Subject Code : RN3P10

Genetic Engineering and Microbial Biotechnology

Unit I – Tools of genetic engineering

Restriction and modification in bacteria *E. coli* K & B system; Restriction endonucleases type I, II, III - Ligases. Vectors – plasmids – phages, cosmids, phagemids, special vectors – broad host range, expression, integrating shuttle vectors – yeast vectors.

Unit II – Cloning

Principles of gene cloning – □ complementation, genomic library & cDNA library – shot gun cloning – screening of recombinants – phenotypic expression of characters – colony hybridization – southern hybridization – use of antibody – Western blot – Physical mapping of the cloned gene.

Unit III – PCR

PCR technology – Gene amplification, PCR primer designing and optimization; variations in PCR (RT PCR, RACE) RAPD, RFLP and site directed mutagenesis – DNA sequencing – Manual and automated chromosome walking – DNA foot printing.

Unit IV – Microbial products through genetic engineering

Cloning of human insulin, Interferon in *E. coli* – Human antibody production by rDNA technology – Vaccine production. Plant genetic engineering – Ti plasmid, CaMV vector – DNA delivery to plant protoplast – transgenic plants – cloning of endotoxins – *Cry* gene – Herbicidal resistance.

Unit V – Bioethics and IPR

Biological risks – biosafety, bioethics – Intellectual property rights (IPR), Patent laws: Indian and International – industrial management - management practices – entrepreneurship economic and cost of microbes and their products.

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5. Gerhardt, P. Murray, R.G., Wood, W.A., and Kreig, N.R. (1994). Methods for General and Molecular Bacteriology, ASM Press, Washington D.C.
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