



UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES

DEPARTMENT OF PHARMACY

FIRST BPHARM PART I EXAMINATION – JULY/AUGUST 2026

PH 1144 HUMAN BIOLOGY I – SEQ

TIME: THREE HOURS

INSTRUCTIONS

- There are **six** questions in part A, B, C, D and E in this paper.
- Answer all questions.
- No paper should be removed from the examination hall.
- Do not use any correction fluid.
- Use illustrations where necessary.

PART A

1. The cardiovascular system continuously adapts to maintain adequate tissue perfusion under varying physiological and disease conditions.
 - 1.1 Write the equation that shows the relationship between heart rate, cardiac output and stroke volume. (05 marks)
 - 1.2 Draw a clearly labelled pressure-volume loop of the left ventricle. Indicate the phases of the cardiac cycle and the opening and closing of the cardiac valves. (25 marks)
 - 1.3 Explain the following properties of the heart.
 - 1.3.1 Inotropic effect (10 marks)
 - 1.3.2 Chronotropic effect (10 marks)
 - 1.3.3 Dromotropic effect (10 marks)
 - 1.4 State two endocrine causes of secondary hypertension. Explain the physiological mechanism by which one of them causes hypertension. (20 marks)
 - 1.5 State four complications of untreated hypertension. (10 marks)
 - 1.6 State four classes of antihypertensive drugs. (10 marks)

PART B

2.
 - 2.1 Outline the clinical features of anaemia in the following body systems.
 - 2.1.1 Skin
 - 2.1.2 Cardiovascular system

- 2.1.3 Respiratory system
- 2.1.4 Digestive system
- 2.1.5 Reproductive system
- 2.1.6 Neuromuscular system (20 marks)
- 2.2 Briefly discuss the causes of iron deficiency anaemia in relation to increased demand, inadequate intake, impaired absorption, and increased loss. (20 marks)
- 2.3 State the antigens and agglutinins associated ABO and Rh blood group systems. Write the clinical significance of these blood group systems. (10 marks)

PART C

- 2.4 Define the minute ventilation. (10 marks)
- 2.5 State the mechanisms by which carbon dioxide is transported in the body. (10 marks)
- 2.6 Draw the normal oxyhemoglobin dissociation curve. Show the right and left shifts of the curve and state two factors causing each shift. (20 marks)
- 2.7 Name the chemoreceptors that regulate respiration and state the primary stimulus for each. (10 marks)

PART D

3.

- 3.1 State two functions of integral membrane proteins. (10 marks)
- 3.2 Explain briefly the three functions of the glycocalyx. (30 marks)
- 3.3 State three differences between integral proteins and peripheral proteins. (15 marks)
- 3.4 Explain briefly the mechanism of voltage-gating of ion channels. (20 marks)
- 3.5 Define filtration. (10 marks)
- 3.6 List the three mechanisms of gating of ion channels. (15 marks)

4.

- 4.1 State two functions of receptors. (10 marks)
- 4.2 Explain briefly the mechanism of action of transmembrane ion-channel receptors. (20 marks)
- 4.3 Draw the dose-response curves showing receptor response versus drug concentration for a full agonist, antagonist, partial agonist, and inverse agonist. (30 marks)

- 4.4 Explain briefly why intracellular receptors produce a slower but long-lasting response than membrane receptors. (20 marks)
- 4.5 Explain briefly why a single ligand can produce different cellular responses through G-protein-coupled receptors (GPCRs). (20 marks)

PART E

- 5.
- 5.1 State two specific features of meiosis that are not observed in mitosis. (10 marks)
- 5.2 State two basic characteristics of epithelial tissue. (10 marks)
- 5.3 Differentiate between exocrine and endocrine glands. (20 marks)
- 5.4 Classify connective tissue and give examples for each subtype. (30 marks)
- 5.5 Briefly describe the gross anatomy of the heart. (30 marks)
- 6.
- 6.1
- 6.1.1 Define the term fertilization. (10 marks)
- 6.1.2 Name the organogenesis period and state why it is important. (20 marks)
- 6.2 State two structural adaptations of the following respiratory structures for their functions. (30 marks)
- 6.2.1 Nasal cavity
- 6.2.2 Trachea
- 6.2.3 Alveoli
- 6.3 State two adaptations of the following organs for their functions. (20 marks)
- 6.3.1 Stomach
- 6.3.2 Small intestine
- 6.4 Name the components of the biliary system. (10 marks)
- 6.5 Name the major salivary glands. (10 marks)

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