DEPARTMENT OF APPLIED BIOSCIENCES

MAHATMA GANDHI UNIVERSITY, NALGONDA

PRE - PH.D BIOCHEMISTRY, SYLLABUS

Candidates should write two theory papers (Paper I & II) of 100 marks each and obtain **a** minimum of 50%, marks in each paper (Max Marks — 100)

Paper I— I BIOCHEMICAL METHODOLOGY AND METABOLISM

UNIT-I

1. Principles and applications of light, phase contrast and electron microscopy, flowcytometry, gel filtration ion exchange, affinity high pressure liquid and gas chromatography. Electrophoresis: Elect focusing, centrifugation.

2. Biophysical methods for biopolymer structure determination: X ray Diffraction, fluorescence, UV-Vis, ORD, CD, IR, NMR and ESR spectroscopy.

Unit - II

1. Nucleic acid hybridization and Cot curves, Sequencing of proteins and Nucleic acids
   Blotting techniques, PCR, DNA foot printing, Screening of genomic and cDNA libraries
2. Tracer technique's in biology, methods of determination of structure of proteins and Nucleic acids. Immuno analytical methods: mono clonal anti bodies, determination of the structure and conformation of proteins and polypeptides, MALDI TOFF, LCMS/MS.
3. Principles, methodology and applications of genetic engineering, chemical synthesis
   genes. Molecular diagnosis gene therapy.

Unit —III

1. Enzyme kinetics, regulation of enzyme activity, allosteric enzymes, and co factors. Active sites and mechanism of action of enzymes, Enzyme activators, inhibitors, isoenzymes.
2. Energy metabolism. Electron transport, oxidative phosphorylation and photosynthesis
3. Carbohydrate Metabolism: Glycogen breakdown and synthesis. Gluconeogenesis

Unit — IV

1. Amino acid metabolism, nitrogen fixation, purine and pyrimidine metabolism
2. Lipid oxidation and metabolism. Metabolism of steroic and phospholipids

Pre - Ph.D Biochemistry Syllabus

(Max Marks -100)

Paper -II : Cell , Immunology and Molecular Biology

UNIT I

1. Bio membranes, structure and functions, Membrane transport.
2. Biochemistry of signal transduction mechanisms.
3. Receptors and mechanism of action of hormones. Molecular physiology of muscle contraction and neuro transmission.

Unit -II

1. Immunology: Classification of Immuno globulins, Immunity, Immuno Humoral and cell mediated immunity. Immunological memory, adjuvants. Lymphokines. T cells receptor. Hypersensitivity, HLA, Autoimmunity, Complement, antibody diversity.
2. Bioinformatics, proteins DNA databases sequence alignment, protein structure determination proteomics and genomics.

Unit- III

1. DNA replication, DNA damage and repair.
2. Mechanism of transcription and translation in prokaryotes and eukaryotes.
3. Viruses: RN A and DNA viruses and life cycle of T-even phages, TMV, OX 174, SV40 and retroviruses.

Unit - IV

1. Regulation of gene expression. Operon concept. Lytic cascade and lysogenic regression. DNA Methylation, Retrochromatin. Antisense RNA. Protein targeting. Post translational and post transcription modification, signal hypothesis. Molecular chaperones.
2. Oncogenes and molecular basis of cancer. Tumor suppressor genes.
3. Viruses. RNA and DNA viruses and. life cycle of T - even phages, TMV, OX 174, SV40 and retroviruses.