Department of Physiology

H.B.T. Medical College Dr RN Cooper Municipal General Hospital Juhu, Mumbai
First Terminal Examination
First MBBS 2024-25

Date: 16.01.2025 Time: 10:30 a.m. - 01:00 p.m. Total marks: 80-------

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Instructions:

1. **Use blue/black ball pen only.**
2. **Do not write anything on the blank portion of the question paper. If written anything such type of act will be considered as an attempt to resort to unfair means.**
3. **All questions are compulsory.**
4. **The number to the right indicates full marks.**
5. **Draw diagrams wherever necessary.**

Section B

2. Long Answer Questions (Attempt any 1 out of 2). (12M×1 = 12M)

a) What is circulatory shock? Describe various stages of haemorrhagic shock. Give physiological basis of its management. (2 + 7+ 3 M)

b) Describe the physiological role of Insulin in the body. How is its secretion regulated? Add a note on diabetes mellitus. (7+ 3 + 2 M)

3. Short Answer Questions (All questions are compulsory). (4M×5 = 20M)

a) A person accidentally hits their elbow on a hard surface and instinctively rubs the affected area, which helps reduce the pain. Explain the physiological basis of this phenomenon for control of pain. (4 M)

b) A 55-year-old male experiences severe dehydration due to prolonged diarrhea. His blood pressure is low, and his heart rate is significantly increased.

a) Explain how dehydration affects stroke volume and consequently, cardiac output. (2M)
b) How does an increase in heart rate compensate for decreased stroke volume, and why might this compensation fail at very high heart rates? (2 M)

c) A neurologist is analyzing EEG patterns of a sleeping patient. She observes low-amplitude, high-frequency waves similar to wakefulness.

a) Which sleep stage is the patient most likely in? (1 M)
b) Compare and contrast REM vs nREM sleep. (3 M)

d) A patient who has undergone surgical removal of the gallbladder (cholecystectomy) reports difficulty digesting fatty meals.

a) Explain the role of bile in fat digestion and absorption. (2 M)
b) Explain the role of cholecystokinin in bile regulation? (2 M)

e) Cortisol plays a crucial role in metabolism and stress response.

a) How does cortisol help maintain blood glucose levels during fasting? (2 M)
b) Explain how the hypothalamic-pituitary-adrenal (HPA) axis regulates cortisol secretion. (2 M)

4. Short Answer Questions (Attempt any 4 out of 5). (5M×4 =20M)

a) A 32-year-old male is brought to the emergency department after a stab wound to the left side of his spinal cord at the T10 level. Upon examination, he exhibits:

- Loss of proprioception and vibration sense in his left leg
- Loss of pain and temperature sensation in his right leg
- Spastic paralysis in his left leg

1) Identify the clinical condition.
2) Explain the physiological basis of sensory and motor deficits seen in this patient. (1 + 3 M)

b) What are the various doctor patient relationships? What is the importance of good communication in medicine? (2+2 M)

c) A preterm newborn (28 weeks gestation) is delivered and develops respiratory distress shortly after birth. The baby has nasal flaring, intercostal retractions, and labored respiration. A chest X-ray reveals a "ground-glass" appearance of the lungs.

a) Describe in detail 3 functions of surfactant. (3 M)
b) What treatment strategies can be used to manage this condition, and how do they help improve lung function? (2 M)

d) A person eats a meal rich in proteins and experiences an increase in gastric acid secretion.

a) Explain the physiological mechanisms that stimulate gastric acid secretion in response to a protein-rich meal. (2 M)
b) How does the stomach protect itself from acid-induced damage while maintaining an acidic environment? (2 M)
c) What would happen to gastric secretion if the vagus nerve were surgically cut, and why? (1 M)

e) A person living in a region with iodine deficiency develops symptoms of fatigue, weight gain, and cold intolerance. Blood tests reveal low levels of T3 and T4, with elevated TSH.

a) Explain why iodine is essential for thyroid hormone synthesis. (2 M)
b) Describe the effect of thyroid hormone on Nervous and cardiovascular system. (2 M)
c) Why is TSH elevated in this condition? (1 M)

5. Short answer questions (Attempt any 4 out of 5) (7M×4 = 28M)

a) Describe the origin, course and termination of dorsal column tract. Add a note on sensations carried by dorsal column pathway. (5 + 2 M)

b) Enumerate the various short term mechanisms for regulation of blood pressure. Describe the baroreceptor mechanism for regulation of blood pressure. (2 + 5 M)

c) What is lung compliance. Enumerate and explain the factors affecting lung compliance. (2 + 5 M)

d) Describe the function and regulation of pancreatic secretion. (5 + 2 M)

e) Define deglutition. Describe the pharyngeal phase of deglutition. (2 + 5 M)