

ITPD Competency Exam

Basic Biomedical Sciences – Study Guide

Suggested Study References:

BASIC BIOMEDICAL SCIENCES

Preferred References

- Microbiology and Immunology On-line, Hunt, R.C. editor. <http://www.microbiologybook.org>
- Lehninger Principles of Biochemistry, by David L. Nelson and Michael M. Cox, Fifth Edition. Freeman/Worth; 2010.
- The Cell, 2nd edition; A Molecular Approach; Geoffrey M Cooper. Boston University Sunderland (MA): Sinauer Associates; 2000.
- Immunobiology, 5th edition; The Immune System in Health and Disease; Charles A Janeway, Jr, Paul Travers, Mark Walport, and Mark J Shlomchik. New York: Garland Science; 2001.
- Robbins & Cotran. Pathologic Basis of Disease, 8th edition. Vinay Kumar, Abul K. Abbas, Nelson Fausto, Jon Aster. Saunders; 2009.

Other References

- The APhA Complete Review for the FPGEE by Dick R. Gourley
- Biochemistry by Jeremy M. Berg, John L. Tymoczko, and Lubert Stryer, Sixth Edition.
- Molecular Biology of the Cell, 5th edition; Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, and Peter Walter. New York: Garland Science; 2012.

Suggested Learning Objectives:

Anatomy and Physiology

- Define the function of minor body systems: integumentary, skeletal, cardiovascular, respiratory, digestive, nervous, endocrine, urinary, and reproductive.
- Define oxidation and reduction.
- Understand the cell cycle and define each phase.
- Understand the basic building blocks of a cell: carbohydrates, amino acids and fatty acids.
- Identify the function of basic cellular components.
- Understand the process of transportation across cell membranes.

Pathology/pathophysiology

- Understand the basic principles and mechanisms of disease including: inflammation, cardiac disorders, brain function, and neoplasm.
- Explain the pathophysiology of disease states amenable to pharmacist intervention (including atherosclerosis, cardiac disorders, shock, hypertension, respiratory disorders , etc.)

Microbiology

- Define prokaryotes and eukaryotes and identify the microbes associated with this definition.
- Differentiate between the microbiological identification of gram-positive and gram-negative bacteria.
- Review the 4-phase growth curve of bacteria.
- Describe the environmental condition needed for bacterial growth.
- Define the terms reservoir, carrier and vector as they relate to infectious disease transmission.
- Review the fundamental concepts of viruses.
- Define the terms endemic, epidemic and pandemic.
- Understand the concepts of natural host defenses and host resistance to microbial invasion
- Describe areas of the body that are considered sterile and areas where bacteria growth is common in the healthy individual.
- Identify and describe the different time periods related to infectious disease manifestations in the body.
- Review the infectious diseases and specific pathogenic microorganisms (bacterial and viral) that cause disease in humans and describe the associated disease-related clinical symptoms.
- Review the principles of host-resistance, specifically the mechanisms related to non-specific immunity and inflammation.

Biochemistry/biotechnology

- Understand protein structure-function relationships; including secondary, tertiary, and quaternary structures
- Identify disease with loss of protein stability and function
- Discuss protein aggregation diseases
- Understand and apply advanced enzymology
- Understand enzymatic reactions including (inhibition, catalysts, and substrates)
- Review the phases of glycolysis and the coordination of regulation of glycolysis and gluconeogenesis
- Describe the relationship between phosphoryl group transfers and ATP
- Describe mechanistic aspects of energy production
- Review biological oxidation-reduction reactions
- Explain the citric acid cycle (Krebs cycle) and the urea cycle.
- Understand the mechanisms and applications of fatty acid catabolism
- Understand all aspects of nucleic acid metabolism and DNA replication
- Explain DNA damage, repair in relation to cancers
- Discuss regulation of gene transcription and translation
- Describe recombinant DNA technology (including the enzymes and cloning vectors)

Molecular biology/genetics

- Review the structure and components of cells and macromolecules (including molecules that make up a cells and macromolecules)
- Review ion channels and how they function
- Describe the different types of ion channels
- Explain the stages of the process of meiosis and mitosis
- Review chromosomes and DNA (including base pairs and genes)
- Understand the process of gene transcription and translation and the enzymes involved in these processes
- Review recombinant DNA technology (including the process, the enzymes involved, and the role of plasmids)

Immunology

- Describe function of key immune cell types
- Describe the derivation of key immune cells
- State key roles of immunoglobulins
- State key types and roles of cytokines
- Define a mitogen and its effect on immune response
- Describe laboratory measurements of response to key viral infections
- Describe steps involved in the use of monoclonal antibodies for measuring immune response.
- Describe laboratory measures to determine blood cell type
- Describe general concepts of immune responses
- State steps involved in delayed hypersensitivity
- Describe key attributes of autoimmune diseases
- Describe the mechanism of graft rejection
- State key concepts of immunodeficiencies