

**GOVERNMENT DEGREE COLLEGE FOR WOMEN (AUTONOMOUS)  
BEGUMPET, HYDERABAD-16  
Affiliated To Osmania University, Re-Accredited With 'B+' Grade by NAAC**



**DEPARTMENT OF BOTANY  
SYLLABUS (2018-19)**

GOVERNMENT DEGREE COLLEGE FOR WOMEN (A) BEGUMPET  
HYDERABAD.

(AUTONOMOUS) CBCS  
DEPARTMENT OF BOTANY

| Code        | Paper/ Title   | Course Type    | HPW     | Credits |
|-------------|--|----------------|---------|---------|
| FIRST YEAR  |  | SEMESTER - I   |         |         |
| BS<br>104   | PAPER-I : Microbial Diversity and Lower Plants             | DSC-1A         | 4T+2P=6 | 4+1=5   |
| FIRST YEAR  |  | SEMESTER - II  |         |         |
| BS<br>204   | PAPER-II: Gymnosperms, Taxonomy of Angiosperms and Ecology | DSC-1B         | 4T+2P=6 | 4+1=5   |
| SECOND YEAR |  | SEMESTER - III |         |         |
| BS<br>301   | SEC-1: Nursery and Gardening                               | SEC I          | 2       | 2       |
| BS<br>302   | SEC-2 Biofertilizers and Organic Farming                   | SEC II         | 2       | 2       |
| BS<br>304   | PAPER-III: Plant Anatomy and Embryology                    | DSC-1C         | 4T+2P=6 | 4+1=5   |
| SECOND YEAR |  | SEMESTER - IV  |         |         |
| BS<br>401   | SEC-3: Greenhouse Technology                               | SEC-3          | 2       | 2       |
| BS<br>402   | SEC-4: Mushroom Culture Technology                         | SEC-4          | 2       | 2       |
| BS<br>404   | PAPER-IV : Cell Biology, Genetics & Plant Physiology       | DSC-1D         | 4T+2P=6 | 4+1=5   |
| BS<br>501   | PAPER-V: Cell Biology & Genetics                           | DSC-1D         | 4T+2P=6 | 4+1=5   |
| BS601       | Paper-VI Ecology and Bio Diversity                         | DSC-1D         | 4T+2P=6 | 4+1=5   |
| BS<br>701   | PAPER-VII: Plant Physiology                                | DSC-1D         | 4T+2P=6 | 4+1=5   |
| BS801       | Paper-VIII : Tissue Culture & Bio Technology               | DSC-1D         | 4T+2P=6 | 4+1=5   |

AECC: Ability Enhancement Compulsory Course, SEC: Skill Enhancement Course, GE: Generic Elective, DSC: Discipline Specific Core, DSE: Discipline Specific Elective.

DEPARTMENT OF BOTANY  
First Year, I -Semester  
Paper-I

Microbial Diversity and Lower Plants Course Code: BOT101

Course Outcomes

- CO1. Understand the characteristics of bacteria and viruses
- CO2. Identify the characteristics of algae
- CO3. Understand the classification and characteristics of fungi
- CO4. Identify the classification and characteristics of bryophytes
- CO 5. Understand the morphological diversity of Bryophytes and Pteridophytes
- CO 6. Know the taxonomic position, occurrence, thallus structure, reproduction of Bryophytes.
- Co7. Know the evolution of Bryophytes and Pteridophytes

**UNIT – I** (15 hours)

- 1) Bacteria: Structure, nutrition, reproduction and economic importance. Brief account of Archaeobacteria, Actinomycetes and Mycoplasma with reference to little leaf of Brinjal and Papaya leaf curl
- 2) Viruses: Structure, replication and transmission; plant diseases caused by viruses and their control with reference to Tobacco Mosaic and Rice Tungro.
- 3) An outline of plant diseases of important crop plants caused by bacteria and their control with reference to Angular leaf spot of cotton and Bacterial blight of Rice.

**UNIT-II** (15 hours)

- 1) General characters, structure, reproduction and classification of algae (Fritsch)
- 2) Cyanobacteria: General characters, cell structure and their significance as biofertilizers with special reference to *Oscillatoria*, *Nostoc* and *Anabaena*.
- 3) Structure and reproduction of the following: Chlorophyceae- *Volvox*, *Oedogonium* and *Chara*; Phaeophyceae- *Ectocarpus*; Rhodophyceae- *Polysiphonia*.

**UNIT-III** (15 hours )

- 1) General characters and classification of fungi (Ainsworth).
- 2) Structure and reproduction of the following: (a) Mastigimycotina- *Albugo*  
(b) Zygomycotina- *Mucor* (c) Ascomycotina- *Saccharomyces* and *Penicillium*.  
(d) Basidiomycotina- *Puccinia* (e) Deuteromycotina- *Cercospora*.
- 3) Economic importance of lichens

**UNIT-IV** (15 hours )

- 1) Bryophytes: **General characters of Bryophytes**, Structure, reproduction, life cycle and systematic position of *Marchantia*, *Anthoceros* and *Polytrichum*, Evolution of Sporophyte in Bryophytes.
- 2) Pteridophytes: **General characters of Pteridophytes**, Structure, reproduction, life cycle and systematic position of *Rhynia*, *Lycopodium*, *Equisetum* and *Marsilea*.
- 3) Stellar evolution, heterospory and seed habit in Pteridophytes.

DEPARTMENT OF BOTANY

First Year, I -Semester

Paper-I

Microbial Diversity and Lower Plants

Practical Syllabus (45 hours)

1. Study of viruses and bacteria using electron micrographs (photographs).
2. Gram staining of Bacteria.
3. Study of symptoms of plant diseases caused by viruses, bacteria, Mycoplasma and fungi:  
Viruses: Tobacco mosaic  
Bacteria: Angular leaf spot of cotton and Rice tungro.  
Mycoplasma: Little leaf of Brinjal and Leaf curl of papaya  
Fungi: White rust on Crucifers, Rust on wheat & Tikka disease of Groundnut.
4. Vegetative and reproductive structures of the following taxa:  
Algae: *Oscillatoria*, *Nostoc*, *Volvox*, *Oedogonium*, *Chara*, *Ectocarpus* and *Polysiphonia*.  
Fungi: *Albugo*, *Mucor*, *Saccharomyces*, *Penicillium*, *Puccinia* and *Cercospora*
5. Section cutting of diseased material infected by Fungi and identification of pathogens as per theory syllabus. White rust of Crucifers, Rust on wheat & Tikka disease of Groundnut.
6. Lichens: Different types of thalli and their external morphology
7. Examination of important microbial, fungal and algal products: Biofertilizers, protein capsules, antibiotics, mushrooms, Agar-agar etc.
8. Field visits to places of algal / microbial / fungal interest (e.g. Mushroom cultivation, water bodies).
9. Study of Morphology (vegetative and reproductive structures) and anatomy of the following Bryophytes: *Marchantia*, *Anthoceros* and *Polytrichum*.
10. Study of Morphology (vegetative and reproductive structures) and anatomy of the following Pteridophytes: *Lycopodium*, *Equisetum* and *Marsilea*.
11. Study of Anatomical features of *Lycopodium* stem, *Equisetum* stem and *Marsilea* petiole & rhizome by preparing double stained permanent mounts.

DEPARTMENT OF BOTANY

First Year, II -Semester

Paper-II

Gymnosperms, Taxonomy of Angiosperms and Ecology

Course Code: BOT201 DSC-1B Credits-4

Theory Syllabus (60 hours)

Course Outcome

After completion of the course the student is able to:

CO1. Understand the diversity of Gymnosperms and economic importance.

CO2. Know the evolutionary trends and affinities of living gymnosperms with respect to external and internal features

CO3. Know the conceptual development of "taxonomy" and "systematics"

CO4. Learn the types of classifications- Natural and phylogenetic.

CO5. Learn about the characters of biologically important families of angiosperms.

CO 6. Know the floral variations in angiospermic families, their phylogeny and evolution.

CO 7. Understand various rules, principles and recommendations of plant nomenclature in plant identification.

CO8. Understand the concept, types, development and functions of various ecosystems and their communication.

CO9. Study of herbarium techniques.

CO 10. Learn the taxonomic evidences from cytological, embryological, numerical and chemicals.

UNIT-I (15 hours )

1) Gymnosperms: **General characters of Gymnosperms**, structure, reproduction and classification (Sporne's). Distribution and economic importance of Gymnosperms.

2) Morphology of vegetative and reproductive parts, systematic position and life cycle of *Pinus* and *Gnetum*.

3) Geological time scale Introduction to Palaeobotany, Types of fossils and fossilization, Importance of fossils.

UNIT-II (15 hours )

1) Introduction: Principles of plant systematics, Types of classification: Artificial, Natural and Phylogenetic; Systems of classification: Salient features and comparative account of Bentham & Hooker and Engler&Prantl classification systems. An introduction to Angiosperm Phylogeny Group (APG).

2) Current concepts in Angiosperm Taxonomy: Embryology in relation to taxonomy Cytotaxonomy, Chemotaxonomy and Numerical Taxonomy.

3) Nomenclature and Taxonomic resources: An introduction to ICN, Shenzhen code – a brief account. Herbarium: Concept, techniques and applications.

UNIT-III (15 hours )

1) Systematic study and economic importance of plants belonging to the following families:

Polypetalae: Annonaceae, Capparidaceae, Rutaceae, Fabaceae (Faboideae/Papilionoideae, Caesalpinioideae, Mimosoideae), Cucurbitaceae

2) Gamopetalae: Apiaceae, Asteraceae, Asclepiadaceae, Lamiaceae, Monochalmydeae: Amaranthaceae, Euphorbiaceae

3) Monocotyledons: Orchidaceae, Poaceae and Zingiberaceae.

**UNIT-IV** (15 hours )

1. Component of Eco system, energy flow, food chain and food webs.
2. Plants and environment, ecological adaptations of plants, Hydrophytes, Xerophytes and Mesophytes
3. Plant Succession serial stages, modification of environment, climax formation with reference to Hydrosere and Xerosere.

DEPARTMENT OF BOTANY

First Year, II -Semester

Paper-II

Gymnosperms, Taxonomy of Angiosperms and Ecology

Practical Syllabus (45 hours)

1. Study of Morphology (vegetative and reproductive structures) of the following taxa: Gymnosperms - *Pinus* and *Gnetum*.
2. Study of Anatomical features of *Pinus* needle and *Gnetum* stem by preparing double stained permanent mounts.
3. Fossil forms using permanent slides / photographs: Cycadeoidea.  
Systematic study of locally available plants belonging to the families prescribed in theory Syllabus (Minimum of one plant representative for each family)
4. Study of morphological and anatomical characteristics of locally available plant species.  
(*Eichhornia*, *Hydrilla*, *Pistia*, *Nymphaea*, *Asparagus*, *Opuntia*, *Euphorbia melii*)
5. Demonstration of herbarium techniques.
6. Candidate has to submit at least 30 herbarium sheets.

DEPARTMENT OF BOTANY B.Sc. BOTANY

**II Year: Semester-III**

**Paper – III: Plant Anatomy and Embryology**

**Credits: 4      Course Code: BOT301**

**Course Outcome**

After completion of the course the student is able to:

- CO1. Develop an understanding of concepts and fundamentals of plant anatomy
- CO2. Examine the internal anatomy of plant systems and organs
- CO3. Develop critical understanding on the evolution of concept of organization of shoot and root apex.
- CO4. Analyze the composition of different parts of plants and their relationships
- CO5. To identify and compare structural differences among different taxa of vascular plants.
- CO6. Learn about double fertilization and their significance
- CO 7. To know the structure and development of monocot and dicot embryos.

**UNIT-I**

**(18h)**

1. Meristems: Types, histological organization of shoot and root apices and theories.
2. Tissues and Tissue Systems: Simple, complex and special tissues.
3. Leaf: Ontogeny, diversity of internal structure; stomata and epidermal outgrowths.
4. General account of adaptations in xerophytes and hydrophytes.

**UNIT-II**

**(16h)**

1. Stem and root anatomy: Vascular cambium - Formation and function.
2. Anomalous secondary growth of Stem - *Achyranthes*, *Boerhaavia*, *Bignonia*, *Dracaena*; Root- *Beta vulgaris*
3. Wood structure: General account. Study of local timbers- Teak (*Tectona grandis*), Rosewood (*Dalbergia latifolia*), Red sanders (*Pterocarpus santalinus*), Nallamaddi (*Terminalia tomentosa*) and Neem (*Azadirachta indica*).

**UNIT-III**

**(10h)**

1. History and importance of Embryology.
2. Anther structure, Microsporogenesis and development of male gametophyte.
3. Ovule structure and types; Megasporogenesis; types and development of female gametophyte.

**UNIT-IV**

**(16h)**

1. Pollen morphology, pollination and fertilization, Pollination Types, Pollen – pistil interaction, Double fertilization.
2. Seed – structure appendages and dispersal mechanisms
3. Endosperm – Development and types. Embryo development and types; Polyembryony and Apomixis – an outline.
4. Palynology: Pollen morphology, NPC system, Applications of Palynology.



DEPARTMENT OF BOTANY B.Sc. BOTANY

**B.Sc. BOTANY**

**II Year: Semester-III**

**Paper – III: Plant Anatomy and Embryology**

**DSC-1C**

**Credits-1**

**Practical syllabus(45 hours)**

1. Demonstration of double staining technique.
2. Tissue organization in root and shoot apices using permanent slides
3. Preparation of double stained Permanent slides

Primary structure: Root - *Cicer*, *Canna*; Stem-

*Tridax*, *Sorghum* Secondary structure: Root –

*Tridax* sp.; Stem-*Pongamia*

Anomalous secondary structure: Examples as given in theory syllabus.

1. Anatomy of Xerophyte (*Nerium* leaf); Hydrophyte (*Hydrilla* stem).
1. Stomatal types using epidermal peels.
1. Structure of anther and microsporogenesis using permanent slides.
  1. Structure of pollen grains using whole mounts - *Hibiscus*, *Acacia* and Grass).
1. Pollen viability test using Evans Blue –*Hibiscus*
1. Study of ovule types and developmental stages of embryosac.
1. Structure of endosperm (nuclear and cellular); Developmental stages of dicot and monocot embryos using permanent slides.

DEPARTMENT OF BOTANY

**B.Sc. Botany**

**II Year: Semester-III**

**Skill Enhancement Course SEC-1(Credits -2)**

**Course Outcomes:**

After completion of the course the student is able to:

CO1.To Learn the importance of Nursery and Gardening, the career and occupational opportunities

CO2.To Learn the techniques of gardening - Types, methods & Tools

CO3.The students will acquire sufficient academic and practical experiences and become self-employed in the nursery ventures.

CO4.The students will learn about how to prepare suitable soil media for potting up, seedling and cutting.

CO5.To impart the skills like germinating seed and transplant seedlings and cutting into pots

CO6.To understand the entrepreneurial skills in nursery technology

**Nursery and Gardening**

**Lectures: 30**

**Unit-I (15h)**

Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants.

1. Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion - Seed production technology - seed testing and certification.
2. Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants –greenhouse - mist chamber, shed root, shade house and glass house.

**Unit-II (15h)**

1.Gardening: definition, objectives and scope - different types of gardening - landscape and home gardening - parks and its components - plant materials and design - computer applications in landscaping - Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.

2.Sowing/raising of seeds and seedlings - Transplanting of seedlings – Study of cultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes and carrots - Storage and marketing procedures.

3.Features of a garden: Garden wall, Fencing, biofencing, Steps, Hedge, Edging, Lawn, Flower beds, Shrubbery, Borders, Water garden. Some Famous gardens of India Cultivation of Important cut flowers: Carnation, Aster, Chrysanthemum, Dahlia, Gerbera, Gladiolous, Marigold, Rose, Lilium, Orchids.

\* Field trip is essential.

DEPARTMENT OF BOTANY

B.Sc. Botany

II Year Semester-III

SEC-2 (Credits -2) **Biofertilizers and Organic Farming (30h)**

Course Outcomes:

After completion of the course the student is able to:

CO1.To Learn the importance of Nursery and Gardening, the career and occupational opportunities

CO2.To Learn the techniques of gardening - Types, methods & Tools

CO3.The students will acquire sufficient academic and practical experiences and become self-employed in the nursery ventures.

CO4.The students will learn about how to prepare suitable soil media for potting up, seedling and cutting.

CO5.To impart the skills like germinating seed and transplant seedlings and cutting into pots

CO6.To understand the entrepreneurial skills in nursery technology

**UNIT-I: (15h)**

1. Manures and Biofertilizers: Types of fertilizers, manures. Manure composition. Manures for crop productivity.
2. Differences between fertilizers and biofertilizers: pH changes and water contamination.
3. Bacterial Biofertilizers: General account on the microbes used as biofertilizer.
4. Algal Biofertilizers: Associative effect of different microorganisms. *Azolla* and *Anabaena-azollae* association, nitrogen fixation, factors affecting growth, *Azolla* in rice cultivation.

**UNIT- II: (15h)**

1. Biofertilizers: Mycorrhizal association, types of mycorrhizal association, occurrence and distribution, phosphorus nutrition, growth and yield, colonization of VAM – isolation and inoculum production of VAM, and its influence on growth and yield of crop plants.
2. Organic Farming: Green manuring and organic fertilizers, Recycling of biodegradable municipal, agricultural and industrial wastes, Bio compost making- types, method of vermicomposting, Panchakavya. Biological pest control (neem).

DEPARTMENT OF BOTANY  
II YEAR: Semester-IV  
**Paper IV: Cell Biology, Genetics and Plant Physiology**  
**DSC-1D Credits-4 Course Code: BOT401**  
**Theory Syllabus (60 hours)**

**Course Outcome**

After completion of the course the student is able to:

- CO1. To explain the structure of Cell components and their functions.
- CO2 .To describe cell division in plants.
- CO3. To have knowledge of the nature and function of genes, processes of inheritance .
- CO4. To describe linkage , crossing over and mutations .
- CO5. Understand water relation of plants with respect to various physiological processes.
- CO 6. Explain chemical properties and deficiency symptoms in plants
- CO 7. Explain the significance of Photosynthesis and respiration.

**UNIT-I:**

(15h)

1. Plant cell envelope: Ultrastructure of cell wall, Models of membrane structure, structure and functions of Semi permeable Plasma membrane.
2. Cell Organelles: Structure and semiautonomous nature of Mitochondria and Chloroplast.
3. Nucleus: Ultra structure, types and functions of DNA &RNA. Mitochondrial DNA & Plastid DNA and Plasmids.
4. Chromosomes: Morphology, organization of DNA in a chromosome, Euchromatin and Heterochromatin, Karyotype. Special types of chromosomes: Lampbrush and Polytene chromosomes.
5. Cell division: Cell and its regulation; mitosis, meiosis and their significance

**UNIT-II**

(15h)

1. Mendalism: History, Principles of inheritance, Chromosome theory of inheritance, Autosomes and sex chromosomes, Incomplete dominance and Co-dominance. Multiple alleles, Lethal alleles, Epistasis, Recessive and Dominant traits, Polygenic inheritance.
2. Linkage and crossing over, Recombination frequency, two factor and three factor crosses; Interference and coincidence. Numericals based on gene mapping; Sex Linkage.
3. Variation in chromosome number and structure: Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy
4. Gene mutations: Types of mutations; Molecular basis of Mutations; Mutagens- physical and chemical (Base analogs, deaminating, alkylating and inter chelating agents);

### Unit-III

1. Plant -water Relations: Water potential, osmosis, osmotic and pressure potential, absorption and transport of water.
2. Mineral Nutrition: Essential micro & macro nutrients and symptoms of mineral deficiency.
3. Transpiration: Stomatal structure and movement.
4. Mechanism of phloem transport.
5. Enzymes: Nomenclature, properties, Classification, Mechanism of enzyme action. Factors regulating enzyme activity.

### UNIT- IV

1. Photosynthesis: Photosynthetic pigments, Cyclic and Non-cyclic Photo phosphorylation. Carbon assimilation pathways: C<sub>3</sub>, C<sub>4</sub> and CAM.
2. Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle and oxidative phosphorylation.
3. Nitrogen Metabolism: Biological nitrogen fixation. **Protein Synthesis, Mechanism of Protein Synthesis.**
4. Physiological role of Phytohormones: Auxins, gibberellins, cytokinins, ABA, ethylene and Brassinosteroids

DEPARTMENT OF BOTANY

II YEAR: Semester-IV

**Paper IV: Cell Biology, Genetics and Plant Physiology**

**DSC-1D Credits-1 Practical Syllabus(45 hours)**

1. Demonstration of cytochemical methods: Fixation of plant material and nuclear staining for mitotic and meiotic studies.
2. Study of various stages of mitosis using cytological preparation of Onion root tips.
3. Study of ultra structure of cell organelles using photographs. Chloroplast, Mitochondria, Nucleus,
4. Study of Special types of Chromosomes (Polytene chromosome and Lampbrush chromosomes- Permanent slide)
5. Mendel's laws through seed ratios. Laboratory exercises in probability and chi-square analysis.
6. Chromosome mapping using test cross data.
7. Incomplete dominance and gene interaction through seed ratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1,9:3:4)
8. Determination of osmotic potential of vascular sap by Plasmolytic method using leaves of *Rheodiscolor/Tradescantia*.
9. Determination of rate of transpiration using Cobalt chloride method
10. Determination of stomatal frequency using leaf epidermal peelings /impressions
11. Determination of amylase activity using potato tubers by titration method
12. Separation of chloroplast pigments using paper chromatography technique
13. Estimation of protein by Biurette method
14. Mineral deficiency symptoms of Micro and Macronutrients

DEPARTMENT OF BOTANY  
**B.Sc. BOTANY II Year: Semester-IV**  
Skill Enhancement Course SEC-3      Credits-2

**Green house Technology (30h)**

Course Outcomes:

After completion of the course the student is able to:

- CO1.To understand the basic concepts of greenhouse technology.
- CO2. To acquire knowledge on fertilizer application and irrigation systems in greenhouses.
- CO3.To know about pest management for greenhouse plants.

**UNIT-I: (15h)**

1. Introduction; scope – classification of greenhouses – construction of green house- heating unit – cooling unit – environmental control (light and temperature).
2. Net- poly houses- low cost green houses. Root media for green houses
3. Fertilizers: Organic and inorganic, liquid fertilizers, application of fertilizers.
4. Water in the Greenhouses: Irrigation system in green houses–misting, Drip irrigation- micro irrigation, water quality, water sanitation.

**UNIT-II(15h)**

1. Plant Protection in Greenhouses: Diseases of greenhouse plants (bacterial, fungal, nematodes and viral diseases)
2. Management of pest and diseases – integrated pest management.
3. Applications of Greenhouse Technology: Importance of greenhouse technology. Micropropagation and greenhouse planting of tissue culture transplants
4. Advantages and disadvantages of greenhouse technology. Seed production, cut flower gardening.

DEPARTMENT OF BOTANY  
B.Sc. BOTANY  
II Year: Semester-IV  
**Skill Enhancement Course**  
**SEC-4 (Credits2)**

Course Outcomes:

After completion of the course the student is able:

- CO1. To acquire an adequate knowledge about importance and habitation of mushroom.
- CO2. To get knowledge of nutritional value, cultivation unit and storage methods.
- CO3. To acquire knowledge about spawn and spawning techniques.
- CO4. To understand the factors influencing the mushroom cultivation and post harvesting methods.
- CO5. The students will acquire sufficient academic and practical experiences and become self-employed in the mushroom

**Mushroom Culture Technology** Lectures:30

**UNIT-I(15h)**

1. Introduction & history. Medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India –*Volvariella volvacea*, *Pleurotus citrinopileatus*, *Agaricus bisporus*.
2. Cultivation Technology: Infrastructure; substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag.
3. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves.
4. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.

**UNIT-II(15h)**

1. Storage: Short-term storage (Refrigeration – up to 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions.
2. Nutritional value of Mushrooms: Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content -Vitamins.
3. Food Preparation: Types of foods prepared from mushrooms. Research Centres -National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.



DEPARTMENT OF BOTANY  
B.Sc. BOTANY Syllabus-Total Hrs of Teaching 45 @ 3HRS/WEEK  
III YEAR-SEMESTER-V-PAPER-V(DSC)

**(CELL BIOLOGY AND GENETICS) Course Code: BOT501**

After completion of the course the student is able to:

CO1. To explain the structure of Cell components and their functions.

CO2 .To describe cell division in plants.

CO3. To have knowledge of the nature and function of genes, processes of inheritance .

CO4. To describe linkage , crossing over and mutations .

**CELL BIOLOGY**

**UNIT-I**

**(10HRS)**

- 1.PLANT CELLENVELOPS:- Ultra structure of cell wall, molecular organization of cell membranes.
2. NUCLEUS:- Ultra structure, Nucleic acids- structure and replication of DNA; types and functions of RNA.

**UNIT-II**

**(13HRS)**

- 3.CHROMOSOMES:- Morphology ,Organization of DNA in a chromosome, Euchromatin and Heterochromatin, Karyotype. Special types of chromosomes (Lamp brush, polytene and B-chromosomes).
4. Cell Division: Mitosis, Meiosis, cell cycle and its regulation, Hypertrophy and Hyperplasia.

**GENETICS**

**UNIT-III**

**(12HRS)**

- 5.MENDELISM:- Genetic interactions/Modified Mendelian Ratios (Epistasis, complimentary supplementary and Inhibitory genes).
- 6.LINKAGE AND CROSSING OVER:- A brief account , construction of genetic maps,2-point and 3-point Test cross data.
- 7.MUTATIONS :-Chromosomal aberrations-structural and numerical changes; Gene mutations

**UNIT-IV**

**(10HRS)**

- 8.GENE EXPRESSION AND EXTRA NUCLEAR GENOME: - organization of gene, transcription, translation, mechanism and regulation of gene expression in prokaryotes(Lac and Trp operon).
- 9.Mitochondrial (mt DNA),(cp DNA) and Plasmids.

Syllabus-Total Hrs of Teaching 45  
B.sc. III YEAR -SEMESTER-V -PAPER-V I DSE-1  
**(ECOLOGY AND BIODIVERSITY) Course Code: BOT601**

**Course Outcomes:**

After completion of the course the student is able to:

CO1. Students learn about the interaction between biotic and abiotic components of the environment.

CO2 .To know about the concept of energy flow in the ecosystem

CO3.To understand the various concepts of Biodiversity, values and factor influence its loss

CO4. They can identify the threats to biodiversity and its habitat loss.

CO5. To Understand the need for conservation of biodiversity

**ECOLOGY**

**UNIT-I**(16Hrs)

- 1.CONCEPTS and COMPONENTS OF ECOSYSTEM:- Energy flow , food chains, food webs, ecological pyramids, Biogeochemical cycles –Carbon cycle (4h)
- 2.Definition of Environment; Atmosphere, Hydrosphere, lithosphere and Biosphere(3h)
- 3.PLANTS AND ENVIRONMENT:-Ecological factors-Climatic (light and temperature), and biotic, Ecological adaptations of plants. (5h)
- 4.Edaphic factors; Soil-formation, weathering, mode of formation; transported; Colluvial, Alluvial, Glacial and Eolian. Soil Erosion and Conservation (4h)

**UNIT-II**

5. POPULATION ECOLOGY:-Natality, mortality, growth curves, ecotypes and ecads (4h)
6. COMMUNITY ECOLOGY:- Frequency, density, cover, life forms, biological spectrum, ecological succession (Hydrosere, xerosere). (4h)
7. Community Dynamics: Succession-Seral stages, Modification of physical environment, climax formation with reference to Hydrosere and xerosere. (4h)
8. Production Ecology: Concepts of productivity- Primary and secondary productivity.(4h)

**BIODIVERSITY**

**UNIT-III**

(6hrs)

9. BIODIVERSITY; Concepts, convention on biodiversity-Earth Summit.(Copenhagen)
10. Biodiversity: Levels, threats and Value
11. **Flora of Telangana: Vegetation and Endemics.**

**UNIT-IV**

(7hrs)

12. Hotspots of India- North Eastern Himalayas, Western Ghats, Endemism IUCN Categories Red Data Book
13. PRINCIPLES OF CONSERVATION:- IUCN threat- categories, RED data book-threatened & endangered Plants of India. Role of organizations in the conservation of biodiversity-WWF NBPGR

B.Sc. III - BOTANY  
QUESTION BANK  
Practical Paper-VI Advanced Elective -1  
**Ecology and Biodiversity**

1. Carry out analysis of the water sample and estimate the amount of carbonates

(OR)

Bicarbonates

2. Carry out analysis of the Soil PH and  
Soil Texture

3. Critical notes on (FIVE) spotters of scientific interest

1. *Hydrilla*
2. *Pistia*
3. *Nymphaea*.
4. *Vallisneria*
5. *Asparagus*.
6. *Aloe vera*
7. *Euphorbia antiquorum*.
8. *Opuntia*
9. *Casuarina*.
10. *Nerium* leaf.
11. *Rhizophora*.
12. *Avecenia*.

SLIDES:

13. *Hydrilla* stem.
14. *Nymphaea* petiole. T.S.
15. *Vallisneria* leaf T.S.
16. *Asparagus* cladode T.S.
17. *Nerium*, leaf T.S.
18. *Casuarina* stem T.S.
19. *Rhizophora* pneumatophores T.S.
20. *Avecennia* leaf T.S.

5.

Record

6 VIVA VOCE ( INTERACTIVE  
TESTING)

## DEPARTMENT OF BOTANY

Semester-V: Elective

B.Sc. III Year Semester-V

**Economic Botany**

GE-1E (2 hrs/week) Credits-2      Generic Elective-I      30 hours

### Course Outcomes:

After completion of the course the student is able to:

CO1. Study of economic products with special reference to the Botanical name, family, morphology of useful part and the uses

### Theory Syllabus

#### Unit-I:

1. Cultivated Plants: Concept of origin, their importance.
2. Vegetables: Nutritional and Commercial values of Root crops, leafy and fruit vegetables.
3. Cereals: Rice, Wheat and maize -Origin, morphology and uses
4. Pulses: General account with special reference to Gram and soybean
5. Millets: Nutrient significance of Sorghum, Finger millet, Pearl millet, Foxtail millet.

#### Unit-2:

6. Spices: General account with special reference to clove and black pepper.
7. Fruits and nuts: Commercial and nutritional value of South Indian fruits. Cashew nut, Almond and Walnut.
8. Beverages: Tea & Coffee - morphology, processing, uses.
9. Oils and Fats: General description with special reference to groundnut and sunflower
10. Fiber Yielding Plants: General description with special reference to Cotton (Botanical name, family, part used, morphology and uses)

## DEPARTMENT OF BOTANY

B.Sc. III Year Semester-V

Skill Enhancement Course

SEC-3 (2 hrs/week)

(Credits 2) Lectures: 30

Nursery and Gardening

Course Outcomes:

After completion of the course the student is able :

CO1.To Learn the importance of Nursery and Gardening, the career and occupational opportunities

CO2.To Learn the techniques of gardening - Types, methods & Tools

CO3.The students will acquire sufficient academic and practical experiences and become self-employed in the nursery ventures.

CO4.The students will learn about how to prepare suitable soil media for potting up, seedling and cutting.

CO5.To impart the skills like germinating seed and transplant seedlings and cutting into pots

CO6.To understand the entrepreneurial skills in nursery technology

### Unit-I

1. Nursery: definition, objectives and scope and building up of infrastructure for nursery, planning and seasonal activities - Planting - direct seeding and transplants. (4h)

2. Seed: Structure and types - Seed dormancy; causes and methods of breaking dormancy - Seed storage: Seed banks, factors affecting seed viability, genetic erosion - Seed production technology - seed testing and certification. (6h)

3. Vegetative propagation: air-layering, cutting, selection of cutting, collecting season, treatment of cutting, rooting medium and planting of cuttings - Hardening of plants - green house - mist chamber, shed root, shade house and glass house. (6h)

### Unit-II

4. Gardening: definition, objectives and scope - different types of gardening - landscape and home gardening - parks and its components - plant materials and design - computer applications in landscaping- Gardening operations: soil laying, manuring, watering, management of pests and diseases and harvesting.(8h)

5. Sowing/raising of seeds and seedlings - Transplanting of seedlings - Study ofcultivation of different vegetables: cabbage, brinjal, lady's finger, onion, garlic, tomatoes, and carrots - Storage and marketing procedures. (6h)

DEPARTMENT OF BOTANY  
Syllabus-Total Hrs of Teaching 45hrs@ 3hrs/week  
B.sc. III YEAR -SEMESTER-VI -PAPER-VII-DSC  
( PLANT PHYSIOLOGY ) Course Code: BOT701

**Course Outcomes:**

After completion of the course the student is able:

CO1. To become knowledgeable in plant and its water relations.

CO2. To Know about the requirement of mineral nutrition for plant growth

CO3. To understand the process of Photosynthesis, Respiration and Nitrogen metabolism

CO4. To Know about the Plant Growth hormones (Auxins, Gibberellins, Cytokinins, Ethylene)

**UNIT-I**

(16 Hrs.)

1. WATER RELATIONS:- Importance of water to plant life, physical properties of water, diffusion, imbibition, Osmosis & osmotic pressure, water potentials; absorption & transport of water, Ascent of sap; transpiration, Stomata structure and movements.

2. MINERAL NUTRITION; Criteria of Essentiality of Elements, Essential macro and micro mineral nutrients and their role; symptoms of mineral Deficiency; absorption of mineral ions; passive and active absorption.

**UNIT-II-**

(16Hrs)

3. ENZYMES:- Nomenclature, IUB classification, mechanism and regulation of enzyme action. Enzyme kinetics factors regulate enzyme action.

4. PHOTOSYNTHESIS:- Photosynthetic pigments, absorption and action spectra; red drop and Emerson Enhancement effect; concept of two photo systems; mechanism of photosynthetic electron transport and evolution of oxygen; photo phosphorylation; carbon assimilation pathways: C<sub>3</sub>, C<sub>4</sub> and CAM Photorespiration.

**UNIT-III**

(12Hrs)

5. TRANSLOCATION OF ORGANIC SUBSTANCES:- Mechanism of phloem transport; source -Sink Relationships

6. RESPIRATION:- Aerobic and Anaerobic; Glycolysis, Krebs' cycle; Electron transport system

Mechanism of Oxidative phosphorylation, Pentose phosphate pathway.

**UNIT-IV-**

(16Hrs)

7. NITROGEN METABOLISM:- Biological Nitrogen fixation, Nitrate reduction, Ammonia assimilation. Protein Synthesis, mechanism of protein synthesis.

8. Growth Definition, phases and kinetics of growth Physiological effects of Phyto hormones- Auxins, Gibberellins, Cytokinin, ABA, Ethylene and Brassinosteroids.

B.Sc. III year ( Practical) Syllabus and question Bank.  
Semester VI –DSC  
(Plant Physiology)

I. Conduct Major Physiology experiment(A)

1. Determination of Osmotic potential of vacuolar sap by plasmolytic method using leaves of /  
Rheo/Tradescantia.
2. Determination of rate of transpiration using cobalt chloride method.
3. Separation of chlorophyll pigments using paper chromatography technique.
4. Estimation of protein by biuret method.

II. Conduct Minor Physiology experiment (B)

5. Determination of stomatal frequency using leaf epidermal peeling impression
6. Determination of catalase activity using potato tubers by titration method.
7. Demonstration of Imbibition.

III. Spotters. (C, D,E,F)-

8. Plasmolysed cell.
9. Stomatal opening and closing.
10. Catalase activity-enzyme concentration.
11. Catalase activity- substrate concentration.
12. Catalase activity- temperature.
13. Chromatogram & Rf.

IV RECORD-

V. Viva  
Voce

DEPARTMENT OF BOTANY  
Syllabus-Total Hrs of Teaching 45@3hrs/week  
B.sc. III YEAR -SEMESTER-VI -PAPER-VIII DSE-III

(TISSUE CULTURE & BIOTECHNOLOGY) Course Code: BOT801

Course Outcomes:

After completion of the course the student is able to:

CO1. To provide students with an understanding of principles and techniques of plant tissue culture

CO 2 . Understand the basic knowledge about tissue culture tools, medium, sterilization and techniques of tissue culture.

CO3. Study about the role of tissue culture in crop improvement.

CO4. Understand the fundamentals of Recombinant DNA Technology.

CO5. Know about Genetic Engineering.

CO6. Analyze the enzymes and vectors for genetic manipulations

CO7. Concepts, tools and techniques related to in vitro propagation of plants.

CO8. Understand the principle and basic protocols for Plant Tissue Culture.

**TISSUE CULTURE:**

**UNIT-I**

1. Introduction, sterilization procedures, explants culture media-composition and preparation Micropropagation.

(4h).

2. Callus culture; cell and protoplast culture, somatic hybrids and cybrids (8h)

**Unit-II**

3. Application of tissue culture: production of pathogen free plants and soma clonal variants, production of Stress resistance plants, secondary metabolites and synthetic seeds. (6h)

4. Induction of hairy root and its application in production of secondary metabolites.(2h)

**BIOTECHNOLOGY:**

**Unit- III**

1. Introduction, history and scope and applications (3h)

2. DNA Recombinant Technology: Basic aspects of gene cloning. Enzymes used in gene cloning. Restriction enzymes Ligases, polymerases. (8h)

3. Applications of biotechnology in agriculture. (2h)

**Unit-IV**

1. Gene cloning: Vectors-cloning vehicles, (Cosmids, plasmids, Bacteriophages and Phasmids) applications of r-DNA technology. (8h)

2. Gene Libraries: Genomic Libraries, cDNA libraries.PCR and its applications. (4h)



DEPARTMENT OF BOTANY

**B.Sc. III year Practical question bank**

**Semester VI –DSE-III  
(Tissue Culture & Bio-technology)**

I. Conduct the Tissue Culture, Biotechnology and Seed technology experiment (A) allotted to you to write procedure. Give result and inference

1. Preparation of plant tissue culture medium (basal medium-MS medium)
2. Isolation and estimation of DNA
3. Testing of seed viability using 2, 3, 5 triphenyltetrazolium chloride (TTC)

II. Conduct the tissue culture/ biotechnology/ seed technology experiment (B) allotted to you and write procedure.

4. Demonstration of micro propagation using explants like axillary buds and shoot meristems [inoculation of explants]
5. Demonstration of seed dressing using fungicide to control diseases.
6. Demonstration of seed dressing using biofertilizers (rhizobium) to enrich nutrient supply

III. Critical notes on spotters (specimen / photograph / equipment / sketch without labeling) C D E F and G , (Tissue culture-3; Biotechnology-2 )

C D E& F- TISSUE CULTURE & BIOTECHNOLOGY

7. Laminar airflow
8. Incubator
9. Autoclave
10. Culture medium
11. Micropropagation
12. Explantes
13. Callus
14. Somatic embryos
15. Antibiotics
16. Vaccines
17. Biofertilizers (Rhizobium)
18. Single Cell protein
19. Transgenic plants
20. Multiple shoots
21. Artificial/Synthetic seeds

IV. RECORD

V. Viva Voce

DEPARTMENT OF BOTANY  
B.Sc. II Year Semester-VI  
Skill Enhancement Course  
SEC-4 (2 hrs/week) (Credits 2) Lectures: 30  
Mushroom Culture Technology

**Course Outcomes:**

After completion of the course the student is able:

- CO1. To provide adequate knowledge about importance and habitation of mushrooms.
- CO2. To get knowledge of nutritional value, cultivation unit and storage methods.
- CO3. To acquire knowledge about spawn and spawning techniques.
- CO4. To understand the factors influencing the mushroom cultivation and post harvesting methods.
- CO5. The students will acquire sufficient academic and practical experiences and become self-employed in the mushroom

**UNIT-I**

1. Introduction & history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India –Volvariella volvacea, Pleurotus citrinopileatus, Agaricus bisporus. (5h)
2. Cultivation Technology. Infrastructure; substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves.(10h)
3. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production. (2h)

**UNIT-II**

4. Storage and nutrition : Short-term storage (Refrigeration – upto 24 hours) Long term Storage (canning, pickles, papads), drying, storage in salt solutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fiber content - Vitamins. (8h)
5. Food Preparation: Types of foods prepared from mushrooms. Research Centers - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.(5h)

DEPARTMENT OF BOTANY  
B.Sc. III Year Semester-VI  
**Plant Biodiversity and Human Welfare**  
GE-2E (2 hrs/week) Credits-2      Generic Elective-II      30 hours

**Course Outcome**

After completion of the course the student is able to:

CO1. To identify the natural resources which can be conserved for future and sustainable development.

CO2. To know the causes of diversity loss and also about the organization who have been continuously working for biodiversity management and sustainable development.

CO3. To create awareness about conservation of nature and natural resources.

**Unit-I:**

1. Plant diversity and its scope- Genetic diversity, Species diversity, Plant diversity at the ecosystem level, Agro-biodiversity and cultivated plant taxa, wild taxa. Values and uses of Biodiversity: Ethical and aesthetic values, Precautionary principle, Methodologies for valuation, Uses of plants, Uses of microbes.

2. Loss of Biodiversity: Loss of genetic diversity, Loss of species diversity, Loss of ecosystem diversity, Loss of agro-biodiversity, Projected scenario for biodiversity loss,

3. Conservation of Biodiversity: Conservation of genetic diversity, species diversity and ecosystem diversity, In situ and ex situ conservation, Social approaches to conservation, Biodiversity awareness programmes, Sustainable development.

**Unit-II:**

4. Role of plants in relation to Human Welfare; a) Importance of forestry, their utilization and commercial aspects. b) Avenue trees. c) Ornamental plants of India.

d) Alcoholic beverages through ages. Wood and its uses.

5. Fruits and nuts: Important fruit crops are of commercial importance.

6. Management of Plant Biodiversity: Organizations associated with biodiversity management- Methodology for execution-IUCN, UNEP, UNESCO, WWF, NBPGR; Biodiversity legislation and conservations, Biodiversity information management and communication.