

MANIPAL ACADEMY OF HIGHER EDUCATION
FIRST MBBS DEGREE EXAMINATION – MAY/JUNE 2019
SUBJECT: PHYSIOLOGY– PAPER I (ESSAY)

Monday, June 03, 2019

Time: 10:20 – 13:00 Hrs.

Maximum Marks: 80

✍ **Answer ALL the questions.**

✍ **Long Essays:**

1. A 43-year-old factory worker had hearing loss due to sudden exposure to loud sound from a blast at his work place. He was told by his doctor that his inner ear hair cells are damaged by the loud noise. He was advised to use a cochlear implant that can improve his hearing ability.
 - 1A With the help of a simplified diagram, explain the structure of Organ of Corti.
 - 1B. Explain how the oscillation of basilar membrane leads to generation of action potentials in cochlear nerve.
 - 1C. Draw and label auditory pathway.
 - 1D Explain the type of hearing impairment produced by loud noise.

(3+3+3+1 = 10 marks)

2. A 26-year-old software engineer visited her physician with complaints of undue tiredness at the end of her busy day at her office. Her limbs would tire and eye lids droop forcing her to stop working. After thorough investigations, a diagnosis of *myasthenia gravis* was arrived at. Her muscle strength would improve after administration of neostigmine. She was initially prescribed prednisolone, a synthetic glucocorticoid.
 - 2A. Draw a labeled diagram of the structure that is affected and explain how the above condition affects muscle function?
 - 2B. Explain the basis of using neostigmine in improving the muscle weakness.
 - 2C. Explain the role of the glucocorticoids in this condition.
 - 2D. Explain the other pharmacological actions of glucocorticoids.

(5+2+1+2 = 10 marks)

3. **Short answer questions:**

- 3A. Explain the role of dopamine as a neurotransmitter and as a hormone.
- 3B. Explain the somatotopic organization in precentral and postcentral gyrus.
- 3C. A 7-year-old child is being treated for poor vision due to vitamin A deficiency. Explain in detail the role of vitamin A in vision.
- 3D. Explain how the components of vestibular apparatus respond to rotational acceleration in a horizontal plane. Add a note on postrotatory nystagmus.
- 3E. Compare and contrast postsynaptic inhibition from pre synaptic inhibition. Give examples for each.

- 3F. List the stimuli for thirst. How do they stimulate thirst mechanism?
- 3G. Explain the connections and functions of neocerebellum.
- 3H. Explain the physiological basis/and cause of the following neurological observations:
 i) Babinski sign ii) Akinesia iii) Positive Romberg sign iv) Fluent aphasia
- 3I. Compare the causes of each of the following endocrine disorders:
 i) Central/cranial diabetes insipidus and nephrogenic diabetes insipidus
 ii) Pituitary dwarfism and Laron dwarfism
 iii) Primary hyperparathyroidism and secondary hyperparathyroidism
 iv) Primary hyperaldosteronism and secondary hyperaldosteronism
- 3J. On a Monday morning, you are called to attend to a 60-year-old man who became disoriented and fainted while he was waiting for his turn in a bank. You come to know that he is a known diabetic on regular insulin supplement. The attendant of the victim mentioned that he had skipped his breakfast. He recovered dramatically after intravenous glucose.
 i) List all the neuroglycopenic symptoms of this condition.
 ii) What compensatory changes occur in autonomic nervous system and endocrine system as a result of hypoglycemia?
- 3K. A new born has been diagnosed as having *5 α -reductase* deficiency. The external genitalia of the new born resemble that of female. Ultra sound examination showed presence of male internal genitalia and testes in abdomen.
 i) Name the above condition.
 ii) Account for the appearance of genitalia of the new born.
 iii) Mention the role of *5 α -reductase* in adults.
- 3L. Explain the physiological basis/cause of the following:
 i) Midcycle spinnbarkeit ii) Luteolysis iii) Milk ejection
 iv) Lactation amenorrhea
- 3M. A man sustained head injury in a road traffic accident resulting in the disruption of the vascular connection between the median eminence and the anterior pituitary. Explain the probable effect of this disruption on *anterior pituitary* function.
- 3N. Explain the effects of the following on thyroid function:
 i) Large dose of iodine ii) Iodine deficiency
 iii) Iodotyrosine deiodinase deficiency iv) Propylthiouracil
- 3O. Explain **Chvostek sign** and **Trousseau sign**. In which condition are they elicited?
 (4 marks \times 15 = 60 marks)



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MANIPAL ACADEMY OF HIGHER EDUCATION
FIRST MBBS DEGREE EXAMINATION – MAY/JUNE 2019
SUBJECT: PHYSIOLOGY– PAPER II (ESSAY)

Tuesday, June 04, 2019

Time: 10:20 – 13:00 Hrs.

Max. Marks: 80

✍ **Essays:**

1. A 30 year old man suffered from significant blood loss following a road traffic accident. On arrival at hospital, blood pressure was recorded as 70/50 mm of Hg.

1A. What are the determinants of arterial blood pressure? Explain how blood loss has caused low blood pressure.

1B. Describe the compensatory changes in heart and circulation that tend to restore the mean arterial pressure.

(4+6 = 10 marks)

2. Describe the role of kidneys in acid base balance under the following headings:

2A. Mechanism of H⁺ secretion in proximal and distal tubules.

2B. Role of renal tubular buffers.

(6+4 = 10 marks)

3. **Short answer questions:**

3A. Explain the significance of PR interval. What is first degree heart block?

3B. Explain the role of bile salts in fat digestion and absorption.

3C. Explain the effects of excess ECF K⁺ and Ca²⁺ on cardiac muscle function.

3D. Explain the causes and effects of turbulent blood flow. Add a note on flow murmurs.

3E. List the forms in which CO₂ is transported in blood. What is chloride shift?

3F. Give the location of respiratory chemoreceptors. Mention the factors that stimulate these receptors and the effects of stimulation.

3G. Explain the role of surfactant in normal lung function. What are the consequences of surfactant deficiency in a newborn immediately following birth?

3H. Using a graph, explain the variations in intrapleural and intrapulmonary pressures during a normal respiratory cycle.

3I. Explain the formation and functions of lymph.

3J. Stating Starling forces, explain the cause for edema in:

i) Hypoalbuminemia

ii) Rise in venous pressure

3K. Explain why the deficiency of following factors lead to bleeding disorders:

i) von Willebrand factor

ii) Factor VIII

- 3M. Explain how three different agonists function synergistically on parietal cell to bring about gastric HCl secretion. Mention the causes for peptic ulcer disease.
- 3N. List the stages of deglutition. Add a note on
- i) Reflux esophagitis
 - ii) Achalasia cardia
- 3O. Explain defecation reflex. What is Hirschsprung disease?

(4 marks × 15 = 60 marks)

