

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

Thursday, October 15, 2020

Time: 10:20 – 13:00 Hrs.

Maximum Marks: 80

✍ **Answer ALL the questions.**

✍ **Essays:**

1. A 23 year old female with complaints of weight loss and heat intolerance since 3 months had a resting pulse rate of 120 beats /minute and a blood pressure of 150/50 mm Hg. Lab investigations revealed an elevated T3 and T4 and lowered levels of TSH. Following further investigations, a diagnosis of Grave's disease was made.

- 1A. Explain the reason for the abnormal level of each of mentioned hormones in this case
- 1B. Explain the physiological basis for the pulse rate and pulse pressure observations in this patient
- 1C. List any four other features of Grave's disease.
- 1D. Name any TWO classes of antithyroid drugs and give their mechanism of antithyroid action.

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

2A. With a labelled diagram, explain the withdrawal reflex. Add a note on the mechanism and significance of after discharge.

2B. Explain the classical conditioned response using a suitable example.

(6+4 = 10 marks)

3. **Short answer questions**

3A. Compare and contrast

- i) Wernicke and Broca aphasia
- ii) Central and nephrogenic diabetes insipidus

3B. Explain the followings:

- i) Ionic basis for absolute and relative refractory periods
- ii) Safety factor in neuromuscular transmission

3C. Mention the sequence of events that lead to hyperpolarization in rods following exposure to light.

3D. Mention the actions of the autonomic nerves on

- i) Blood vessels
- ii) Gastrointestinal tract
- iii) Smooth muscles of the urinary bladder

3E. Briefly explain the formation, circulation and drainage of the cerebrospinal fluid.

3F. Describe the manifestations of a right sided hemisection of the spinal cord at the level of spinal segment T10.

- 3G. Explain the mechanisms by which the nervous system discriminates between stimuli of different intensities.
- 3H. Briefly explain the followings:
- Role of troponin in contraction of skeletal muscles
 - Sources of energy for skeletal muscle contraction
- 3I. Give TWO physiological functions of testis in males, each in
- Fetal life
 - During puberty
- 3J. Mention the source and pattern of secretion of prolactin during pregnancy and period of lactation. Highlight its role in lactation
- 3K. Explain the physiological mechanisms that result in ovulation.
- 3L. Explain the mechanism of conduction of action potential in a myelinated and unmyelinated neuron.
- 3M. Explain the role of the basilar membrane in discrimination of sound frequencies.
- 3N. Explain the mechanism by which the eye accommodates for near vision.
- 3O. Explain the physiological basis for
- Carpopedal spasm seen in hypocalcemic tetany
 - Hypokalemic alkalosis seen in Conn syndrome

(4 marks × 15 = 60 marks)



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SUBJECT: PHYSIOLOGY– PAPER II (ESSAY)

Friday, October 16, 2020

Time: 10:20 – 13:00 Hrs.

Max. Marks: 80

✍ **Essays:**

1. A 59 year old patient presented with dyspnea and decreased exercise tolerance. A soft second heart sound and systolic murmur were heard on auscultation. Following investigation, he was diagnosed to be having a stenotic aortic valve.
 - 1A. Using a graph, describe the left ventricular pressure and aortic pressure changes during a **normal** cardiac cycle. Indicate the timing of second heart sound in the same graph.
 - 1B. How are the aortic and left ventricular pressures different in this patient compared to the normal graphs.

(8 ½+1 ½ = 10 marks)

2. A 27 year old mountaineer following a sudden ascent to high altitude developed acute shortness of breath and dizziness. His PaO₂ was found to be 35 mm Hg and saturation of Hb with O₂ was 60%. He was immediately shifted to a hospital at base camp. His condition improved with administration of 100% O₂.
 - 2A. Draw a graph to show how the percentage saturation of hemoglobin for oxygen changes with PO₂. Mention the significance of the characteristic shape of the curve.
 - 2B. Explain the compensatory physiologic changes that normally occur during acclimatization to high altitude.

(10 marks)

3. **Short answer questions:**

- 3A. Discuss the ionic basis of pacemaker potential. Explain how autonomic nerves control pacemaker function.
- 3B. Explain briefly how the baroreceptor reflex allows rapid adjustments in mean arterial pressure in response to changes in posture.
- 3C. List the various factors which can affect myocardial contractility. How does change in myocardial contractility affect Frank Starling curve?
- 3D. Define and classify *shock with examples*. Add a note on irreversible shock.
- 3E. Draw neural circuit to illustrate the reflex pathway involved in mechanism of peristalsis.
- 3F. Describe defaecation reflex.
- 3G. Explain the functions of large intestine.
- 3H. Based on Fick law of diffusion, explain the factors determining the volume of gas diffusing across alveolar-capillary membrane.
- 3I. Explain the role of Helper T cells in immunity.

- 3J. Classify anemia based on blood indices. Mention why the blood indices are affected in pernicious anemia.
- 3K. Discuss why bilirubin is present but urobilinogen is absent in the urine of a patient with obstructive jaundice.
- 3L. Compare and contrast facilitated diffusion and active transport. Give examples.
- 3M. Describe the temperature regulating mechanisms activated when the body is exposed to heat. Add a note on pathogenesis of fever.
- 3N. Explain how vasa recta functions as countercurrent exchanger.
- 3O. Draw a graph and represent the renal threshold and transport maximum for glucose. What is osmotic diuresis?

(4 marks × 15 = 60 marks)

