Subject Code : P8GT9

III SEMESTER - CORE COURSE IX:
GENE MANIPULATION OF MICROBES, PLANTS AND ANIMALS

UNIT -I

Genetic engineering – an introduction and scope. Vectors- plasmids, phage vectors, cosmids, phagemids, gateway vectors and artificial chromosomes. Enzymes in gene manipulations, DNA transfer techniques.

UNIT- II

Cloning strategies – construction of genomic libraries – types and methods; cloning in *E.coli*, Bacilli and Yeast. Recombinant system and screening of recombinant clones; Recombinant products –detection; site directed mutagenesis.

UNIT- III

Plant genome organization – plant nuclear genes, chloroplast genes, mitochondrial genes; cytoplasmic male sterility; heterosis and hybrid seed. Plant transformation –*Agrobacterium* – Ti and Ri plasmid vectors; Microprojectile bombardments – Gene gun. Phytochrome mediated functions and light activated genes.

UNIT -IV

Gene manipulation in animals - animal cell culture techniques – transfection and production through cell culture technique – regulatory proteins, blood products, vaccines and hormones, transgenic proteins. Chromosomal manipulation of fish, cryopreservation of gametes and embryos. Transgenic animals- *in vitro* fertilization and embryo transfer.

UNIT- V

Pest management using juvenile hormones analogues, pheromones; Biotechnology of silk worms. Baculo viruses in biocontrol and foreign gene expression. Gene therapy – prospects, methods and applications. Genome projects: human, drosophila, *Coenoharbiditis elegans*; Plant genetic engineering for herbicide resistance, pest resistance and disease resistance. Metabolic engineering of plants. Production of antibodies and pharmaceutically useful proteins in plants.

References

1. Old, R.W and S.B. Primrose. 1996. Principles of Gene Manipulation: An Introduction to Genetic Engineering. Blackwell Scientific Publications, Oxford.
2. Glover, DM. and BD. Hames .1995. DNA Cloning: A Practical Approach.. IRL Press, Oxford.

3. Innis, M.A., D.H. Gelfand and J.J. Sninskey .1995. PCR Strategies.. Academic Press, San Diego.
4. Persing, D.H., K T.F Smith, F.C. Teower and T.J.While. 1993. Diagnostic Molecular Microbiology. ASM Press, Washington D.C.
5. Watson J.D.,Gilman M., Witkowski,J., and Zoller M. 1992. Recombinant DNA. Scientific American Books, New York.
6. Tvan R.S. 1997. Recombinant Gene Expression Protocols. Humana Press Inc., Tokowa.
7. Mantel. S. H, Mathews. J. A, Mickee. R.A. 1985. An Introduction to Genetic Engineering in Plants, Blackwell Scientific Publishers, London.
8. Dodds J.H. 2004. Plant Genetic Engineering, Cambridge University Press, Cambridge.
9. Mantell, S.H and Smith, H. 1983. Plant Biotechnology. Cambridge University Press, UK.
10. Hammond, J., McGarvey, P. and. Yusibov, V. 2000. Plant Biotechnology. Springer Verlag, UK.
11. Kirsi-Marja, Oksman-Caldentey and Wolfgang H. Barz.(Ed.). 2002. Plant Biotechnology and Transgenic Plants, Marcel Dekker, Inc. New York.
12. Adrian Slater, Nigel W. Scott and Mark R. Fowler. 2003. Plant Biotechnology (The Genetic Manipulation of Plants), Oxford University press, UK.
13. Gilmartin and Bowler. (Eds). 2002. Molecular Plant Biology: A Practical Approach (Vol. I and II), Oxford University press, UK.
14. Freshney, E. D.2000. Animal Cell Culture: A practical approach. John Wiley Pub.,New York.
14. Mather, J.P. and Barnes, D. (Eds.). 1998. Animal Cell Culture Methods (Methods in Cell Biology. VOL. 57). Academic Press, London.
15. Butler, M. (Ed.). 1990. Mammalian Cell Biotechnology- A Practical Approach. Oxford Univ. Press, Oxford.
16. Puller, A. (Ed) .1993. Genetic Engineering of Animals. VCH Publishers, New York.