Contents

Section I: Theories

1. Cell and Subcellular Organelles **3**
- *Cell* *3*
- *Lysosomes* *4*
- *Peroxisomes* *5*
- *Mitochondria* *5*
- *Marker Molecules* *5*
- *Transport Mechanisms* *5*
- *Transport Systems* *6*

2. Enzymology **8**
- *Enzymes* *8*
- *Nomenclature* *8*
- *Prosthetic Groups, Cofactors and Coenzymes* *8*
- *Enzyme Kinetics* *9*
- *Michaelis-Menten Theory* *9*
- *Factors Affecting Enzyme Activity* *10*
- *Inhibition of Enzyme Activity* *11*
- *Regulation of Enzyme Activity* *12*
- *Specificity of Enzymes* *12*
- *Clinical Enzymology* *12*
- *Enzyme Pattern (Enzyme Profile) in Diseases* *14*

3. Carbohydrates **15**
- *Functions of Carbohydrates* *15*
- *Classification of Carbohydrates* *15*
- *Metabolism of Carbohydrates* *19*
- *Glycolysis (Embden-Meyerhof-Parnas Pathway)* *19*
- *Cori Cycle (Lactic Acid Cycle)* *21*
- *Rapoport-Luebering Reaction* *21*
- *Gluconeogenesis* *22*
- *Glycogen Metabolism* *23*
- *Blood Glucose Regulation* *25*
- *Glucagon* *26*
- *Glucose Tolerance Test* *26*
- *Diabetes Mellitus* *27*
- *Pentose Phosphate Pathway* *29*
- *Glucuronic Acid Pathway of Glucose Metabolism* *30*
- *Polyol Pathway of Glucose* *30*
- *Fructose Metabolism* *30*
- *Galactose Metabolism* *30*
- *Metabolism of Alcohol* *31*

4. Proteins and Amino Acids **33**
- *Amino Acids* *33*
- *Proteins* *35*

- *Metabolism of Amino Acids* 36
- *One-Carbon Metabolism* 39
- *Amino Acid Metabolism* 40

5. Lipids **48**
- *Chemistry of Lipids* 48
- *Functions of Lipids* 48
- *Classification of Lipids* 48
- *Fatty Acids* 48
- *Oxidation of Odd-chain Fatty Acids* 52
- *Triacylglycerols* 54
- *Ketone Bodies* 56
- *Cholesterol and Lipoproteins* 57
- *Lipoproteins* 59
- *Free Fatty Acids* 61
- *Polyunsaturated Fatty Acids* 61
- *Eicosanoids* 62
- *Sphingolipidoses or Lipid Storage Diseases* 63
- *Hypercholesterolemia* 63
- *Atherosclerosis* 64

6. Cellular Energetics **65**
- *Citric Acid Cycle* 65
- *High-energy Compounds* 67
- *Electron Transport Chain* 68
- *Oxidative Phosphorylation* 69
- *Chemiosmotic Hypothesis* 69

7. Nutrition **71**
- ***Vitamins*** ***71***
- *Fat-soluble Vitamins* 71
- *Water-soluble Vitamins* 76
- ***Minerals*** ***83***
- ***Protein Energy Malnutrition*** ***89***

8. Tissue Biochemistry **90**
- *Heme Synthesis* 90
- *Heme Catabolism* 92
- *Hemoglobin* 94
- *Myoglobin* 97
- *Immunochemistry* 97
- *Immunity* 97
- *Immunoglobulins* 98
- *Acid-Base Balance* 100
- *Maintenance of Blood pH* 100
- *Buffers of the Body Fluids* 100
- *Respiratory Regulation of pH* 100
- *Renal Regulation of pH* 100
- *Disturbances in Acid-Base Balance* 101
- *Plasma Proteins* 103
- *Transport Proteins* 104
- *Acute Phase Proteins* 104

9. Molecular Biology **105**
- *Purine and Pyrimidine Metabolism* 105
- *DNA Structure* 106

- *Replication of DNA* 107
- *DNA Repair Mechanism* 109
- *Transcription and Translation* 110
- *Mutations* 112
- *Regulation of Gene Expression* 113
- *Recombinant DNA Technology* 114
- *Gene Therapy* 115
- *Genetic Code* 116
- *Transfer RNA* 116

10. Xenobiotics **118**
- *Free Radicals* 118
- *Oxidative Stress* 118
- *Lipid Peroxidation* 119
- *Antioxidants* 120
- *Metabolism of Xenobiotics or Detoxification* 120

11. Cancer **122**
- *Tumors* 122
- *Cancer* 122
- *Tumor Markers* 123
- *Anticancer Drugs* 125
- *Apoptosis* 125

12. Biotechniques **126**
- *Electrophoresis* 126
- *Polymerase Chain Reaction* 126
- *Radioimmunoassay* 127
- *Enzyme-linked Immunosorbent Assay* 127
- *DNA Fingerprinting* 128
- *Tools in Biochemistry Blotting Techniques* 128

13. Clinical Chemistry **130**
- *Liver Function Tests* 130
- *Renal Function Tests* 131
- *Gastric Function Tests* 134

Section II: Practicals

14. Qualitative Analysis **137**
- *Scheme for Identification of Important Biological Products* 137
- *Reactions of Carbohydrates* 138
- *Color Reactions of Proteins* 139
- *Reactions of Nonprotein Nitrogenous Substances* 140

15. Quantitative Analysis **142**
- *Introduction to Clinical Biochemistry* 142

16. Urine Analysis **143**
- *Physical Characteristics of Urine* 143
- *Chemical Constituents of Urine* 144

17. Biochemical Pathways **145**

Viva Voce

Viva Voce **153**
- *Cell and Subcellular Organelles* *153*
- *Enzymology* *153*
- *Carbohydrates* *154*
- *Proteins and Amino Acids* *155*
- *Lipids* *156*
- *Cellular Energetics* *157*
- *Nutrition* *157*
- *Tissue Biochemistry* *157*
- *Molecular Genetics* *158*
- *Cancer* *158*
- *Biotechniques* *158*
- *Clinical Chemistry* *158*

Appendix 1

Important Topics **159**
- *Cell and Subcellular Organelles* *159*
- *Enzymology* *159*
- *Carbohydrates* *159*
- *Proteins and Amino Acids* *160*
- *Lipids* *160*
- *Cellular Energetics* *160*
- *Nutrition* *160*
- *Tissue Biochemistry* *161*
- *Molecular Biology* *161*
- *Xenobiotics* *161*
- *Cancer* *161*
- *Biotechniques* *162*
- *Clinical Chemistry* *162*

Appendix 2

Multiple Choice Questions **163**
- *Cell and Subcellular Organelles* *163*
- *Enzymology* *163*
- *Carbohydrates* *163*
- *Proteins and Amino Acids* *165*
- *Lipids* *167*
- *Cellular Energetics* *169*
- *Nutrition* *169*
- *Tissue Biochemistry* *169*
- *Molecular Biology* *170*
- *Xenobiotics* *172*
- *Cancer* *172*
- *Clinical Chemistry* *172*
- *Biotechniques* *172*

Index *173*