MAHATMA GANDHI UNIVERSITY

B.Sc. BOTANY PROGRAMME

Semester V Course 8 BO5B08U

CELL MOLECULAR BIOLOGY AND EVOLUTION

(Theory: 54 hours; Practical : 45 hours) (Theory Credit 3, Practical Credit1)

Objectives

1. Understand the Ultra structure and functioning of cell in the submicroscopic and molecular level.
2. Get an idea of origin, concept of continuity and complexity of life activities.
3. Familiarization of life process.
4. Understand the basic and scientific aspect of diversity.
5. Understand the cytological aspects of growth and development.
6. Understand DNA as the basis of heredity and variation.
7. Understand the concept of evolution as the basis of biodiversity.

Module – I

CELL BIOLOGY **28 hours**

Unit 1.Historical account of cell Biology 1 hours

Cell theory

Protoplasm theory

Unit 2.Cell 8 hours

The physio-chemical nature of plasma membrane and cytoplasm Eukaryotic, Prokaryotic cell.

The ultra structure of plant cell with brief description and function of the following organelles-Endoplasmic reticulum, Plastids, Mitochondria, Ribosomes, Dictyosome, Microbodies, lysosomes. Vacuole and cell sap, Nucleus - ultra structure, nucleolus structure and function.

Unit 3 Chromosomes 15 hours

Morphology - fine structure Dupraw model - Nucleosome model – chemical organization of nucleosome – nucleoproteins, karyotype and idiogram; Special type of chromosomes - salivary gland ,Lampbrush and B chromosome.Cell cycle, mitosis, meiosis: significanceof mitosis and meiosis.Change in number of chromosomes -Aneuploidy and Euploidy

Change in the structure of chromosomes - Chromosomal abberations deletion, duplication, inversions and translocations. Meiotic Behaviour of chromosomes. Lagging of chromosomes and Chromosome Bridge

Unit 4 Mutations 2 hours

Spontaneous and induced. Mutagens- Physical and Chemical mutagens.

Chromosomal and point mutations. Molecular mechanism of mutation - Transition, Transvesion and Substitution.

Unit 5 Stem cells; definition, sources and applications. 2 hours

Module – II **17 hours**

MOLECULAR BIOLOGY

Unit1. Nucleic acids - structure of DNA and RNA - basic features, alternate forms of DNA - types and structure of RNA 3hrs.

unit2. Replication of DNA - Meselson-Stahl experiment - details of semiconservative replication of DNA 3 hrs.

unit3. Gene expression - concept of gene, definitions - the central dogma - details of transcription in procaryotes and eucaryotes - RNA prosessing.details of translation - genetic cod features 6hrs.

unit4. Control of gene expression - positive and negative control - operon model - lac operon, trp operon -attenuation 3hrs

unit5. Genetic basis of cancer - oncogenes - tumor suppressor genes - metastasis -2hrs

Module – III

EVOLUTION **9 hours**

Unit 1 Introduction, Progressive, Retrogressive, Parallel and Convergent evolution. Theories of evolution - Lamark's, Darwin's, Weisman's and De Vries. 4 hours

Unit 2 Neo Darwinism 5 hours

Reproductive isolation, Mutation, Genetic drift, Speciation. Variation and evolution, hybridization and evolution, Polyploidy and evolution. Mutation and evolution.

Practicals **45 hours**

1. Make acetocarmine squash preparation of onion root tip to identify mitotic stages.
2. Study the Mitotic Index of onion root tip cells
3. Study of meioses in any flower bud by smear preparation of PMC's
4. Identification of Barr body
5. PTC Testing
6. Identification of salivary gland chromosome.
7. Identify and study photographs and diagrams of cell division anomalies like lagging chromosomes, chr. bridge, aneuploidy, polyploidy. study the chromosomal patterns/ Karyotype in auto-, allo-, and aneuploids
8. Work out elementary problems based on DNA structure and replication

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Cytology
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