Subject Code : P8MB7

Core Course VII (CC) – Microbial Genetics and Molecular Biology

Unit - I: DNA replication and repair

Identification of genetic material (Griffith, Avery and Hershey and Chase experiments). DNA replication - Meselson – Stahl experiment , Molecular mechanisms of DNA Replication – bidirectional and rolling circle replication. Differences in prokaryotic and eukaryotic replication. Plasmids – types, structure and replication. DNA repair – mechanism of excision repair, SOS repair and mismatch repair.

Unit – II: Transcription and translation

Process of transcription – initiation, elongation – termination. Synthesis of mRNA in prokaryotes and eukaryotes. Synthesis of rRNA and tRNA. RNA processing – capping and polyadenylation. Genetic code, process of translation – initiation, elongation and termination. Signal sequences and protein transport.

Unit – III: Concept of Gene & Gene regulation

Organization of Gene in Prokaryotes and Eukaryotes - Introduction - Operon concept, lac and trp operons, promoters and repressors. Regulation of gene expression – Transcriptional control – promoters, terminators, attenuators and anti terminators; Induction and repression; Translational control – ribosome binding, codon usage, antisense RNA; post-transcriptional gene silencing – RNAi.

Unit - IV: Gene transfer mechanisms

Transformation – competence cells, regulation, general process; Transduction – general and specialized; Conjugation – Hfr, triparental mating, self transmissible and mobilizable plasmids, pili.

Unit – V: Transposable elements

Introduction - Discovery insertion sequences, complex and compound transposons – T10, T5, and retroposon – Nomenclature- Insertion sequences – Mechanism – Transposons of E.coli, Bacteriophage and Yeast.

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Antony JF, Griffiths, Gilbert WM, Lewontin RC and Miller JH (2002). Modern Genetic Analysis, Integrating Genes and Genomes, 2nd edition, WH

Blackburn GM, Gait MJ. (1996). Nucleic acids in chemistry and biology. Oxford University press.

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Lewin B. (2000). Genes VII. Oxford University press

Maloy SR, Cronan Jr. JE, Freifelder D (1994). Microbial genetics. Jones and Bartlett publishers.

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Watson JD, Hopkins NH, Roberts JW, Steitz JA, Weiner AM. (1998). Molecular biology of the gene, 4th edition, Benjamin/Cummings publishing company.

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