

**Instructions:** All questions in Sections I & II carry equal marks

Illustrate your answers with neat diagrams wherever necessary.

**Question 1 Write the following**

- (i) Describe the hierarchical organization of skeletal muscle from muscle fiber (7 Marks) to whole muscle.
- (ii) Elaborate on the structural components of a neuron, including the cell body, (7 Marks) axon, and synapses.

**OR**

- (i) What is role of muscular system? Explain its various types in detail. (7 Marks)
- (ii) How do neurotransmitters transmit signals across synapses, and what is their (7 Marks) role in neural communication?

**Question 2 Write the following**

- (i) How are carbohydrates, proteins, and fats broken down and absorbed in the (7 Marks) small intestine?
- (ii) Explore the functions of the pituitary gland and its role as the "master gland" (7 Marks) in the endocrine system.

**OR**

- (i) Explain the processes of mechanical and chemical digestion in the stomach, (7 Marks) focusing on the actions of gastric juices.
- (ii) Discuss laws involved in respiration process. (7 Marks)

**Question 3 Write the following**

- (i) Describe the pathway of blood flow through the heart and the pulmonary (7 Marks) and systemic circulations.
- (ii) Explain the roles of helper T cells and cytotoxic T cells in cell-mediated (7 Marks) immunity.

**OR**

- (i) Explore the anatomy of the heart, including its chambers, valves, and major (7 Marks) blood vessels.
- (ii) Write a short note on cardiac cycle. (7 Marks)

**Question 4 Write the following**

- (i) Describe the anatomy of the nephron, including its various segments and their functions. (7 Marks)
- (ii) Discuss the hormonal regulation of the menstrual cycle, including the roles of estrogen, progesterone, follicle-stimulating hormone (FSH), and luteinizing hormone (LH). (7 Marks)

**OR**

- (i) Elaborate on the processes of filtration, reabsorption, and secretion in the nephron. (7 Marks)
- (ii) Explain the process of spermatogenesis, including its regulation by hormones. (7 Marks)

**Question 5 Attempt any seven out of twelve**

**(14 Marks)**

- (i) What distinguishes cardiac muscle from skeletal and smooth muscle in terms of structure?
- (ii) How do the nervous and endocrine systems work together to maintain homeostasis?
- (iii) Explain the role of dendrites and axons in neuron communication.
- (iv) Name the protective layers that surround and support the brain.
- (v) Name the primary organs involved in the human respiratory system.
- (vi) What is the role of salivary amylase in the digestive process?
- (vii) What are the primary components of blood and their functions?
- (viii) Where is the sinoatrial (SA) node located, and what is its function?
- (ix) How does the immune system distinguish between self and non-self antigens?
- (x) Name three major electrolytes regulated by the kidneys.
- (xi) How does reabsorption occur in the nephron, and what substances are reabsorbed?
- (xii) How does testosterone contribute to male reproductive function?

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