

Question Paper

Exam Date & Time: 28-Feb-2022 10:20 AM - 01:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION FIRST MBBS DEGREE (CBME) EXAMINATION – FEBRUARY/MARCH 2022 SUBJECT: PHYSIOLOGY - PAPER I

Marks: 80

Duration: 160 mins.

Essay questions:

1. A 22-year-old man of coastal Karnataka, was planning to run a marathon. He wanted to train himself at high altitude so he went to visit his friend in Ladakh (altitude 15000 feet). He was hyperventilating from the moment he got down from the taxi. Within a couple of days, while running, he experienced extensive spasms and cramping in his calf muscles. Slowly he developed symptoms that he seldom experienced at sea level like dyspnea, headache, lassitude, irritability, nausea and vomiting. He also developed ataxia and disorientation. Laboratory analysis revealed respiratory alkalosis.
 - 1A) Explain the regulation of respiration by central and peripheral chemoreceptors. Based on this, explain the basis for the hyperventilation observed in the above case. (6)
 - 1B) Mention the normal acclimatization changes that will occur in this individual if he continues to stay at high altitude for the next few weeks. (4)
- 2) Describe the process of glomerular filtration and factors affecting filtration with special emphasis on the net filtration pressure. Explain how GFR can be measured. (6+4 = 10 marks)

3. Short answer questions:

- 3A) Name the muscles of respiration. Explain the intra-pleural and alveolar pressure changes occurring during a respiratory cycle. (4)
- 3B) Draw a diagram of the ventricular action potential and give the ionic basis for the different phases. (4)
- 3C) Explain Frank-Starling's law and how it is applicable to the human heart. (4)
- 3D) Discuss the mechanisms of regulation of local blood flow. (4)
- 3E) A patient presents to the emergency department with intermittent chest pain. The ECG and blood tests are positive for myocardial infarction (MI). (4)
 - i) What are the changes in the ECG that are likely to be present in this case?
 - ii) Give the electrode placements and connection for the bipolar limb leads.
- 3F) Explain the role of CNS ischemic response in regulation of blood pressure. (4)
- 3G) Explain any one short term neural mechanism of blood pressure regulation. (4)
- 3H) Name the renal buffers. Explain bicarbonate reabsorption in the nephron. (4)
- 3I) Classify lymphocytes. Explain the role of lymphocytes in cell mediated immunity. (4)

- 3J) Explain the pathophysiology of erythroblastosis fetalis. Explain how the condition can be prevented. (4)
- 3K) A 42-year-old woman presents to her doctor's office with menstrual bleeding for up to 2 weeks' duration for each of the past two cycles. She also reports that she has had several episodes of epistaxis (nosebleed) over the past two months. Blood analysis shows platelet count of 30,000cells / μ L.
Explain the role of platelets in hemostasis. Based on this, explain why this patient has a bleeding tendency. (4)
- 3L) Discuss active transport mechanisms with suitable examples. (4)
- 3M) Explain the physiological basis of the following: (4)
- i) Acetylcholinesterase inhibitors alleviate the symptoms of myasthenia gravis.
 - ii) "Botox treatment" alleviates some of the effects of ageing.
- 3N) Classify nerve fibres based on their conduction velocities. Explain the factors affecting velocity of nerve conduction. (4)
- 3O) Mention the differences between isometric and isotonic muscle contraction. Give examples for each type of contraction. (4)

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Question Paper

Exam Date & Time: 01-Mar-2022 10:20 AM - 01:00 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION FIRST MBBS DEGREE (CBME) EXAMINATION – FEBRUARY/MARCH 2022 SUBJECT: PHYSIOLOGY - PAPER II

Marks: 80

Duration: 160 mins.

Essays:

1. A 52 year old reports to the neurology department complaining of unsteadiness while walking. The patient on walking had a tendency to sway to the right side. Examination revealed no obvious muscle weakness. However there were errors during performance of voluntary movements with the patient exhibiting dysmetria and dysdiadokokinesia on the right side.
 - 1A) Give the likely site of lesion in the CNS. Would the manifestations be ipsilateral or contralateral to the side of lesion? (2)
 - 1B) What other features are likely to be seen in this patient? (2)
 - 1C) Explain the normal connections and functions of the affected structure. (6)

2. A 24 year patient who was known to have type 1 diabetes mellitus is admitted to the hospital with severe nausea and vomiting. The patient appears dehydrated. He has rapid and deep respiration with an acetone odour to the breath. On investigation, the patient's blood glucose was 460 mg /dl. Urine dipstick was positive for glucose and ketone bodies.
 - 2A) Explain how carbohydrate, protein and lipid metabolism is regulated by insulin. (7)
 - 2B) Explain the normal mechanism of insulin secretion. (3)

3. Short answer questions:

- 3A) Classify sensory receptors giving examples for each. (4)
- 3B) Give the cause and explain the features of Parkinson's disease. Give the basis for treatment. (4)
- 3C) Explain the different types of aphasias. (4)
- 3D) Draw a diagram showing the origin, course and termination of the lateral spinothalamic tract. Give the functions of the pathway. (4)
- 3E) Explain the stretch reflex and inverse stretch reflex. (4)
- 3F) Explain the response of retinal rods to light exposure. Write briefly on light adaptation. (4)
- 3G) Give the structural and function features of the basilar membrane. Explain the role of the inner ear in frequency discrimination of sound. (4)
- 3H) Give examples of conductive and sensorineural deafness. Explain how tuning fork tests can help differentiate between the two types of deafness. (4)
- 3I. List the functions of cortisol. Explain why giving high doses of synthetic cortisol to a patient over an extended period of time can be harmful. (4)

- 3J. List all the physiological actions of testosterone. (4)
- 3K) Describe the normal pattern of secretion of ovarian and pituitary hormones during the menstrual cycle. (4)
- 3L) Briefly explain the functions of placenta. (4)
- 3M) A 55-year-old patient is admitted to the hospital with complaints of vague abdominal pain, loss of appetite, weight and steatorrhea since the past few months. On examination, the patient has jaundice with plasma bilirubin concentration of 14 mg/dL. Further investigation reveals complete obstruction of common bile duct due to a tumour.
- Explain the digestive, absorptive mechanisms that have been affected in this case leading to steatorrhea. (4)
- 3N) Explain the events in the pharyngeal stage of deglutition. (4)
- 3O) Explain the mechanism of acid secretion in the stomach. (4)

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