

DEPARTMENT OF BIOCHEMISTRY

FACULTY OF MEDICINE

A.M.U., ALIGARH

Syllabus for Ph.D Admissions Test 2022-23 onwards

SECTION-B

- 1. Molecular Cell Biology:** Human cell organelles and their structure and function; composition and properties of cell membrane; transport across membrane; cell-cell communication; programmed cell death; cell differentiation and cancer; p-53 gene; types of stem cells and their therapeutic uses; neurobiology and neurochemistry; functions of muscle proteins; telomers and telomerase.
- 2. Blood and Biological Fluids:** Structure and properties of hemoglobin, albumin and immunoglobulin G; chemistry of blood clotting; composition and diagnostic significance of cerebrospinal fluid and amniotic fluid; acute phase proteins (hsp). Metabolic and respiratory acidosis; analysis of analytes in blood, urine and cerebrospinal fluid; Components of liver function test (LFT) and renal function test (RFT); markers of myocardial infarction; fasting and post prandial blood glucose test; non-enzymatic glycosylation of albumin and hemoglobin in diabetes mellitus and healthy subjects; tumor markers.
- 3. Advanced Enzymology:** Properties, catalytic behavior, kinetics and regulation of allosteric and non-allosteric enzymes; diagnostic significance of serum enzymes; abzymes; isozymes.
- 4. Metabolism and its Integration:** Metabolism of carbohydrates, lipids, amino acids, proteins, heme and nucleic acids; inborn errors of carbohydrate, amino acid and nucleic acid metabolism; regulation of carbohydrate and lipid metabolic pathways; electron transport chain and oxidative phosphorylation.
- 5. Hormones:** Role of hormones in the regulation of carbohydrates and lipid metabolism and their mechanism of action; consequences of hormone dysfunction.
- 6. Advanced Molecular Biology:** Structure and properties of genetic material; replication; transcription and post transcriptional processing; translation; regulation of gene expression; DNA repair; human genome project and its implications; recombinant DNA technology and its applications; gene silencing; restriction and molecular genetic maps; genomics, proteomics and lipidomics.
- 7. Immunology:** Innate and adaptive immunity; cellular and protein components of immune system; primary and secondary immune response; types of immunoglobulins and basis of antibody diversity; multiple myeloma; complement system; monoclonal antibodies and their therapeutic uses; immunobiology of HIV; mechanism of action of anti-HIV drugs; autoimmunity and autoimmune disorders; composition of immunodominant antigens of Swine, Bird and Human Flu viruses.

- 8. Vitamins, Ions, Trace Elements:** Metabolism of Ca, Pi, Cu and Fe; Role of Na, K and Cl in homeostasis and related disorders; regulation of acid-base balance; biochemical functions of vitamins; toxicity of vitamin A, D, E and K; diseases of vitamin deficiency; role of vitamins in free radical homeostasis.
- 9. Free Radicals and Antioxidants:** Chemistry and pathology of free radicals and antioxidants (enzymatic as well non-enzymatic).
- 10. Techniques:** Basic principle of sedimentation and analysis of sub-cellular fractions; principle and applications of HPLC, affinity chromatography, immunodiffusion, agarose gel and polyacrylamide gel electrophoresis, ultraviolet and visible light spectroscopy, circular dichroism spectroscopy, spectrofluorometry, band shift assay, DNA fingerprinting, ELISA, radioimmunoassay, immunoblotting and polymerase chain reaction.
- 11. Quality Control and Biostatistics:** Quality Control and automation in clinical biochemistry laboratory; biostatistics and its application; selection of statistical methods and their evaluation; standard error; standard deviation; student's and paired 't' tests; Z- test; Chi-square test; Fisher exact test; non-parametric tests of significance; confidence level; p-value; one-way and two-way analysis of variance.