B.Sc MICROBIOLOGY (CBCS) REVISED SYLLABUS - 2020

MBT III: MOLECULAR BIOLOGY AND MICROBIAL GENETICS

CREDITS: 4

TOTAL HOURS: 60

No. of hours: 12

UNIT- I: Nucleic acids

DNA and RNA Role in heredity-The central dogma
Watson and Crick model of DNA
Types of RNA, structure and functions
Organization of DNA in prokaryotes

UNIT- II : Genetic material and replication **No. of hours: 12**

Experiments which established DNA as genetic material
RNA as genetic material
Mechanism of DNA Replication in Prokaryotes
Proof of semi conservative mechanism of replication (Messelson - Stahl Experiment)
Extra chromosomal genetic elements - Plasmids and transposons

UNIT- III: Gene expression and regulation **No. of hours: 12**

Concept of gene - Muton, recon and cistron; One gene- one polypeptide, one gene- one enzyme and one gene-one product hypothesis.
Genetic code
Structure of ribosomes
Protein synthesis Transcription and translation in Prokaryotes
Regulation of gene expression in bacteria *lac* operon

UNIT- IV: Mutations, damage and repair **No. of hours: 12**

Outlines of DNA damage and repair mechanisms
Mutations - spontaneous and induced, base pair changes, frame shifts, deletions, inversions, tandem duplications, insertions
Mutagens - Physical and Chemical mutagens
Bacterial recombination Transformation, Conjugation, Transduction (Generalized and specialized transductions)

UNIT- V: Genetic engineering **No. of hours: 12**

Basic principles of genetic engineering.
Restriction endonucleases, DNA polymerases and ligases.
Vectors.
Outlines of gene cloning methods.
Polymerase chain reaction.
Genomic and cDNA libraries.
General account on application of genetic engineering in industry, agriculture and medicine.

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TOTAL HOURS: 30 **CREDITS: 1**

1. Study of different types of DNA and RNA using micrographs and model / schematic representations.
2. Study of semi-conservative replication of DNA through micrographs / schematic representations
3. Isolation of genomic DNA from *E. coli*
4. Estimation of DNA using UV spectrophotometer.
5. Resolution and visualization of DNA by Agarose Gel Electrophoresis.
6. Resolution and visualization of proteins by Polyacrylamide Gel Electrophoresis (SDS - PAGE).
7. Problems related to DNA and RNA characteristics, Transcription and Translation.
8. Induction of mutations in bacteria by UV light.
9. Instrumentation in molecular biology - Ultra centrifuge, Transilluminator, PCR