

C-8: MICROBIAL GENETICS (THEORY)
SEMESTER –IV
HMBCR4082T

TOTAL HOURS: 52

CREDITS: 4

Module 1

Marks 20

Unit 1 Mutations, DNA damage and repair

No. of Hours: 10

Genome organization: *E. coli*, *Saccharomyces*, *Tetrahymena*

Mutations and mutagenesis: Definition and types of Mutations; Physical and chemical mutagens; Molecular basis of mutations; Functional mutants (loss and gain of function mutants); Uses of mutations, Reversion and suppression: True revertants; Intra- and inter-genic suppression; Ames test; Mutator genes

Unit 2 Transposable elements

No. of Hours: 12

Prokaryotic transposable elements – Insertion Sequences, composite and non-composite transposons,

Replicative and Non replicative transposition, Mu transposon; Eukaryotic transposable elements - Yeast (Ty retrotransposon), *Drosophila* (P elements), Maize (Ac/Ds) Uses of transposons and transposition

Module 2

Marks 30

Unit 3 Mechanisms of Genetic Exchange

No. of Hours: 18

Transformation - Discovery, mechanism of natural competence

Conjugation - Discovery, mechanism, Hfr and F' strains, Interrupted mating technique and time of

entry mapping; Transduction - Generalized transduction, specialized transduction, LFT & HFT lysates, Mapping by recombination and co-transduction of markers

Unit 4 Plasmids

No. of Hours: 12

Types of plasmids – F plasmid, R Plasmids, colicinogenic plasmids, Ti plasmids, linear plasmids,

yeast- 2 μ plasmid, Plasmid replication and partitioning, Host range, plasmid-incompatibility, plasmid amplification, Regulation of copy number, curing of plasmids

C-8: MICROBIAL GENETICS

(PRACTICAL) HMBCR4082P

TOTAL HOURS: 39

CREDITS: 2

1. Preparation of Master and Replica Plates
2. Study the effect of chemical (HNO₂) and physical (UV) mutagens on bacterial cells
3. Study survival curve of bacteria after exposure to ultraviolet (UV) light
4. Isolation of Plasmid DNA from *E.coli*
5. Study different conformations of plasmid DNA through Agarose gel electrophoresis.
6. Demonstration of Bacterial Conjugation
7. Demonstration of bacterial transformation and transduction
8. Demonstration of AMES test

SUGGESTED READING

1. Klug WS, Cummings MR, Spencer, C, Palladino, M (2011). Concepts of Genetics, 10th Ed., Benjamin Cummings
2. Krebs J, Goldstein E, Kilpatrick S (2013). Lewin's Essential Genes, 3rd Ed., Jones and Bartlett Learning
3. Pierce BA (2011) Genetics: A Conceptual Approach, 4th Ed., Macmillan Higher Education Learning
4. Watson JD, Baker TA, Bell SP et al. (2008) Molecular Biology of the Gene, 6th Ed., Benjamin Cummings
5. Gardner EJ, Simmons MJ, Snustad DP (2008). Principles of Genetics. 8th Ed. Wiley-India
6. Russell PJ. (2009). *i* Genetics- A Molecular Approach. 3rd Ed, Benjamin Cummings
7. Sambrook J and Russell DW. (2001). Molecular Cloning: A Laboratory Manual. 4th Edition, Cold Spring Harbour Laboratory press.
8. Maloy SR, Cronan JE and Friefelder D(2004) Microbial Genetics 2nd EDITION., Jones and Barlett Publishers
9. Larry Snyder. Molecular Genetics of Bacteria: 3rd (third) Edition.

