

# MANIPAL ACADEMY OF HIGHER EDUCATION

## FIRST MBBS DEGREE EXAMINATION – JUNE 2021

### SUBJECT: PHYSIOLOGY– PAPER I (ESSAY)

Friday, June 18, 2021

Time: 10:20 – 13:00 Hrs.

Maximum Marks: 80

✍ Answer ALL the questions.

✍ **ESSAYS:**

1. A 52-year-old man consulted a neurology clinic. On examination, the neurologist noticed that the man was not able to walk in a straight line and was swaying towards one side. Motor incoordination and errors in voluntary movements on the right side were obvious. Bed-side neurological tests revealed dysmetria and past pointing on the right side.

1A. Specify the location of lesion in the above case.

1B. Draw any TWO afferent and TWO efferent connections of the part of the brain that is affected in this case.

1C. Mention the bed-side neurological test/s that demonstrate/s dysmetria. Explain the physiological basis of this clinical abnormality.

1D. Name other clinical manifestations of this neurological disorder

(1+4+2+3 = 10 marks)

2. A 17-year-old girl with delayed puberty was found to have testes rather than ovaries in the abdominal cavity, on investigation. Further investigation revealed that she had epididymis, vas deferens and seminal vesicles, but the external genitalia were female in appearance.

2A. Is the above individual a genetic male or a female? Give reasons.

2B. Write a summary of normal sex determination, differentiation and development of male internal and external genitalia in humans. Give the source and influence of various hormones.

2C. What is the most likely cause of development of female external genitalia in the above individual?

2D. Define puberty. List the sequence of events that normally occur during puberty in female. Mention the pattern of GnRH secretion at puberty.

(1+5+1+3 = 10 marks)

3. **SHORT ANSWER QUESTIONS:**

3A. List the anterior pituitary hormones. Explain the regulation of secretion of any ONE of the hormones.

3B. Mention any THREE effects of insulin on glucose metabolism. How are they affected in uncontrolled diabetes mellitus?

3C. Compare the cellular mechanism of action of steroid and thyroid hormones.

3D. Explain the location and functions of somatosensory area of cerebral cortex

- 3E. Classify sensory receptors. Explain the generation of receptor potential recorded from pacinian corpuscle.
- 3F. Based on the functions of prefrontal cortex, mention TWO effects of prefrontal lobotomy.
- 3G. Draw and label *dorsal column- lemmniscal pathway* from origin to termination.
- 3H. Explain the cochlear mechanisms for pitch discrimination. Mention the advantage of audiometry over tuning fork tests in the diagnosis of hearing loss.
- 3I. Explain the pathophysiology in the following conditions:  
i) Closed angle glaucoma    ii) Presbyopia
- 3J. Mention the functions of different types of cells in testis. What is 'capacitation' of sperms?
- 3K. Mention the physiological actions of cortisol.
- 3L. Explain the mechanism of TWO contraceptive methods that can be employed in females.
- 3M. Explain why skeletal muscle weakness develops in Myasthenia Gravis and Eaton Lambert Syndrome.
- 3N. Define 'all or none law' and 'absolute refractory period' as applicable to neural tissue.
- 3O. Name the glial cells. Mention the functions of any ONE.

(4 marks × 15 = 60 marks)



**MANIPAL ACADEMY OF HIGHER EDUCATION**  
**FIRST MBBS DEGREE EXAMINATION – JUNE 2021**  
**SUBJECT: PHYSIOLOGY– PAPER II (ESSAY)**

Monday, June 21, 2021

Time: 10:20 – 13:00 Hrs.

Max. Marks: 80

✍ **Essays:**

1. *A 60-year-old man suffering from long-standing uncontrolled type 2 diabetes mellitus visits his physician for the routine investigations. His plasma creatinine level is found to be higher than normal. The physician suspects a deranged renal function and advises strict control of diabetes to his patient.*
- 1A. Considering that the creatinine production is normal in this patient, the increased plasma creatinine level is most likely due to decrease in which process occurring in nephrons? Explain the dynamics of this process.
- 1B. Define renal clearance. Explain how renal clearance can be used for estimation of renal plasma flow.
- 1C. Add a note on regulation of renal blood flow.

(5+3+2 = 10 marks)

2. *A 42-year-old man is admitted for complaints of extreme fatigue, tingling in his feet and difficulty with balance. He has a hemoglobin of 7 G/dl and mean corpuscular volume of 130fL A peripheral blood smear shows profound macrocytosis. There is marginal leucopenia. His physician suggests life-long requirement of parenteral administration of a vitamin for improvements of the man's condition*
- 2A. Explain the dietary absorption of the vitamin that is deficient in this man.
- 2B. Explain the role of this vitamin in erythropoiesis
- 2C. Account for the observed values of hemoglobin concentration and MCV in this case.
- 2D. Mention the other factors essential for erythropoiesis.

(3+3+2+2 = 10 marks)

3. **Short answer questions:**

- 3A. Explain how myocardial contractility (inotropic effect) regulates stroke volume of heart
- 3B. Explain the special features of coronary circulation.
- 3C. Explain the features of obstructive jaundice.
- 3D. Draw a graph that depicts ventricular volume changes during a cardiac cycle. Give the normal values of End Diastolic Volume, End Systolic Volume and Ejection Fraction
- 3E. Explain how CNS ischemic response affects arterial blood pressure. What is Cushing reflex?
- 3F. Write short note on genesis and causes of cardiac murmurs.

- 3G. Explain the principle of measurement of body fluid compartments. Name the substances used to measure different fluid compartments. How is total blood volume measured?
- 3H. Explain the immediate effects of voluntary hyperventilation.
- 3I. Describe the cause and effects of the following:
- i) Dysbarism
  - ii) Hyaline membrane disease
- 3J. Explain the role of intrapleural pressure in normal breathing. What is transpulmonary pressure?
- 3K. Outline the role of peripheral chemoreceptors in regulation of respiration.
- 3L. Explain the esophageal phase of deglutition. What is Achalasia cardia?
- 3M. Outline the functions of bile salts
- 3N. Explain the pathophysiological basis and effects of the following conditions:
- i) Lactose intolerance
  - ii) Steatorrhea
  - iii) Automatic bladder of complete spinal transection
  - iv) Osmotic diuresis of diabetes mellitus
- 3O. Explain the organization of juxtaglomerular apparatus. Give the nerve supply to this structure  
(4 marks × 15 = 60 marks)

