Question Paper

Exam Date & Time: 06-Sep-2024 (10:20 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST PROFESSIONAL YEAR MBBS DEGREE EXAMINATION - SEPTEMBER 2024
SUBJECT: PY 101THP1 - PHYSIOLOGY - PAPER - I
(PY-1 CBME SCHEME - REPEATERS)

Marks: 80 **Duration: 160 mins.**

All questions are compulsory.

Write brief, clear and legible answers.

Illustrate your answers with diagrams and flow charts wherever appropriate.

Essay questions:

1. Explain the stages of erythropoiesis with the help of diagrams. Explain the factors regulating erythropoiesis. Add a note on reticulocyte. (4+4+2 = 10 marks)

2. A middle-aged man comes to OPD complaining of muscle weakness as the day progresses which is relieved after a few minutes of rest. He had drooping eyelids and slurred speech. The patient was given Neostigmine following which he showed improvement in muscle power.

2A) What is the probable diagnosis in the above case? (1)

2B) Explain the basis for the muscle weakness observed in this case. (2)

2C) What is the action of neostigmine and mention the other modes of treatment of above condition? (2)

2D) Explain normal excitation contraction coupling in skeletal muscle. (5)

3. **Short answer questions:**

3A) A 45-year-old patient, was diagnosed of cancer 5 years back is now admitted in the hospital. The treating physician has explained him that the prognosis is bleak as the disease has Progressed to its terminal stages. The patient tells the doctor that he wishes to decline life sustaining treatment, as he had suffered a lot all these years and also his family is struggling to bear the expenses, though his family members are willing to do whatsoever required for his survival. So, they requested the treating physician to talk to the patient and try to convince him to avail the required treatment.

What should the doctor do? Support your answer keeping in view the role of good communication skill and empathy - A key component, pertaining to an effective doctor-patient relationship. (4)

3B) Define Landsteiner's law. Give physiological basis for the occurrence of ABO antibodies in blood. (2+2 = 4 marks)

3C) Explain the action potential of ventricular muscle with the help of a diagram and give its ionic basis. What is the effect of hyperkalemia on membrane potential? (3+1 = 4 marks)

3D) Define, give the normal value and mention the significance of: (2+2 = 4 marks)

i) End diastolic volume.

ii) Ejection fraction.

3E) Draw normal ECG from limb lead II and give the cause for each wave. Add a note on PR interval and QT interval in a normal ECG recording. (2+2 = 4 marks)

3F) Draw a normal pressure volume loop of the left ventricle. Depict changes that occur in the loop with increase in contractility. (2+2 = 4 marks)

3G) With the help of a flow chart, explain how the baroreceptor mechanism regulates blood pressure when blood pressure decreases. (4)

3H) Discuss the characteristic features of coronary circulation. Explain why the sub-endocardium is more prone to infarction. (3+1 = 4 marks)

3I) Draw the labelled normal oxygen-hemoglobin dissociation curve. Explain the cause for the two different phases of the curve. Add a note on P**50**. (2+1+1 = 4 marks)

3J) Mention the forms in which carbon dioxide is transported in blood. Discuss the role of carbonic anhydrase enzyme in carbon dioxide transport. (1+3 = 4 marks)

3K) Give the cause, clinical features, treatment and preventive measures for decompression sickness. (4)

3L) What is acclimatization to high altitude? Explain the various physiological changes taking place in this process. (4)

3M) Describe the mechanisms involved in the autoregulation of GFR. (4)

3N) Describe briefly the mechanism of Na+ reabsorption in different segments of renal tubules. (4)

3O) Draw a labelled diagram to show innervation of urinary bladder. Explain the neural pathway for control of micturition. (4)

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Question Paper

Exam Date & Time: 09-Sep-2024 (10:20 AM - 01:00 PM)

MANIPAL ACADEMY OF HIGHER EDUCATION

FIRST PROFESSIONAL YEAR MBBS DEGREE EXAMINATION - SEPTEMBER 2024
SUBJECT:PY101THP2: PHYSIOLOGY - PAPER II
(PY-1, CBME SCHEME - REPEATERS)

Marks: 80 **Duration: 160 mins.**

Answer all the questions.

Essay type:

1. A 58-year-old patient is hospitalized, reporting a two-year history of swallowing difficulties. This difficulty has worsened progressively, accompanied by regurgitation of both solids and liquids. Additionally, the patient complains of pain in the retrosternal region. Over the past two years, there has been a weight loss of approximately 10 kilograms. Oesophageal manometry revealed reduced oesophageal peristalsis, elevated lower oesophageal sphincter tone with incomplete relaxation during deglutition.

1A) Identify the likely condition the patient has. Discuss the pathophysiology of the condition. (3)

1B) Explain the role of the enteric nervous system in initiating the peristaltic wave in response to a bolus of food. (4)

1C) Compare and contrast the motor activity of the small intestine with that of the esophagus. Add a note on the Basic Electrical Rhythm. (3)

2. A 25-year-old man was brought to the emergency with a stab injury to his lower spine. On examination, he could not move his left lower extremity and couldn't feel pain over the right lower extremity. There was a loss of proprioceptive sensations, tactile discrimination and vibration sensation over the left lower limb and a loss of pain and temperature on the right lower limb.

2A) Draw labelled diagrams of the two principal ascending tracts that might have been damaged in this patient. (4)

2B) Using a diagram, explain the basis for the pattern of sensory loss observed in this patient. (3)

2C) Using a labelled diagram, explain the descending analgesic system. (3)

3. **Short notes questions**

3A) Explain the mechanism of activation of the auditory receptors. (4)

3B) A 60-year-old woman is referred to an ophthalmologist for visual field evaluation by her family physician. She is subsequently diagnosed with a pituitary tumour compressing the central portion of the optic chiasma. (4)

i) Draw a labelled diagram of the visual pathway.

ii) Explain the visual field defect that is likely to be observed in the above case.

3C) Mention the functions of the following structures in the eye: (4)

i) Iris

ii) Fovea centralis

iii) Canal of Schlemm

iv) Ciliary muscle

3D) Discuss effective closing techniques that can be used by a doctor in a patient interview. (4)

3E) Explain the functions of Broca's and Wernicke's area in the categorical hemisphere. (4)

3F) Using diagrams, compare the reflex arcs and operation of the stretch and inverse stretch reflexes. (4)

3G) Describe the structure and function of the receptors in the semicircular canals. (4)

3H) Compare the mechanisms of presynaptic inhibition and post synaptic inhibition with appropriate diagrams. (4)

3I) Explain the effects of the following on digestion and absorption (4)

i) Total gastrectomy

ii) Surgical removal of the entire ileum

3J) During menstruation, the stratum functionalis is shed from the endometrium. Explain the physiological mechanism responsible for this shedding. (4)

3K. A 36-year-old mother of four is considering tubal ligation to ensure her family gets no larger. She asks the physician if she will become 'menopausal' after the surgery.

i) Explain what tubal ligation is and how it acts as a contraceptive measure. (2)

ii) Will tubal ligation cause menopause in this patient? Justify your answer. (2)

3L. A young man presents with hypertension, a plasma pH of 7.5, and polyuria. His plasma potassium is 2.8 mEq/l. He is found to have a high circulating aldosterone level, low renin level, and a diagnosis of Conn's syndrome is made.

i) Draw a diagram depicting the cellular mechanism of action of aldosterone. Give the basis for all features observed in this patient. (3)

ii) Give the basis for the low renin level observed in this patient. (1)

3M) An obese male patient diagnosed with type 2 diabetes mellitus has a random blood glucose measurement of 250mg/dl.

Based on the actions of insulin, explain the basis for the hyperglycemia observed in this patient. (4)

3N. Following thyroid surgery, a 32-year-old man experiences muscle cramps affecting his lower back, legs, and feet, with a positive Trousseau's sign. His blood calcium level measures 7.5 mg/dl.

i) Explain the physiological actions of the affected hormone in this case. (3)

ii) Give the basis for the observed features in the patient. (1)

3O) Specify the abnormality in hormonal secretion in each of the following conditions:

i) Cretinism

ii) Acromegaly

iii) Myxoedema

iv) Diabetes insipidus

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