

B. Sc. ZOOLOGY - II YEAR - SEMESTER –IV
KAKATIYA UNIVERSITY – WARANGAL - TELANGANA
Under Graduate Courses (Under CBCS 2025-26 onwards)
PAPER-IV: CELL AND MOLECULAR BIOLOGY & GENETICS

UNIT – I: Cell Biology

- 1.1 Cell Structure and Organization: Prokaryotic vs. eukaryotic cells, organelles, and their functions.
- 1.2 Membrane Biology: Structure and functions of biological membranes, transport mechanisms, and cell signaling.
- 1.3 Cell Cycle and Cell Division: Phases of the cell cycle, mitosis, and meiosis, regulation, and significance.
- 1.4 Cytoskeleton and Cellular Motility: Microtubules, microfilaments, intermediate filaments, and their roles in intracellular transport.
- 1.5 Cellular Communication: Signal transduction pathways, receptors, and second messengers.

UNIT – II: Molecular Biology

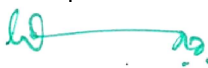
- 2.1 DNA Structure and Function: Double helix model, types of DNA, organization of prokaryotic and eukaryotic genomes.
- 2.2 DNA Replication: Mechanism, enzymes involved, prokaryotic vs. eukaryotic replication.
- 2.3 Transcription and RNA Processing: Mechanism of transcription, types of RNA, post-transcriptional modifications.
- 2.4 Translation and Protein Synthesis: Genetic code, ribosomes, initiation, elongation, and termination of protein synthesis.
- 2.5 Gene Regulation: Operon concept, epigenetics, and post-transcriptional gene regulation.

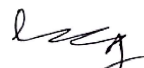
UNIT – III: Genetic Engineering and Applications

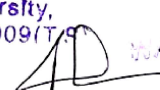
- 3.1 Mutations and DNA Repair: Types of mutations, mutagens, mechanisms of DNA repair.
- 3.2 Recombinant DNA Technology: AI-Driven Innovations in Recombinant DNA Technology: Enhancing Gene Cloning, PCR Optimization, and Vector Design
- 3.3 Genetic Engineering in Biology: Gene therapy, transgenic animals, CRISPR technology.
- 3.4 Genomics and Proteomics: Human Genome Project, applications of genomics, and proteomics in biotechnology.
- 3.5 Applications of Molecular Biology: Forensic science, genetic testing, and synthetic biology.

UNIT – IV: Principles of Genetics

- 4.1 Mendelian Genetics: Laws of inheritance, monohybrid and dihybrid crosses, test cross, and back cross.
- 4.2 Non-Mendelian Genetics: Incomplete dominance, codominance, multiple alleles, and epistasis.
- 4.3 Chromosomal Basis of Inheritance: Chromosome theory, linkage, crossing over, and gene mapping.
- 4.4 Sex Determination and Sex-Linked Inheritance: Chromosomal and environmental sex determination, X-linked, Y-linked, and sex-limited traits.
- 4.5 Genetic Disorders and Pedigree Analysis: Autosomal and sex-linked genetic disorders, pedigree construction, and interpretation.


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