Subject Code : RN4G9E

Electives – Group E – Biotechnology
Paper IX : Recombinant DNA Technology

Unit I

Introduction to recombinant DNA Technology I : Cloning Vectors

Basic systems of rDNA technology : Vectors/cloning vehicles –plasmids, cosmids, Ti and Ri plasmids, BAC, YAC, expression vectors, shuttle vectors, sperm as a vector.

Unit II

Introduction to recombinant DNA technology II : Enzymes systems and hosts.

Enzymes – exonucleases, endonucleases – restriction endonucleases, ligases, DNA modifying enzymes – methylase. Alkaline phosphatase, topoisomerase, Host-E.coli, Bacillus, Plant cells and animal cells. Transposons.

Unit III

Principles and Techniques

Preparation of plasmid DNA-Alkaline lysis, boiling preparation, DNA quantification – spectrophotometric technique, gene transfer techniques-transformation, transduction and conjunction, transformation – competence preparation heat shock method, electroporation, shot gun technique, microinjection and biolistic method, procedures for developing transgenic animals and plants, biosafety, DNA sequence – chemical degradation; chain termination and automated sequence.

Unit IV

Analysis and expression of cloned genes

Selection methods –antibiotics, expression basis – GUS expression blotting techniques – Southern blot and Northen blot, PCR, DNA finger printing – restriction fragment length polymorphism (RFLP), Random amplified polymorphic DNA (RAPD), DNA foot printing, genomic library construction – cDNA, genome mapping and chromosome walking.

Unit V

Applications of rDNA technology in animals

Transgenic animals, insulin, interferon and other pharmaceutical production; recombinant bovine and human growth hormones; farm animal protection,

gene therapy- homepoeitic cells, genetically engineered bone marrow cells, skin fibroblast, hepatocytes, myoblast and genetically modified lymphocyes – recombinant technology in the production of vaccines.

Reference Books :

1. Old & Primerose, 1989, Principles of Gene Manipulation 3rd Edition Publishers Business Service
2. J.D. Watson, M.Gilman, J. Witkowski & M. Zoller, 1992, Recombinant DNA Technology, 2nd Edition, Scientific Americans Books, New York.
3. S.Maulik and S.D.Patel, 1997, Molecular Biotechnology, Wiley – Liss.
4. K.Kreuzer & A.Massey, 1996, R-DNA Technology and Biotechnology, ASM Press, Washington. D.C.
5. D.Berg & M.Singer, 1992, Dealing with genes, Blackwell Scientific Publication.
6. B.R. Click & J.J.Patenak, 1994. Molecular Biotechnology, ASM Press, Wasington
7. B.Lewin, 2000, Gene VII, Oxford University Press, New York.
8. T.Kosuage, C.P.Meredit, 1989, Genetic Engineering of Plants, Hollaender Plenum Press.
9. Butterworth – Heinemann, 1993, Genome Management in Prokaryotes, Open Universiteit Nederland.
10. Butterworth – Heinemann, 1993, Techniques for Engineering Genes, Open Universiteit Nederland.
11. W.W.U., M.J. Welsh, P.B. Kaufman & H.H. Zhang, 1997, Methods in Gene Biotechnology, CRC Press, New York.