

MOHANLAL SUKHADIA UNIVERSITY, UDAIPUR

B. Sc. BIOTECHNOLOGY I YEAR TDC (2016-17)

Paper IV : *Cell Biology, Genetics and Evolution*

Unit-I

Discovery of cell, the cell theory, ultrastructure of a eukaryotic cell – plant and animal cell. Structure and functions of cell organelles – endoplasmic reticulum, golgi complex, mitochondria, chloroplast, ribosomes, lysosomes, peroxisomes, nucleus (nuclear envelope with nuclear pore complex, nucleolus, nucleoplasm, and chromatin). Vacuole, Cytoskeletal structures (microtubules, microfilaments and intermediate filaments).

15 Credit hours

Unit-II

Chromosome discovery, morphology and structural organization – centromere, secondary constriction, telomere, chromonema, euchromatin and heterochromatin, chemical composition and karyotype. Ultrastructure : Single-stranded hypotheses, folded-fibre and nucleosome models. Special types of chromosomes: Salivary gland and Lampbrush chromosomes. Cell cycle, mitosis and meiosis. Cell senescence and Programmed Cell Death (PCD). Amoeboid, ciliary and flagellar movement.

15 Credit hours

Unit-III

Mendel's work, laws of heredity, test cross, incomplete dominance and simple problems. Interaction of genes : supplementary factors-comb pattern in fowls, complementary genes- flower colour in sweet peas, multiple factors – skin colour in human beings, epistasis- plumage colour in poultry, multiple allelism-blood groups in human beings.

Sex determination in plants and animals : concepts of allosomes and autosomes, XX-XY, XX-XO ZW-ZZ, ZO-ZZ types, linkage and crossing over coupling and repulsion hypothesis, linkage in maize and *Drosophila*, mechanism of crossing over and its importance, chromosome mapping – linkage map in maize.

15 Credit hours

Unit-IV

Chromosomal variations : A general account of structural and numerical aberrations, chromosomal evolution of wheat and cotton.

Cytoplasmic Inheritance : Plastid inheritance in *Mirabilis*, petite-characters in yeast and kappa particles in *Paramecium*.

Mutations-types: Spontaneous and induced, mutagens : physical and chemical, mutation at molecular level. mutations in plants, animals and microbes for economic benefit of man. Human genetics – karyotype in man, inherited disorders – allosomal (Klinefelter

syndrome and Turner's syndrome), autosomal (Down syndrome and Cri-Du-Chat Syndrome).

15 Credit hours

Unit-V

Evolution and origin of species – theories of evolution, lamarkism, darwinism, mutation theory neodarwinism. Succession and fossil records, genetic variation, phenotypic variation sources of genetic variation. Selection, mechanism of race differentiation, speciation, mechanism of reproductive isolation and origin of adaptations.

15 Credit hours

Recommended Books

1. Alberts, B., Bray, D. Lewis, J., Raff, M., Roberts, K. and Watson, J.D. 1999. Molecular Biology of Cell. Garland Publishing Co. New York, USA.
2. Snustad, D.P. and Simmons, M.J. 2000. Principles of genetics. John Wiley and Sons.
3. Russel, P.J. 1998. Genetics. The Benjamin/Cumming Publishing Co.
4. Gasque, E. Manual of Laboratory experiments in cell Biology. W.C. Wilson Public.
5. Gardaner *et al.* Principles of genetics. John Wiley and Sons.
6. Robertis, E.D.P., Robertis, E.M.F. Cell and Molecular Biology. Sauder College Publication.
7. Beeker, W.M. The world of the cell. Pearson Education.
8. Karp, G. Cell and Molecular Biology. John Willey and sons.
9. Lodish and Baltimore. Molecular Cell Biology. W.H. Freeman and Co.
10. Rastogi V.B. Organic evolution.