

# **BOTANY COURSE OUTCOME (CBCS)**

## **Semester 1**

### **CC1-Phycology and microbiology**

At the end of this course student will be able to :

- Identify the gram negative and gram positive bacteria.
- Measure the reproductive part of many algae under the microscope using drawing prism and micro meter.
- Identify the algae used as food, fodder and medicine.
- Discriminate between useful and harmful bacteria.

### **Mycology & Phytopathology (CC 2)**

At the end of this course students will be able to:

- Identify different groups of fungi based on their morphological features.
- explainmycorrhizal association and appreciate adaptive strategies of algae andfungi.
- Specify plant diseases in terms of causal organisms, symptoms and diagnoses, modes of infection and methods of disease control.
- compute strategies for conventional and novel control of plant diseases.

## **Semester 2**

### **CC3-Plant anatomy:**

At the end of the course students will be able to :

- Understand the details anatomical structure of root, stem and leaf.
- Identify the anomalous secondary growth found in both root and stem.
- Identify the different types of stomata present over the leaf.
- Know how to do differential staining to differentiate different tissues of the plant body.

## **Archegoniatae ( CC 4)**

After completing this course students will be able to:

- Compare Bryophytes, Pteridophytes and Gymnosperms in terms of morphology, anatomy and reproduction.
- Analyze evolution of sporophytes/gametophytes and their transition to land habit.
- Assess economic importance of all the groups.

### **General Elective (Semester 2, GE2/CC2, Pteridophytes, Gymnosperms, Palaeobotany, Morphology and Taxonomy).**

On completion of the course students will be able to

- Discuss Pteridophytes and Gymnosperms in terms of classification, morphology, anatomy, reproduction and economic importance.
- Explain plant fossils, process of fossilization, geological time scale, palynology and its application help to comprehend importance of fossil studies in plant science.
- Compare of different morphological characters i.e. inflorescence, flower, fruit and seed. They will also be able to assess different classification systems and diagnostic characters of various plant groups required for classification and identification of different taxa.

## **Semester 3**

### **CC 5- Paleobotany and palynology**

- In this course students get to know about the past life through plant fossils of different plant groups.
- It also Includes pollen study and it's application in different field like medicine, forensic science and paleoenvironment.
- It includes Geological time scale and study of Indian Gondwana system.

### **Reproductive Biology of Angiosperms ( CC 6)**

At the end of this course students will be able to:

- Describe and identify taxa on the basis of different morphological characters i.e. inflorescence, flower, fruit and seed.
- Discuss molecular and genetic aspects of flower development.
- Explain microsporogenesis, microgametogenesis, double fertilization, embryogenesis in *Capsella*, types of Apomixis and Polyembryony.

### **Plant Systematics ( CC 7)**

Students who complete this course will be able to

- Discuss classical taxonomy in terms of components of systematics viz. nomenclature, identification and classification.
- Explain ICN, its principles, different types of names, importance of author citation, Type method and various rules followed for nomenclature of taxa.
- Compare amongst recent classification systems and demonstrate role of botanical garden and herbaria for classification and identification of taxa.
- Analyze phylogenetic relationship among taxa with the help of phenetics and cladistics.
- Identify different monocotyledonous and dicotyledonous families and their representative members on the basis of diagnostic features and also to analyze systematic position and economic importance of the said families.

**Skill Enhancement Course-Elective (Semester 3, SEC A, Applied Phycology, Mycology and Microbiology).**

Skill Enhancement course comprising Applied Phycology, Mycology and Microbiology make the students equipped with additional skills to suffice their capabilities for entrepreneurship, academia and industry.

On completion of course students will be able to:

- Explain Algal food sources, uses of algae as phycocolloid and diatomite, biotechnological application of algae in terms of biodiesel and bioplastics.
- Discuss Fungal food sources as well as use of fungi and microbes as source of enzyme, amino acid, vitamin, antibiotic and pharmaceuticals.
- Analyze different procedures regarding industrial production of Cheese, ethanol, Vinegar and Streptomycin and their usefulness in terms of income generation.
- Evaluate algal toxin and fungal toxin (Aflatoxin) that might help in selecting the appropriate material for use in different purposes.
- Assess role of microbes as biofertilizers, biopesticides and in mineral processing which will promote their use in a bigger way in future and in turn help in protection of environment.

## **Semester 4**

### **CC8-Plant geography, ecology and evolution**

At the end of this course students will be able to :

- Identify the plants used as metal indicator.
- Explain the reasons why the plant species are threatened.
- Analyze the leaves collected from polluted and less polluted area.
- Compute the frequency of plant species of a particular region.

### **Economic Botany (CC 9)**

After completing this course students will be able to:

- Discuss origin of cultivated crops, plant introduction, crop domestication and importance of germplasm diversity.
- Explain origin, morphology, processing and uses of Cereal crops and legumes provides a detailed knowledge about their future sustainable cultivation and utilization.
- Assess morphology, processing and uses of cash crops like Sugarcane, spices and beverages states how these crops can be utilized for income generation.
- Outline general account of timbers mainly Sal and Teak and fiber yielding plants like Cotton and Jute. This helps in assessment of timber sources and their utilization in India and importance of use of eco-friendly plant fibers in our daily life.
- Compare therapeutic and habit-forming and health hazards associated with habit-forming drugs.

### **CC10-Genetics**

At the end of this course students will be able to :

- Determine the gene order in a chromosome.
- Calculate the recombination frequency of a particular gene.
- Comprehend the different types of chromosomal aberration.
- Visualise and identify the different divisional stages of mitosis and meiosis.

## **Skill Enhancement Course-Elective (Semester 4, SEC B, Mushroom Culture Technology).**

At the end of this course students will be able to:

- Identify edible and poisonous mushroom and analyze nutritional and medicinal value of mushrooms.
- Compare cultivation techniques of button mushroom, Paddy straw mushroom and oyster mushroom.
- Analyze detailed cultivation technology in terms of infrastructure and substrate required, techniques and factors affecting mushroom bed preparation and composting technology. Study of cultivation technology in detail will help them to set up their own production unit in future.
- Compare various long term and short-term strategies for storage of mushrooms after harvesting. A good number of recipes/types of food prepared from mushrooms have also been included to promote entrepreneurship in terms of hospitality industry.
- Knowledge of research centres of mushrooms at national and regional level will help to solve any problem met during cultivation, storage and marketing of the finished product.
- Analysis of cost-benefit ratio will help to assess the economic viability of mushroom production.

## **Semester 5**

### **CC11-Cell and molecular biology**

At the end of this course student will be able to:

- Estimate DNA and RNA content of a cell
- Measure the plant cell size using micrometry.
- Count the cell per unit volume.
- Analyze the replication, transcription and translation both in prokaryote and eukaryote.

### **CC 12 – Biochemistry**

At the end of this course students will be able to :

- Prepare solutions and buffers.

- Estimate the protein content of the sample.
  - Classify and naming of an enzyme.
- Determine velocity of an enzyme, substrate concentration in a enzyme catalysed reaction

### **Discipline Specific Elective Courses (Semester 5, DSE A, Biostatistics).**

On completion of Biostatistics course students will be able to

- Understand fundamental concepts of biostatistics, biometry and interpretation of statistical data generated during experimental set up.
- Develop skills in data tabulation and graphical representation of data.
- Develop proficiency in hypothesis testing and interpretation.
- Understand measurement of gene frequency in terms of interpretation of Hardy-Weinberg equilibrium which will help them to undertake and propose different models with regard to population studies.

### **DSEB5 -5 : Plant Biotechnology**

- Plant biotechnology includes basic techniques of tissue culture, culture of callus,,anther& pollen , protoplast for plantlet regeneration.
- It also includes study of somatic embryogenesis and organogenesis.  
Plant genetic engineering also included in this course which includes application of Biotechnology in Agriculture and Health science.

### **DSE A General (Semester 5, Phytochemistry & Medicinal Botany).**

On completion of Phytochemistry and Medicinal Botany course students will be able to

- Identify role of medicinal plants in traditional and modern systems of medicine and the importance of holistic mode of treatment followed in Indian Traditional systems of medicine.
- Differentiate between Primary and Secondary metabolites and also evaluate terpenoids, alkaloids and phenolics.
- Assess pharmacologically active constituents present in various plants and their uses.
- Evaluate importance of folk medicine for the treatment of Jaundice, cardiac ailments and Diabetics.

## **Semester 6**

### **CC 13- Plant Physiology:**

At the end of this course students will be able to :

- Understand the physiological role of different plant hormones like Auxin, Gibberellin etc.
- Know how the light monitors flowering of the plant.
- Understand how the cold temperature control the flowering of the plants.
- Determine the loss of water per stomata per hour.
- To calculate the rate of imbibition and rate of transpiration.

### **CC 14- Plant Metabolism :**

At the end of this course students will be able to :

- Separate plastidial pigments.
- Estimate the total chlorophyll content from different types of leaves.
- Determine the RQ of germination seeds.
- Know the macromolecular separation by chromatographic methods.

### **Discipline Specific Elective Courses (Semester 6, DSE A, Medicinal and Ethnobotany).**

After completing this course students will be able to

- Identify role of medicinal plants in traditional and modern systems of medicine and the importance of holistic mode of treatment followed in Indian Traditional systems of medicine.
- Assess crude drugs in terms of classification, evaluation and uses which will aid in identification and characterization of these drugs.
- Compare between primary and secondary metabolites and discuss active constituents of various plant-based drugs for identification of adulterants in herbal drugs.
- Explain ethnobotany viz. plants used by the local communities for nutritive and medicinal value which will help in transformation of Traditional knowledge for promotion of herbal medicines.
- Compute need based conservation strategies for sustainable utilization of medicinal plants.

## **DSEB 6- 8 THEO : Natural resource and management**

- This course study includes detailed idea about different types of Natural resources like Land, Water, Forest and Biodiversity.
- It also includes study of resource management practices along with efforts taken till date to conserve resources.  
The main goal of this course is to make students aware how they can do sustainable utilization of the resources.

- **DSE B General (Semester 6, Economic Botany).**

At the end of this course students will be able to

- Discuss Centre of origin of cultivated plants and their importance with reference to Vavilov's work.
- Explain different food crops and beverages viz. Rice, Legumes and Tea in terms of morphology, processing and uses.
- List scientific names, families, part used and uses of different economically important plants.