

MANIPAL ACADEMY OF HIGHER EDUCATION
FIRST MBBS DEGREE EXAMINATION – AUGUST 2020
SUBJECT: PHYSIOLOGY– PAPER I (ESSAY)

Friday, August 07, 2020

Time: 10:20 – 13:00 Hrs.

Maximum Marks: 80

✍ **Answer ALL the questions.**

✍ **Essays:**

1. A 30-year-old male complains of loss of libido, lethargy, muscle weakness and mental depression. He is found to have high gonadotropin levels and low testosterone level in plasma. A diagnosis of hypogonadism was made. Testosterone replacement therapy was advocated to restore muscle power and libido.

1A. Describe the endocrine function of adult testes.

1B. Account for the abnormal hormonal levels in this case.

1C. Mention the two types of male hypogonadism. How do they differ?

(7+2+1 = 10 marks)

2. A 47-year-old woman presents with severe headaches and blurred vision. Physical examination reveals a prominent forehead and lower jaw, enlarged tongue, and large hands and feet. She is found to have lost some vision in her peripheral (temporal) visual fields. Laboratory examination reveals an increased serum glucose level. A pituitary adenoma involving somatotropes is suspected in this woman.

2A. Name the above condition giving reasons to your answer.

2B. Describe the actions of the hormone secreted by pituitary somatotropes.

2C. Account for the type of visual field defect in this individual.

(2+6+2 = 10 marks)

3. **Short Answer Questions:**

3A. Draw the neural circuits for crossed extensor reflex and give the significance of the reflex.

3B. A known hypertensive patient developed a stroke that resulted in sudden and violent involuntary flinging movement of the right lower limb. MRI indicates infarct of the subthalamic nucleus. Explain the role of this nucleus in motor control mechanism.

3C. Describe the generation of receptor potential from a pacinian corpuscle. What is graded response?

3D. Explain the role of the following hypothalamic nuclei- *Suprachiasmatic nucleus* and *mammillary body*.

3E. Name TWO different neuromuscular blocking agents. Explain the mechanism of action of each.

3F. Draw and label pain pathway from the face.

- 3G. Define and classify aphasia. Mention the cause of each type.
- 3H. Explain the how the inner ear codes for pitch discrimination.
- 3I. Describe how the image forming mechanism is defective in myopia. Represent the basis for its correction in a diagram.
- 3J. Explain the location and histology of olfactory epithelium. What is olfactory adaptation?
- 3K. Describe the actions of insulin on lipid metabolism.
- 3L. Give the endocrine causes of dwarfism. Explain the cause of ANY ONE type.
- 3M. Describe the ionic basis of a neuronal action potential at different stages. What is refractory period?
- 3N. Explain the biosynthesis of thyroid hormones.
- 3O. Explain the features of Cushing syndrome.

(4 marks × 15 = 60 marks)



MANIPAL ACADEMY OF HIGHER EDUCATION
FIRST MBBS DEGREE EXAMINATION – AUGUST 2020
SUBJECT: PHYSIOLOGY– PAPER II (ESSAY)

Saturday, August 08, 2020

Time: 10:20 – 13:00 Hrs.

Max. Marks: 80

Essays:

1. A 10-year- old boy accompanied his parents for an expedition to a high altitude region at the top of a mountain range and got acclimatized to the barometric pressure of 462 mm Hg at the peak. The partial pressures of the various gases in his alveolar air are as follows:

Nitrogen	335 mm Hg
Carbon dioxide	30 mm Hg
Water vapor pressure	47 mm Hg

He has a hemoglobin level of 16 G/dL and hematocrit of 50%

- 1A. Calculate the following from the given data: Inspired PO₂; Oxygen carrying capacity; MCHC
 - 1B. What is the approximate alveolar PO₂? Explain all acclimatization changes that occurred to the lowered PO₂ in this case.
 - 1C. Account for the change in partial pressure of carbon dioxide in alveolar air in the boy.
- (3+5+2 = 10 marks)

2. A 45-year-old diabetic patient comes with complaints of dizziness that generally occurs immediately after he stands up from a supine posture. The BP recorded in this patient in the supine position was 140/80 mmHg and his pulse rate was 82/min. Blood pressure and pulse rate recorded immediately after standing were 118/64 mmHg and 84/min respectively.

- 2A. Explain what altered cardiovascular dynamics upon standing caused the dizziness in this individual.
- 2B. Explain, using a neural circuit, the reflex regulating mechanism that should have been operating to restore the mean arterial pressure upon standing.
- 2C. Draw a graph showing the baroreceptor response to arterial pressure changes in a normal individual.

(2+6+2 = 10 marks)

Short Answer Questions:

- 3A. Explain the pressure changes in left ventricle and left atrium during the filling phase of ventricular diastole. How is this affected if mitral valve is stenosed? Give reasons to your answer.
- 3B. Draw the normal ECG pattern in leads II and aVR. Account for the differential configuration in these leads. How are the mentioned leads connected in conventional electrocardiography?
- 3C. Explain the phasic changes of left coronary blood flow. Mention how coronary blood flow is regulated during increased myocardial O₂ demand.

- 3D. Explain the consequences of
- Surfactant deficiency in newborn
 - Rapid ascent following deep sea diving
- 3E. Explain how oxygenation and deoxygenation of blood affect the carbon dioxide transport?
- 3F. Explain the following in gut:
- Emulsification of dietary fat
 - Formation and role of micelles
- 3G. Describe the functions of esophageal sphincters. Add a note on achalasia.
- 3H. List any THREE proteolytic enzymes of exocrine pancreas. Explain their activation? Add a note on protein malabsorption.
- 3I. Describe the site and mechanism of glucose reabsorption in kidney. Mention how nephrons will handle glucose when plasma glucose is 300 mg/dL.
- 3J. Explain the structure of the filtration barrier in kidney. How is this structure suited for its function?
- 3K. Explain why creatinine clearance is used to measure glomerular filtration rate? Why plasma level of creatinine is an index of renal function?
- 3L. Draw and label the neural circuit for micturition reflex. Add a note on automatic bladder of spinal transection
- 3M. What is 'fibrinolysis'? Give the reactions that lead to fibrinolysis. Mention its significance.
- 3N. Describe a 'monocyte'. Give its normal differential count in blood. Name any TWO functions of monocyte- macrophage system.
- 3O. Define 'Osmosis', 'osmolarity' and 'osmotic pressure' giving suitable examples.

(4 marks × 15 = 60 marks)

