Subject Code : P8BI4

MOLECULAR BIOLOGY AND GENETIC ENGINEERING

UNIT – I

Sequence organization of prokaryotic and eukaryotic DNA – Mitochondria and chloroplast DNA – DNA replication – transcription and translation – codon and anticodon concepts – inhibitors of transcription and translation – Gene as the unit of expression – spontaneous mutation, induced mutation – reversed and suppression mutation – DNA repair mechanism

UNIT – II

Gene regulation in prokaryotes and eukaryotes – operon concept – lac, trp – promotor, attenuator – terminator and operator – transcription factors – allosteric enzymes and feed back inhibition – repression – Gene transfer mechanisms - transformation, conjugation, transduction – Genetic linkage and crossing over and genetic mapping of chromosomes

UNIT – III

Basics of recombinant DNA technology – Restriction enzymes and mapping of DNA – Introduction to cloning – cloning vectors – plasmid & phage vectors – expression of the clones, gene selection, maximizing gene expression.

UNIT – IV

DNA sequencing – DNA sequencing by base specific cleavage and by primed enzymatic synthesis – insertions and deletions – chromosome walking, selection, immunological identification of clones – PCR & RFLP, RAPD techniques, bio-chips and DNA finger printing.

UNIT – V

Applications of recombinant DNA technology – commercial aspects of recombinant proteins - cloning in plants – direct transfer of DNA into plant cells – transgenic plants – transgenic animals – gene transfer by nuclear injection – gene therapy – pharmaceuticals – anti-sense RNA technique – siRNA

Reference Books

1. Benjamin Lewin, Genes VIII, Pearson - Prentice Hall International Edition, New Delhi, 2004.
2. Freifelder D. Molecular Biology, Jones and Bartlett Publishers Inc. 1987.
3. Watson, J.D., et al., Recombinant DNA, 2nd ed. Scientific American Books, New York, 1992.
4. Winnacker E. L. From Genes to Clones, VCH Weinhein, Germany, 1987.
5. Prokop, Ales, Bajpai, Rakesh K., and Ho, Chester S., Recombinant DNA Technology and Applications, McGraw-Hill, New York, 1991.
6. Nicholl D.S.T., An Introduction to Genetic Engineering, 2nd Edn., Cambridge University Press, UK, 2002.
7. Griffiths A.J.F., Gelbart W.M., Lewontin, R.C., Miller J. H. Modern Genetic Analysis (Integrating Genes and Genomes), 2nd Edn., W.H. Freeman, New York, 2002.
8. T. A. Brown, Genomes, 2nd Edition, BIOS Scientific Publishers, Ltd.,Oxford, UK, 2002.