

SYLLABUS

M.Sc. ZOOLOGY 2nd SEMESTER

Course I: Concepts of Cell Biology and Genetics (MSCZO -506)

UNIT WISE CONTENTS

CYTOGENETICS

Block I:

Unit1: Biology of chromosome

- 1.1 Objectives
- 1.2 Introduction
- 1.3 Classes of DNA
- 1.4 Chromosomal proteins: Histone and their modifications
- 1.5 -Nucleosome model
- 1.6 Centromere, Kinetochore and Telomere
- 1.7 Metaphase chromosome banding
- 1.8 Chromosome and Chromosomal aberrations
- 1.9 Giant chromosomes: Polytene and Lampbrush chromosome
- 1.10 Summary
- 1.11 Terminal Questions and Answers

Unit 2: Sex chromosome, sex determination and Dosage compensation in *Drosophila* and Humans

- 2.1 Objectives
- 2.2 Introduction
- 2.3 Sex chromosomes
- 2.4 Sex determination
- 2.5 Dosage compensation
 - 2.5.1 in *Drosophila*
 - 2.5.2 in Human beings
- 2.6 Summary
- 2.7 Terminal Questions and Answers

Unit 3: Cell division

- 3.1 Objectives
- 3.2 Introduction
- 3.3 Mitosis
 - 3.3.1 Role of Maturation Promoting Factors
 - 3.3.2 Chromosomal movement
 - 3.3.3 Exit from Mitosis
 - 3.3.4 Cytokinesis
- 3.4 Meiosis
 - 3.4.1 Chromosome Pairing and Recombination
 - 3.4.2 Genetic regulation of Meiosis
- 3.5 Summary
- 3.6 Terminal Question and Answers

Unit 4: Somatic Cell Genetics

- 4.1 Objectives
- 4.2 Introduction
- 4.3 Cell fusion and hybrids
 - 4.3.2 Agents and mechanism of fusion
- 4.4 Heterokaryon – selecting hybrid and chromosome segregation
- 4.5 Summary
- 4.6 Terminal Question and Answers

Block II:

Unit 5: Human cytogenetics

- 5.1 Objectives
- 5.2 Summary
- 5.3 Karyotype and Nomenclature of Metaphase Chromosome Bands
- 5.5 Types of Chromosomes their Anomalies and Disease
- 5.6 Common Syndromes caused by Aneuploidy, Polyploidy, Mosaicism, Deletion and Duplication
- 5.7 Chromosomal Anomalies in Malignancy
 - 5.7.1 Chronic Myeloid Leukemia
- 5.8 Human Genome
- 5.9 Summary
- 5.10 Terminal Questions and Answers

Unit 6: Microbial Cytogenetics

- 6.1 Objective
- 6.2 Introduction
- 6.3 Bacterial chromosome. Bacterial Transformation, Transduction and Conjugation
- 6.4 Bacteriophages
 - 6.4.1 Types
 - 6.4.2 Structure and morphology of T₄ phase
 - 6.4.3 Morphogenesis
- 6.5 Summary
- 6.6 Terminal Questions and Answers

Unit 7: Molecular cytogenetic techniques

- 7.1 Objectives
- 7.2 Introduction
- 7.3 FISH, GISH
- 7.4 DNA Fingerprinting
- 7.5 Flow Cytometry
- 7.6 Summary
- 7.7 Terminal Questions and Answers

Unit 8: Genome Analysis and Genetics of Cell cycle

- 8.1 Objectives
- 8.2 Introduction
- 8.3 C- Value paradox
 - 8.3.1 Detailed account of various models of Prokaryotic Genomes
 - 8.3.2 Viral Genome and Eukaryotic Genomes
- 8.12 Summary
- 8.13 Terminal Questions and Answers