

Course: MICROBIOLOGY PG

Semester	4
Paper Number	MMCB 4412
Paper Title	<u>EUKARYOTIC CELL BIOLOGY AND REGULATION OF GENE EXPRESSION</u>
No of credits	6
Non composite/composite	Composite
No. of periods assigned	6
Course description/objective	<ul style="list-style-type: none">• To know the techniques and structural characteristics of eukaryotic chromosomes• To characterize the prokaryotic and eukaryotic gene regulation• To characterize the cellular biological processes like cell cycle,protein sorting
Reference List	<ul style="list-style-type: none">✓ Weaver✓ GENES XI✓ Watson✓ Alberts-The cell✓ Molecular Cell Biology-Baltimore and Lodish
Evaluation	<p>Theory: 70 (60 End sem + 10 CIA) Practical: 30 (10 End sem + 20 CIA)</p> <p>Question Paper format: theory end semester</p> <p>Module 1: 30 marks SHORT QUESTION: FROM 7 QTNS ANSWER 5 (EACH 2 MARKS) = 5X2=10 LONG QUESTION: FROM 6 QTNS ANSWER 4 (EACH 5 MARKS)= 4X5=20</p> <p>Module 2: 30 marks SHORT QUESTION: FROM 7 QTNS ANSWER 5 (EACH 2 MARKS) = 5X2=10 LONG QUESTION: FROM 6 QTNS ANSWER 4 (EACH 5 MARKS)= 4X5=20</p> <p>Viva: End sem 10 marks</p>

MMCB4412

EUKARYOTIC CELL BIOLOGY AND REGULATION OF GENE EXPRESSION

THEORY 70

MODULE-1 Eukaryotic cell biology(35 MARKS)

Domains in membrane- natural & artificial membranes, Structure of Chromatin, Chromosome, Centromere, Telomere, Nucleosome, genome organization, chromatin remodelling; types of histones, histone modifications-methylation, acetylation, phosphorylation and its effect on structure and function of chromatin, DNA methylation, repetitive and non-repetitive DNA sequence, Law of DNA constancy, C value paradox and Genome size, Karyotype and Idiogram, chromosome banding pattern, types of 9 chromosomes, Giant chromosomes- polytene and lampbrush chromosome, multigene families, General strategies of the cell cycle; molecular mechanism of cell-cycle control (AKM)

Protein sorting and intracellular protein Transport: GERL system- Endoplasmic Reticulum – Structure, targeting and insertion of proteins in the ER, protein folding, processing and quality control in ER, smooth ER and lipid synthesis, export of proteins and lipids, Golgi Apparatus – Organization, protein glycosylation, protein sorting and export from Golgi Apparatus, Lysosomes. Different types of secretory pathways and Sec mutants, Protein targeting to Mitochondria, Chloroplast, Peroxisome [SSC]

Techniques used in cell biology [SSC]

Nerve cells, neuronal transmission, vesicle trafficking pathways and their relevance to signaling. [RM]

MODULE 2: Regulation of Gene expression in Prokaryotes and Eukaryotes (35 MARKS)

Principles of transcriptional regulation. [MMG]
Molecular mechanisms of transcription activation and repression
Regulatory Aspects of DNA Replication and Translation.

Major Features of Post-Transcriptional Processings: Capping, Polyadenylation, RNA Splicing, Protein Splicing, RNA Editing, RNA Modification, Protein Degradation, miRNA. [JG]

PRACTICAL: 30

Study of plant and animal cell after staining, blood cell, squamous cell. Detection of Barr Body. Study of Mitotic chromosome. Demonstration of Karyotype and ideogram. Study of Chromosomal aberration using physical and chemical mutagen. Study of Meiotic chromosome. Study of irregularities of Meiotic chromosome. Calculation of plasmolysis frequency. [AKM]

Induction of gene in Bacteria [MMG]

Reference:

Weaver

GENES XI

Watson

Alberts-The cell

Molecular Cell Biology-Baltimore and Lodish