Mahatma Gandhi University, Nalgonda

Ph.D. Entrance Test 2024

Part B Syllabus of Biotechnology

Unit-1 Cell biology & Genetics : Structure and functions of cell organelles; Structure and properties of cell membrane and transport mechanisms; prokaryotic and eukaryotic Cell cycle, check points and CDK's; Abnormalities in Cell Cycle – Cancer ; Mechanism Cell Division-Mitosis and Meiosis; Recombination; Necrosis, Senescence; Apoptosis, Mendel's Laws, Incomplete dominance, Co-dominance, Penetrance and Expressivity, Pleiotropism, Phenocopy, Epistasis, Multiple Allelism, Pseudoallelism, Inheritance of quantitative traits, Sex determination in Drosophila, Birds, Man, Bonellia, Pedigree analysis, X-linked inheritance, Y-linked inheritance.

Unit-2 Biochemistry & Bioanalytical techniques: Chemistry of carbohydrates, aminoacids, lipids and nucleic acids; TCA & Glycolysis nomenclature and classification of Enzymes, Enzyme activation, types of Enzyme inhibitiors, Dialysis, Ultrafiltration Spectroscopy Techniques - UV, Visible and Raman Spectroscopy Fluorescence; Types of centrifuge - Microcentrifuge, High speed & Ultracentrifuges, Chromatographic methods, TLC and Paper Chromatography, Ion exchange, HPLC; Electrophoretic techniques- Theory and application of Polyacrylamide and Agarose gel electrophoresis; Capillary electrophoresis; 2D Electrophoresis.

Unit-3 Microbiology & Immunology: Historical developments in Microbiology and Microbial Biotechnology, Identification methods of microorganisms, Structure, characters, classification of Bacteria, Archaea, Fungi, Algae, virus, structure and replication of Bacteriophage (T2), Retroviruses, Prions – Kuru, Methods of cultivation of viruses, Methods of sterilization, pure culture, Methods of preservation of microbial cultures of industrial application, Nutritional groups of microorganisms and their importance, Microbiological media and their application, Microbial growth curve, Exponential growth and synchronous growth. Acquired and Innate Immunity, Cells involved in immunity, Organs of the immune system- Types, structure and function of Immunoglobulin, organization of immunoglobulin genes Microbial Products-Alcohol, Citric acid, Glutamic acid.

Unit-4 Molecular biology & rDNA Technology : DNA and RNA as genetic material , Enzymes involved in the replication of DNA and their features, Replication of circular and linear DNA, Regulation of eukaryotic genome replication, Mutagens and Molecular mechanisms of mutagenesis, Repair mechanisms, Transformation, Conjugation, Transduction and mapping, Homologous and Non- homologous recombination, Transposon and rearrangements, Prokaryotic and eukaryotic genes and genome organization, c-value paradox, Kinetics of DNA re-association, gene families, Organization of mitochondrial and chloroplast genomes. Restriction endonucleases, DNA modifying enzymes, methylases, polymerases, ligases, kinases, phosphatases, nucleases, RNA dependent DNA polymerase, Terminal Deoxynucleotidyl

transferase, cloning and expression vectors, genomic and cDNA libraries, Blotting and Hybridization techniques, DNA sequencing, PCR technology.

Unit-5 Animal & Plant Biotechnology: Culture media, sterilization, Development and maintenance of cell line, Cell hybridization, hybridoma and monoclonal antibodies production, In vitro culture and cryopreservation of germ cells and embryo, Stem cell – isolation and culture, Development of Transgenic animal- methodology and Application. Introduction to totipotency of plant cells, Callus and suspension cultures, Micro propagation of ornamental, horticulture and forest plants, Somatic embryogenesis, embryo rescue, somaclonal variation, Production of commercially important compounds using plant cell culture techniques, Protoplast culture and fusion, somatic hybrids Development of transgenic plants – methods and applications, Bioinformatics: Introduction to Bioinformatics 1. DNA sequences 2. RNA sequences 3. Protein sequences. comparison of sequences. BLAST & FASTA Mean, Median, Mode, Student T-test & F-Test, ANOVA.