



UNIVERSITY OF JAFFNA, SRI LANKA  
FIRST EXAMINATION FOR MEDICAL DEGREES – APRIL 2025  
ACADEMIC YEAR 2022/2023

PHYSIOLOGY – PAPER II

Date: 23.04. 2025

Duration: 9.00 a. m – 12.00 p. m (3 Hours)

Answer All the TEN Questions

Answer each part in **separate** answer book

PART A

1. Briefly explain the basis of the following:
  - 1.1. Bluish tint in the skin is seen in individuals with polycythemia (30 Marks)
  - 1.2. Streptokinase is given to patients with myocardial infarction (30 Marks)
  - 1.3. Booster doses of tetanus toxoid are given to pregnant mothers (40 Marks)
  
2. A 34-year-old woman complained of weight gain for the past six months.  
The following signs were found on examination: <sup>Goiter</sup> hoarse voice, dry skin and bradycardia.  
Findings of her blood report is given below:
  - Free T<sub>4</sub> – 1.1 pmol/L (Normal: 9 – 21 pmol/L)
  - Free T<sub>3</sub> – 0.8 pmol/L (Normal: 2.6 – 6.2 pmol/L)
  - TSH – 36 mIU/L (Normal: 0.2 – 4.5 mIU/L)
  - 2.1. Write the probable diagnosis. (10 Marks)
  - 2.2. Explain the basis of the following:
    - 2.2.1 Goiter (30 Marks)
    - 2.2.2 Bradycardia (25 Marks)
    - 2.2.3 Weight gain (35 Marks)
  
3. Describe the functions of:
  - 3.1. Blood testis barrier (35 Marks)
  - 3.2. Progesterone during pregnancy (30 Marks)
  - 3.3. Oxytocin in breastfeeding (35 Marks)

4. A seven-year-old boy was brought to the hospital with a complaint of several episodes of watery stools for two days. His urine was dark yellow in colour and his urine output was reduced. On examination he had signs of severe dehydration. Arterial blood gas analysis revealed a pH of 7.32
- 4.1 List five (5) signs of dehydration (15 Marks)
  - 4.2 Explain the basis of reduced urine output (50 Marks)
  - 4.3 Briefly describe the mechanisms that will occur in the distal convoluted tubules of this child to maintain normal acid base status. (35 Marks)
- 5.
- 5.1. List five (5) consequences of reduced gastric acid secretion (25 Marks)
  - 5.2. Briefly describe the intestinal factors that inhibit gastric emptying (35 Marks)
  - 5.3. A patient who underwent gastrectomy with gastro-jejunostomy six months ago complained that, he develops sweating and palpitation two hours after eating a sugary desert. Briefly explain the basis of these symptoms. (40 Marks)

## PART B

6. A 45-year-old female presented with progressively worsening shortness of breath during mild exertion over the past few months. She is a non-smoker. Physical examination revealed a respiratory rate of 24 breaths per minute, mild cyanosis, and bilateral crepitation at the lung bases. Arterial blood gas (ABG) analysis on room air showed:

- pH: 7.48
- PaCO<sub>2</sub>: 30 mmHg
- PaO<sub>2</sub>: 55 mmHg
- HCO<sub>3</sub><sup>-</sup>: 20 mEq/L
- SpO<sub>2</sub>: 86%

- 6.1. State the acid base abnormality in the above patient and give reasons for your answer (20 Marks)

- 6.2. Explain the physiological basis of the above acid base abnormality in this patient (30 Marks)

- 6.3. Pulmonary function tests of the above patient revealed the following:

- FEV<sub>1</sub>: 80% of predicted
- FVC: 70% of predicted
- FEV<sub>1</sub>/FVC ratio: 95%
- DLCO - 50% of predicted

- 6.3.1. State the type of lung disease. Give reasons for your answer. (20 Marks)

- 6.3.2. Explain the physiological basis of cyanosis observed in this patient (30 Marks)

7. Explain the physiological basis of the following.

- 7.1. Increased coronary blood flow in physical exercise (40 Marks)

- 7.2. Hypotension in emotional shock (35 Marks)

- 7.3. Low heart rate in complete heart block (25 Marks)

8. A 50 year old Bank manager was admitted to the hospital with the complaint of tightening chest pain radiating to the left arm for about one hour duration. He used to smoke 20 cigarettes/day for the past 20 years.

On examination patient was dyspneic and sweating. His pulse rate was 90 per minute and the blood pressure was 100/90mmHg. In echo cardiogram, left ventricular ejection fraction was 35%. Coronary angiogram showed obstruction in the left coronary artery.

After treatment the patient was discharged with drugs including Aspirin and beta blockers.

- 8.1 Explain the physiological basis of the following in this patient

8.1.1. Chest pain radiating to the left arm (30 Marks)

8.1.2. Heart rate (40 Marks)

- 8.2. Explain the basis of the following treatments given to this patient

8.2.1. Aspirin (15 Marks)

8.2.2. Beta blockers (15 Marks)

9.

- 9.1. Explain how cerebellum is involved in regulating a voluntary movement (50 Marks)

- 9.2. Explain the basis of:

9.2.1. Clasp knife rigidity in upper motor neuron lesion (25 Marks)

9.2.2. Reduced conduction velocity in autoimmune disease of the nerves (25 Marks)

10. Briefly describe:

10.1. Obstructive sleep apnea (25 Marks)

10.2. Masking effect in hearing (25 Marks)

10.3. Blind spot in the visual field (25 Marks)

10.4. The role of hippocampus in memory (25 Marks)