

Table of Specification –PhD Biochemistry Spring 2026

NUMS Entry Test

S.No	TOPIC	MCQs
1	Cell and Cell Signaling <ul style="list-style-type: none"> ○ 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) 	07
2	Enzymology <ul style="list-style-type: none"> ○ Properties of enzymes ○ Factors affecting activity of enzymes ○ Enzymes kinetics ○ Enzyme inhibition ○ Regulation of enzymes ○ Isoenzymes ○ Enzymes in clinical diagnosis – CLINICAL ENZYMOLOGY 	05
3	Chemistry, Metabolism and related diseases of Carbohydrates <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 NADPH ○ Synthesis and degradation of glycosaminoglycans ○ Regulation of metabolic pathways ○ Glycogen Storage diseases 	10
4	Chemistry and Metabolism of Lipids <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 ○ Disorders of lipid metabolism 	10
5	Chemistry and Metabolism of Amino Acids and Proteins <ul style="list-style-type: none"> ○ 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 	10

	<ul style="list-style-type: none"> ○ Nitrogen disposal from amino acids ○ Nitrogen balance- Urea Cycle steps and regulation ○ Ammonia metabolism ○ Metabolism of individual amino acids ○ Synthesis and degradation of hemoglobin ○ Hemoglobinopathies ○ Porphyrrias ○ Inborn errors of metabolism 	
6	<p>Nucleotide Metabolism & Basic Molecular Biology</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 ○ Mutations ○ Translation and post-translational modifications ○ Single nucleotide polymorphism 	10
7	<p>Molecular Techniques & Xenobiotics Metabolism</p> <ul style="list-style-type: none"> ○ Solution & buffer system ○ Principles & applications of the following in Bio chemistry: ○ Amino Acid Analyzer ○ Chromatography ○ PCR & Electrophoresis ○ Mass Spectroscopy ○ ELISA ○ Spectrophotometry ○ Restriction endonucleases ○ Phase I and Phase 2 Reactions of Xenobiotics Metabolism 	05
8	<p>Endocrinology Chemistry, functions, synthesis, regulation and hyper & hypo and disease states of the following hormones:</p> <ul style="list-style-type: none"> ○ Thyroid ○ Parathyroid ○ Adrenal ○ Pancreatic ○ Pituitary ○ Steroid hormones (Testosterone, Progesterone, Estrogen, Calcitriol) 	10
9	<p>Nutritional Biochemistry:</p> <ul style="list-style-type: none"> ○ Dietary reference intakes ○ Nutritional aspects of carbohydrates, fats and proteins ⊖ Glycemic Index ○ Water soluble vitamins ○ Fat soluble vitamins ○ Minerals 	5
10	<p>Bioenergetics</p> <ul style="list-style-type: none"> ○ Electron transport chain ○ Oxidative phosphorylation 	5

	<ul style="list-style-type: none"> ○ ATP synthase---structure and functions ○ Uncouplers and inhibitors ○ Shuttle mechanisms 	
11	<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 <ul style="list-style-type: none"> I. Saliva II. Gastric Juice III. Succus Entericus IV. Pancreatic Juice V. Bile Juice ○ Biochemical disorders of GIT, e.g. achlorhydria, peptic ulcers, lactose intolerance, cholelithiasis 	8
12	Research Methodologies	15
Total		100