

Postgraduate Spring 2023
TOS NUMS Entry Test
PhD Biochemistry

S.No	TOPIC
1	<p>Cell and Cell Signaling</p> <ul style="list-style-type: none"> ○ Chemical structure and functions of cell organelles and cell membrane ○ Transport system across cell membrane ○ Types of receptors and mechanisms ○ Second messenger systems ○ Nitric oxide synthase and its role in signaling ○ Cell Signaling and Human diseases (HCV, Cholera, Dyslipidemia, Hyperlipidemia, Bordetella pertussis) ○ Xenobiotics
2	<p>Enzymology</p> <ul style="list-style-type: none"> ○ Classification and properties of enzymes ○ Factors affecting activity of enzymes ○ Enzymes kinetics ○ Enzyme inhibition ○ Synthesis and regulation of enzymes ○ Enzymes in clinical diagnosis
3	<p>Chemistry and Metabolism of Carbohydrate</p> <ul style="list-style-type: none"> ○ Composition and functions of Monosaccharides, Disaccharides, Oligosaccharides and Polysaccharides, Glycoproteins, Glycosaminoglycans ○ The Glycolytic Pathway ○ Gluconeogenesis ○ Glycogenesis and Glycogenolysis ○ Advanced Glycation End Products ○ TCA and Pyruvate Dehydrogenase Complex ○ Pentose Phosphate Pathway and NADP ○ Synthesis and degradation of glycosaminoglycans ○ Regulation of metabolic pathways ○ Insulin and Glucagon ○ Diabetes mellitus ○ Glycogen Storage diseases
4	<p>Chemistry and Metabolism of Lipids</p> <ul style="list-style-type: none"> ○ Classification, structure and functions of lipids ○ Properties of lipids (peroxidation, rancidity, ROS) ○ Eicosanoids, their classification and functions in health and disease ○ Fatty acid synthesis and oxidation ○ Metabolism of phospholipids ○ Metabolism of cholesterol ○ Metabolism of lipoproteins ○ Ketogenesis and ketolysis ○ Prostaglandins and thromboxanes ○ Disorders of lipid metabolism
5	<p>Chemistry and Metabolism of Amino Acids and Proteins</p> <ul style="list-style-type: none"> ○ Amino acids classification ○ Chemical properties of amino acids ○ Classification and functions of proteins ○ Separation and study techniques of proteins ○ Plasma proteins and immunoglobulins ○ Amino acid pool and dietary protein digestion ○ Nitrogen disposal from amino acids ○ Urea Cycle steps and regulation ○ Ammonia metabolism ○ Metabolism of individual amino acids ○ Synthesis and degradation of hemoglobin ○ Hemoglobinopathies ○ Porphyrias

	<ul style="list-style-type: none"> ○ Inborn errors of metabolism
6	<p>Basic Molecular Biology of Eukaryotes</p> <ul style="list-style-type: none"> ○ Structure and biomedical functions of nucleotides, nucleosides and nucleic acids ○ Synthesis and degradation of purines and pyrimidines ○ Gout and Lesch Nyhan syndrome ○ DNA replication ○ DNA damage and repair system ○ Transcription and posttranscriptional modifications ○ Types of epigenetic and genetic mutations and genetic disorders ○ Translation and post-translational modifications ○ Mendelian inheritance ○ Single nucleotide polymorphism
7	<p>Molecular Techniques</p> <ul style="list-style-type: none"> ○ Polymerase chain reaction (PCR), types and clinical applications ○ DNA /RNA extraction ○ Restriction endonucleases ○ Probes and molecular beacons ○ Gel electrophoresis ○ Southern blotting ○ RFLP ○ ELISA ○ Spectrophotometry ○ Recombinant DNA cloning ○ DNA, RNA and protein sequencing ○ Microarray
8	<p>Endocrinology Chemistry, functions, synthesis, regulation and hyper & hypo states of the following hormones:</p> <ul style="list-style-type: none"> ○ Thyroid ○ Parathyroid ○ Adrenal ○ Pancreatic ○ Pituitary ○ Steroid hormones (Testosterone, Progesterone, Estrogen, Calcitriol)
9	<p>Nutritional Biochemistry:</p> <ul style="list-style-type: none"> ○ Dietary reference intakes ○ Nutritional aspects of carbohydrates, fats and proteins ○ Nutrition and life stages ○ Water soluble vitamins ○ Fat soluble vitamins ○ Minerals
10	<p>GIT</p> <ul style="list-style-type: none"> ○ Digestion, Absorption, Transport of Carbohydrates, Proteins, Lipids and Nucleoproteins ○ Composition, functions, daily secretion, stimulants and depressants of <ol style="list-style-type: none"> I. Saliva II. Gastric Juice & HCL III. Succus Entericus IV. Pancreatic Juice V. Bile Juice ○ Biochemical disorders of GIT, e.g. achlorhydria, peptic ulcers, lactose intolerance, cholelithiasis
11	<p>Bioenergetics</p> <ul style="list-style-type: none"> ○ Electron transport chain ○ Oxidative phosphorylation ○ ATP synthase---structure and functions ○ Uncouplers and inhibitors
12	<ul style="list-style-type: none"> ○ Research Methodology ○ Biostatistics/Analytical ○ Medical Writing/ Bioethics