



All India Institute of Medical Sciences, Kalyani
First Professional MBBS Examination, October 2023

Time: 3 Hrs.

Physiology (Paper-I)

Marks: 100

INSTRUCTIONS:

- Answer all questions.
- Illustrate your answers with well labelled diagram wherever necessary.
- Answer each section in a separate answer book.

SECTION - A (50 MARKS)

1. A 50-year-old man comes to his family physician complaining of fatigue. The patient indicated breathlessness and palpitation on climbing the stairs which has been progressively worsening over the past month. He does not participate in any regular exercise. On Physical examination, it was found that the patient had marked pallor with pale mucous membrane and conjunctiva, tachycardia, systolic cardiac murmur and glossitis. Given his history and the findings on his physical examination, the physician suspected anaemia and sent him for a blood examination. The results were as shown below

- RBC count- 3.5 million cells/mm³
- Haemoglobin- 7gm/dl
- Haematocrit -30%
- Serum iron- low
- MCV- low
- MCHC-low

- a) Diagnose the type of anaemia in this patient with reason. (2)
- b) Explain any two causes for this condition. (0.5+0.5)
- c) As a treating physician what treatment would you plan and what advice would you give this patient in preventing this condition? (1.5+1.5)
- d) Explain in detail the aetiological and laboratory classification of anaemia with an example for each. (4)

Short answer

(8X5)

2. Briefly describe the various degenerative changes occurring in the part of the nerve fibre distal to an injury. (5)
3. What are immunoglobulins? Describe the mechanism of Humoral immunity (2.5+2.5)
4. "Too much or too little overlap of thick and thin filaments in resting muscle results in decreased tension". Substantiate your answer with the help of a labelled diagram. (3+2)
5. Explain the ionic basis of Nerve Action potential with a labelled diagram. Add a note on the refractory period. (3+2)
6. Explain briefly Glucostatic function of liver. (5)
7. Discuss briefly the source and physiological functions of hormone Cholecystokinin. (5)
8. Miss Kalpana has been recently diagnosed with multiple sclerosis, a disease of the central nervous system, in which axons lose their myelin sheath. How does the loss of the myelin sheath alter nerve conduction velocity? What are the other factors affects nerve conduction velocity? (2+3)
9. What is achalasia cardia? Briefly describe Lower esophageal sphincter and its importance. (1+4)

SECTION - B (50 MARKS)

1. Mrs Sulochona Das, is a 78-year-old widow who was brought to the emergency room one evening by her sister. Early in the day, Mrs. Das had seen bright red blood in her stool, which she attributed to hemorrhoids. She continued with her daily activities: she cleaned her house in the morning, had lunch with family and participated in a "Puja". However, the bleeding continued all day, and by dinnertime, she could no longer ignore it. Mrs. Das does not smoke or drink alcoholic beverages. She takes aspirin, as needed, for arthritis daily. In the emergency room, Mrs. Das was light-headed, pale, cold, and very anxious. Her hematocrit was 29%. Her BP and heart rate was as follows, (2+2+1+2+1+2=10)

Parameter	Supine	Standing
Blood Pressure	90/60	75/45
Heart Rate	105/min	135/min

- a. Identify the condition.
 - b. Why was Mrs. Das's arterial pressure lower in the upright position than in the lying (supine) position?
 - c. Mrs. Das' heart rate was elevated (105 beats/min) when she was supine. Why?
 - d. Why was her heart rate even more elevated (135 beats/min) when she was upright?
 - e. What is hematocrit?
 - f. How will you manage this case in emergency?
2. Mr. Basu, a 60-year-old man, presented with crushing chest pain, diaphoresis, and breathlessness in the past 1 hour. The Standard ECG reveals > 2 mm ST segment elevation in leads I, AVL, V5 and V6. He was diagnosed with acute lateral wall ST segment elevation myocardial infarction. If ST segment elevation occurs in myocardial infarction, what is the underlying mechanism? (5)
3. Briefly describe chemical regulation of respiration. (5)
4. With the help of a labelled diagram explain the differences in the oxygen dissociation curve of Fetal and adult haemoglobin. Add a note on the Bohr effect. (4+1)
5. List any four features of the coronary circulation. Explain the nervous regulation of coronary blood flow. (2+3)
6. Describe Hering-Breuer Reflex? (5)
7. Define lung compliance? What factors affect it and how it changes in lung disorders? (1+4)
8. What is Windkessel Effect? Explain its significance with respect to Cardiac output and blood flow. (2+3)
9. Draw a diagram showing ionic basis of Cardiac Pace-maker potential. ➔ (5)
