

M.Sc. (FINAL) BOTANY

PAPER-VII

PLANT BIOTECHNOLOGY AND GENETIC ENGINEERING

UNIT-I

Recombinant DNA technology – gene cloning principles and techniques (plasmid, phage, cosmid, construction of genomics/ cDNA libraries, choice of vectors, DNA synthesis and sequencing PCR, PAGE, Northern and Southern blotting, RFLP, RAPD, AFLP based DNA finger printing. Integration and expression of foreign genes in pro- and eukaryotes. Improvement of industrial microbes and nitrogen fixers, fermentation technology.

UNIT-II

Biotechnology : Basic concept, principles, plant tissue culture – history, concept of totipotency and cellular differentiation, fundamental aspects of morphogenesis, somatic embryogenesis, androgenesis, protoplast isolation, cultures, hybridization. Application of plant tissue culture in production of useful metabolites, plant pathology and conservation.

UNIT-III

Bacterial transformations, selection of recombinants and transformants. Techniques of molecular biology : Cell fractionation, isolation and purification of protein and nucleic acids, nucleic acid hybridization. Chloroplast and mitochondrial genome.

UNIT-IV

Genetic engineering of plants – Aims, strategies for development of transgenics with examples, *Agrobacterium*, the natural genetic engineering, t-DNA and transposon mediated gene tagging, chloroplast transformation and its utility, intellectual property rights, possible ecological risks and ethical concerns.

UNIT-V

Genetic and physical mapping of genes, artificial chromosomes, genome projects, functional genomics, proteomics, microarrays, protein profiling and its significance. Basics of protein engineering and design, enzyme technology, immunotechnology and bioprocess technology. Bioinformatics, computer application in Biotechnology.