various functions of stomata.
- To give a general idea about plant adaptations.
- To know about the various categories of plants based on their response to water.
- To discuss the morphological and anatomical adaptations in xerophytes.
- To discuss the morphological and anatomical adaptations in hydrophytes.
- To acquaint students briefly with the structure of the flower and its various parts.
- To know the students the morphological nature of the flower.
- To understand the structural organization of a flower.
- To study in detail the structure of anther.
- To know the various layers of the anther.
- To understand the development of anther.
- To understand the process of formation of pollen grains.
- To understand the structure of pollen grains.
- To know the types of pollen tetrads.
- To know the development of male gametophyte.

- To know the basic structure of an angiospermic ovule.
- To know the development of an ovule.
- To know the parts of an ovule.
- To know the various types of an ovule.
- To make them aware about the arrangement of ovules in an ovary.
- To understand the basic structure of an embryo sac.
- To understand the various components of an embryo sac.
- To understand the various types of embryo sacs.
- To know the nutrition of the embryo sacs.
- To understand the mechanism of pollination.
- To understand the types of pollination.
- To make them understand the dehiscence of anther
- To understand the adaptations for self-pollination.
- To understand the adaptations for cross-pollination.
- To know the various agents of cross-pollination.
- To know the structure of wind-pollinated flowers.
- To know the structure of insect-pollinated flowers.
- To know the structure of bird-pollinated flowers.
- To know the structure of bat-pollinated flowers.
- To gain an insight in to the basic process of fertilization in plants.
- To understand the germination of pollen grains.
- To understand the growth of pollen tube.
- To know the entry of pollen tube in to ovule and in to the embryo sac.
- To understand the movement of male gametes towards egg and polar nuclei.
- To understand the fusion of gametes.
- To understand the mechanism of double fertilization.
- To know the significance of double fertilization.
- To give students an idea about sexual incompatibility.
- To make them aware about the physiology and biochemistry of incompatibility.
- To understand them about the genetic basis of self-incompatibility.
- To make them aware about the various methods to overcome incompatibility.
- To understand them about the biological significance of incompatibility.
- To give an idea about the structure of a seed.
- To understand them the diversity and morphology in seeds.
- To understand the students the process of development of a seed.
- To understand them the functions of seed.
- To understand the mechanism of seed dispersal.
- To understand the various agencies of seed dispersal.
- To know the dispersal of seeds by wind.

- To know the dispersal of seeds by water.
- To know the dispersal of seeds by animals.
- To know the dispersal of seeds by explosive mechanisms.
- To know the significance of seed dispersal.
- To give them a general idea about the fruits.
- To make them aware about the events leading to fruit formation.
- To make them understand the effect of developing seed on fruit development.
- To understand them the nature of seed effect on fruit development.
- To aware them about the fruit wall.
- To give them a general idea about the parthenocarpy.
- To become aware about the endosperm.
- To understand the process of formation of endosperm.
- To understand the structure of endosperm.
- To know the functions of endosperm.
- To give a brief account of the endosperm.
- To know about the types of endosperm.
- To know the development of each type of endosperm.
- To know about the morphological nature of endosperm.
- To give a general idea about the embryo.
- To know the general laws of embryo formation.
- To understand the structure of monocot embryo.
- To understand the development of monocot embryo.
- To make them understand the physiological and genetical control of embryogenesis.
- To understand the nutrition of the embryo.
- To give a general idea about the embryo.
- To understand the structure of dicot embryo.
- To understand the development of dicot embryo.
- To make them understand the physiological and genetical control of embryogenesis.
- To understand the nutrition of the embryo.
- To have an insight in to the concept of apomixis.
- To understand them the types of apomixis.
- To make them aware about the genetics of apomixis.
- To make them to understand the various techniques to screen apomictics.
- To understand them the practical applications of apomixis.
- To aware students about the concept of polyembryony.
- To understand them the origin of polyembryony.
- To understand them the causes of polyembryony.
- To understand them the classification of polyembryony.

- To understand the various factors affecting the growth of embryoids.
- To understand the practical applications of polyembryony.
- To give a general idea about vegetative propagation.
- To understand the mechanism of vegetative propagation.
- To make them understand the various types of vegetative propagation.
- To understand the advantages and disadvantages of vegetative propagation.
- To make them aware of the embryological characters which have proved of special importance in taxonomic considerations.
- To make them aware about some of the families especially marked out by their embryological features.
- To make them understand the various examples of the value of embryology in taxonomy.
- Also to make them understand the role of palynology in solving taxonomic problems.

Paper Title: Plant Physiology and Metabolism Semester: 4th

Learning Objectives:

Course Objectives: The main objective of the paper includes:

1. To educate student about the mechanism and physiology of life processes in plants. It focuses on the plant nutrient uptake and translocation, photosynthesis, respiration and nitrogen metabolism.
2. Critical knowledge of phyto-hormone biosynthesis, mode and mechanism of action will be highlighted.
3. Students will be oriented into developing a molecular understanding of the principles of photosynthesis and photomorphogenesis, molecular basis of nutrient uptake
4. To illustrates knowledge of stress adaptations in biological systems
5. To present perspectives of the current tools for application in biological system for Physiological research.

Course Learning Outcomes:

1. Students will be able to understand the various physiological life processes in plants
2. They will also gain about the various uptake and transport mechanisms in plants
3. They understand the role of various hormones, signaling compounds, thermodynamics and enzyme kinetics.
4. During the course students will gain knowledge about various mechanisms such as channel or transport proteins involved in nutrient uptake in plants.

4th Semester

Medicinal Botany-II(SEC)

Learning objectives :

To learn about propagation of medicinal plants.

To study the drug development from medicinal plants.

To understand the traditional systems of medicines like Ayurvedic, Siddha and Unani.

To know the pharmacological actions of plant drugs.

To obtain knowledge on the various secondary metabolites in medicinal plants.

Learning Outcomes :

Describe various categories of plant drugs.

Describe various medicinal practices.

Understand solution to develop a wide variety of plants through vegetative propagules.

To ensure knowledge on resource conservation.

Acquire knowledge on the therapeutic uses of plant drugs.

Understand the traditional and modern system of medicine.

Paper: Cell & Molecular Biology (DSE)

Learning Objectives

“Cell & molecular Biology” means to study the ruling the cell’s physiology and Molecular processes occurring in a cell.

The various goals of the Course include:

1. Introduce the student into the world of Molecular Biology
2. Help the student to know the general structure, organization and function of eukaryotic cell organelles & thus eukaryotic cell.
3. We aim to transmit the student how morphology, structure and function are connected.
4. To understand the transfer of genetic information from nucleic acid till protein synthesis and cell function.
5. To help the student to understand the bases of basic research in molecular and cellular biology.

The learning objectives of the Skill course “Biofertilizers” in Botany are as:

1. Students should be able to understand what biofertilizers mean.
2. They should understand what types of microbes constitute potential biofertilizer candidates (nitrogen fixers, symbionts, endophytes).
3. Students should be able to isolate and purify such candidate microbes and understand how to test them for their potential.
4. Students should get an idea about how to grow such candidate microbes in larger volumes and develop them into biofertilizers using suitable carrier material.
5. Students should become able to analyze factors affecting and conditions required for improvement of crop productivity viz. soil type, soil composition, climatic conditions, irrigation and fertilizer/ nutrient requirements.
6. Students should be able to understand the importance and methodology for application of biofertilizers in the field to yield higher crop productivity in a sustainable manner.

Subject: Botany

Semester-6th

Paper title: Genetics and Plant Breeding (DSE)

Learning Objectives

1. To make students understand how characters are transferred from one generation to another, what controls inheritance of characters, what are genes or factors, how presence of factors of one character interact with factors of other characters.
2. To make students aware about what is a chromosome, how chromosomes act as carriers of genes, why and how some genes remain linked, what is crossing over and how reshuffling of genes takes place.
3. To make students understand numerical and structural changes in chromosomes.
4. To make students aware about origin of crops, centre of origin and various methods of selection in crops.
5. To make students aware about the various methods of crop improvement, role of selection, polyploidy, hybridization and point mutations in crop improvement.

Learning Outcomes

After successful completion of this course students are expected to:

Understand the mechanism of inheritance, concept of genes controlling expression of characters, location of genes on chromosomes, changes in chromosome number, crop improvement and methods of crop improvement.

Subject: Botany

Semester-6th

Paper title: Genetics and Plant Breeding (DSE)

Learning Objectives

1. To make students understand how characters are transferred from one generation to another, what controls inheritance of characters, what are genes or factors, how presence of factors of one character interact with factors of other characters.
2. To make students aware about what is a chromosome, how chromosomes act as carriers of genes, why and how some genes remain linked, what is crossing over and how reshuffling of genes takes place.
3. To make students understand numerical and structural changes in chromosomes.
4. To make students aware about origin of crops, centre of origin and various methods of selection in crops.
5. To make students aware about the various methods of crop improvement, role of selection, polyploidy, hybridization and point mutations in crop improvement.

Learning Outcomes

After successful completion of this course students are expected to:

Understand the mechanism of inheritance, concept of genes controlling expression of characters, location of genes on chromosomes, changes in chromosome number, crop improvement and methods of crop improvement.

Semester: 6Th (SEC)

Title of the Paper: Preservation of fruits & Vegetables

Learning Objectives

1. To make students understand the concept of preservation, principles of preservation and methods of preservation.
2. To make students understand food spoilage and causes and consequences of food spoilage.
3. To make students understand food processing and packaging and understand the rules and regulations of food processing.
4. To make students learn technique of preparation of jams, jellies and chutneys.

Learning Outcomes

After successful completion of this course students are expected to:

Understand the concept of preservation and learn various techniques of food processing. Adopt these techniques and utilize the knowledge in day today life.