

Cell and Molecular Biology ZO (N)-102

UNIT WISE CONTENTS

Block I (Cell biology or Cytology)

Unit 1: Cell type

History and origin. Prokaryotic and Eukaryotic cell. Difference between Prokaryotic and Eukaryotic cell.

Unit 2: Plasma membrane

History, Ultra structure, and chemical composition of plasma membrane (Lamellar-models, micellar models and fluid mosaic model). Functions of plasma membrane

Unit 3: Mitochondria

History and structure of mitochondria, biogenesis and functions of mitochondria (Respiratory chain complex and Electron transport mechanism).

Unit 4: Endoplasmic reticulum, Ribosome, Golgi bodies

History, structure, functions and importance

Unit 5: Lysosome, centriole, microtubules

History, structure, functions and importance

Unit 6: Nucleus

History, structure, functions and importance

Unit 7: Chromosomes

History, types and functions of chromosomes. Giant chromosomes, Polytene chromosome and Lampbrush chromosome.

Unit 8: Cell division

Mitosis (cell cycle stages, cytokinesis) Meiosis (reproductive cycle stages, synoptonemal complex, recombination nodules). Comparison between meiosis and mitosis.

Block II: Molecular Biology**Unit 9: Structure and type of DNA**

Structure, functions and type of DNA, Watson and Crick's structural model of DNA, chemical composition of DNA, replication of DNA and recombinant DNA.

Unit 10: Structure of RNA

Structure of RNA (primary, secondary and tertiary structure) and types of RNA (transfer RNA, messenger RNA, ribosomal RNA). Biosynthesis of m- RNA, t-RNA. Function and importance of RNA.

Unit 11: Protein Synthesis and regulation

Protein Synthesis, mechanism (initiation, elongation and termination) of protein synthesis. Gene regulation (Operon hypothesis: regulator gene, promoter gene, operator gene, structural gene, repressor gene, co-repressor gene and inducer gene), regulation at transcription, regulation by gene arrangement and reversible phosphorylation, types of control mechanisms, regulation of gene activity in eukaryotes.

Unit 12: Genetic Code

Properties of genetic code, codons and anti codon, The Wobble Hypothesis, Mutation and the triplet code.

Course Code- ZO (N) 102L Credit: 1

Objectives:

1. To study the microscopic animals and larva of different invertebrate phyla through the permanent slide/ whole mount observation.
2. To study the cytological experiments i.e. cell division stages
3. To develop practical understanding on Mendelian and non Mendelian hereditary experiments.

Syllabus: Permanent preparation of obelia colony; Ovary, pharyngeal and septal nephidium earthworm, parapodia of Nereis and Heteronereis; gill, radula and osphradium of Pila, salivary glands, mouth parts and trachea of cockroach, gill lamina of Unio, staocyst and hastate plate of prawn. Study of mitosis and meiosis using available material. Experimentation on Mendelian and non Mendelian inheritance.

UNIT SCHEDULE

Block : Experimentation

Unit : 1: Permanent slide preparation

Unit: 2: Cytological study

Unit: 3: Genetics experiment

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Identification, systematic position up to order and general study of the following animal forms, microscopic slides / museum specimens:

Unit 1: Permanent slide preparation

Permanent preparations / Minor dissections of the following:

Protozoa: Paramecium

Porifera: Sponge spicules and gemmules.

Coelenterata: Obelia colony, Obelia medusa.

Arthropoda: Mouth parts of honey bee, butterfly, cockroach and grasshopper.

Unit 2: Cytological study

- a. Study of mitosis and meiosis using available material.
- b. Study of permanent slides showing stages of cell division, giant chromosome, , mitochondria, Golgi body etc

Unit 3: Genetics experiment

Experimentation on Mendelian and non – Mendelian inheritance, study of mutants of Drosophila through charts/photographs