MANGALORE UNIVERSITY

DEPARTMENT OF MICROBIOLOGY
M.Sc. MICROBIOLOGY

MBH- 501: Molecular Biology

56h

OBJECTIVES:

1. Isolation of DNA, RNA, Protein and their expression from Escherichia coli, yeasts.
2. To equip students with molecular events such as DNA replication, Transcription and Translation.
3. Understanding the molecular basis of life.
4. Learning of various techniques for molecular analysis such as Agarose-gel electrophoresis, SDS-PAGE, southern blotting, northern blotting, western blotting.
5. Analysis of environmental hazards affecting DNA stability, cell transformation studies.

COURSE OUTCOME

CO1: Able to understand molecular aspects of life
CO2: Knowledge on Prokaryotic and Eukaryotic Cell characteristics, replication, transcription, and translation.
CO3: Evaluate Cellular DNA content, its structural and functional stability
CO4: Students trained to analyze protein synthesis, gene expression and its implications in various diseases
CO5: Students equipped to render service as research scholars, teachers in various institutes in molecular biology divisions and Pharmaceuticals Company.

UNIT- I

Definition, concepts: genes, chromosome, genetic code, prokaryotic and eukaryotic genomic organization structure and types of nucleic acids. Central Dogma of Molecular Biology: transcription and translation in prokaryotes and eukaryotes. Genetic recombination: transformation, transduction & conjugation. Organelle DNA- mitochondrial, chloroplast, Bacterial genome.

UNIT- II

Replication enzymes, factors involved in prokaryotic and eukaryotic Initiation, Elongation and termination of replication, Transcription, DNA proof reading, Activators and inhibitors of replication. Enzymes: activators, transcription factors, prokaryotic and eukaryotic promoters. Post transcriptional modifications- splicing, adenylation, capping, polyribosomes, polycistronic and monocystronic mRNA, Transcriptional inhibitors, Translation and Post Translation modifications.

UNIT- III

DNA damage repair mechanisms: Photo reactivation, Excision, Recombinant, SOS & Mismatch repair. Gene regulation in prokaryotes and eukaryotes: operon concept, catabolic

repression, control by attenuation. Constitutive and Induced Gene expression. Protein splicing, Inter and Intracellular Protein translocation.

UNIT- IV

Molecular Biology of Cancer: Mechanism of transformation of cells, Physical and chemical carcinogens, role of carcinogens & oncogenes in cancer, Oncogene proteins- Protein Kinases, growth factors, the *ras*proteins, Tumor repressor genes, Protein Kinases and transformation Viral oncogenes: Structure & detection of integrated viral DNA.

Note: Each unit is for 14h