UNIT-III

Molecular Technique: Isolation and purification- genomics and plasmid DNA, RNA, Proteins, Blotting principles, types of blotting, immunoblotting- Southern, Northern, Western and dot blots, ELISA, RIA, DNA amplification and genome mapping: PCR, RT-PCR, RFLPs, RADP, FISH, gene silencing

UNIT-IV

DNA Sequencing: Various methods of DNA Sequencing- Sanger's Dideoxy method, Maxam and Gilbert method, Shotgun, Pyrosequencing.

Genome expression analysis: SAGE, EST, Microarray, Quantitative Real Time PCR; RNA Interference (RNAi), Genome Editing- CRISPR

Suggested reading:

1. Buchanan, B., Gruissem, W., & Jones, R.L., 2002, Biochemistry and Molecular Biology of Plants. American Society of Plant Biologists, USA.
2. Bourton E. Tropp, Molecular Biology, 4th Ed., Jones & Barlett learning.
3. Brown, T.A., DNA Cloning and Gene Sequencing Willey-Blackwell, Oxford.
4. Dubey, R.C. A textbook of Biotechnology. S. Chand Publication. Pvt. Ltd.
5. Ramawat, K.G. Molecular Biology and Biotechnology. S. Chand Publication. Pvt. Ltd.

CORE-II PLANT BIOTECHNOLOGY

UNIT-I

Recombinant DNA technology: Restriction endonuclease, DNA modifying enzymes, Vectors, Cloning techniques, Polymerase chain reaction, Gene transfer method: Direct gene transfer, Agrobacterium mediated genetic transformation, Microinjection, Electroporation; Nucleic acid hybridization.

UNIT-II

Organization of Plant genomes; Molecular markers and its application; Genomic and cDNA library; Modern approaches for the analysis of plant genome and proteome, Mutagenesis, Gene transfer.

UNIT-III

Scope of plant biotechnology in crop improvement, human welfare and industry: Genetic manipulation of pest resistant, abiotic and biotic stress tolerance, improvement of crop yield and quality; Molecular farming, Biosafety concerns in Plant Biotechnology, Transformation of chloroplast genome and its advantage.

UNIT-IV

Plant cell and tissue culture: General introduction, history and scope; Concept of cellular differentiation and totipotency; Organogenesis and adventitious embryogenesis: Fundamental aspects of morphogenesis: Somatic embryogenesis and androgenesis, Tissue culture techniques and culture media; Cryopreservation and germplasm conservation. Somatic hybridization: Protoplast isolation, culture and regeneration, Somatic hybridization and hybrid selection; Application of plant tissue culture: Clonal propogation, artificial seed, production of hybrids and soma clones, production of secondary metabolites/natural products.

Suggested reading:

1. Chawla, H.S. 19 Introduction to plant biotechnology
2. Gupta,P. K. Elements of biotechnology.
3. S H Mantell, et. al. Principles of Plant Biotechnology: An introduction to genetic engineering in plants.
4. Singh,B. D. Plant Biotechnology Kalyani Publications.
5. Dubey,R.C. Advanced Biotechnology. S. Chand. Pvt. Ltd.

SEVENTH GENERIC ELECTIVE- APPLIED PHYCOLOGY

UNIT-I

Cultivation of microalgae, culture medium and methods, Assessment of pollutants effects, bioassays, algae of polluted and unpolluted waters, influences of salt, heavy metals, radiation and pesticides on algae.

UNIT-II

Eutrophication, dynamics of fresh water and marine algal blooms, consequences of blooms including toxins of algae, Algal ponds for the treatment of wastewaters and role of algae in phytoremediation.

UNIT-III

Alga of specialized habitats: Terrestrial algae, parasitic algae, thermal algae, freshwater algae, freshwater red algae, snow algae.

UNIT-IV

Algae and human affair: edible algae, algae in single cell protein production, algal biofertilizers, phycocolloids and other useful products of algae, biotechnological application of algae.

Suggested reading:

1. Lee, Robert Edeward, Phycology, Fourth edition 2008, Cambridge University Press.
2. Bold, H.C. and Wynne, M.J. ,1985, Introduction to the Algae, 2nd Edition, Prentice-Hall Inc.

3. Singh, Pande, Jain, 2010, A Text Book of Botany (Algae+Fungi+Brophyta+Pteridophyta) , Pub.Rastogi Publication, Meerut
4. Gangulee, H.C. & Kar, A.K. College Botany Vol. II (Algae+Fungi+Brophyta+Pteridophyta) , New Central Book Agency, Kolkata

SEVENTH GENERIC ELECTIVE- ADVANCE PLANT PATHOLOGY

UNIT-I

General introduction of Plant Pathology, Chemical weapons of pathogens-Enzymes and toxins; Role of growth hormones in plant diseases, Defense mechanism of the host, how the pathogen affects plant physiological functions.

UNIT-II

Genetics of plant disease, effect of environmental factors on the plant disease development, Plant disease epidemiology: Preexisting structural and chemical defense, induced structural and chemical defense, hypersensitive reaction, role of phytoalexins and other phenolic compounds. Management of plant diseases: Cultural, chemical, biological, biopesticides, breeding for resistant varieties, Plant quarantine, integrated pest management.

UNIT-III

Diseases caused by Fungi, Bacteria, Viruses and Mycoplasma.

UNIT-IV

Molecular plant pathology: Molecular aspects of host pathogen interaction – PR proteins, degradation of phytoalexins, systemic resistance mechanism; application of molecular biology to plant disease control- transgenic approach for crop protection.

Suggested Readings:

1. Mehrotra R.S. Plant Pathology. Tata Mc Grow Hill Publishing Co. Ltd. New Delhi.
2. Agrios, G.N. Plant Pathology.
3. Mehrotra and Agrawal. Plant Pathology.
4. Narayansamy, P. Plant Pathogen detection and disease diagnosis.
5. Butler, EJ. Fungi and Diseases in Plants.
6. Singh, R. S. Plant Disease, Oxford and IBH Publishing Co. Pvt.Ltd.

(The candidate are required to choose only one generic elective)

RESEARCH PROECT/DISSERTATION

The students will submit the thesis/Dissertation on the assigned topic of their interest on existing branches of botany. It will be the part of Semester IV. The title of thesis/dissertation will be assigned by concerned faculty member/board in the beginning of Semester III to provide sufficient time to complete thesis/dissertation.