

MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

MBBS PHASE I, STAGE I DEGREE EXAMINATION – AUGUST 2005

SUBJECT: PHYSIOLOGY – I (ESSAY)

Tuesday, August 16, 2005

Time : 2 Hours

Max. Marks: 60

- ✍ Answer ALL questions.
- ✍ Write brief, relevant and legible answers.
- ✍ Draw diagram, flow charts wherever appropriate.

1. A professor of physiology was explaining the importance of reflexes in diagnosing various neurological diseases for the first year medical graduates. He brought three patients with different neurological disorders and demonstrated knee jerk in each of these patients. He also called a student to come forward and elicited the knee jerk in him and demonstrated the students how a normal response would look like. Students were surprised to see three different types of responses in three patients. First patient showed an exaggerated jerk, the second showed a pendular jerk while the third showed no response at all. The professor explained the physiology of the knee jerk and the cause for the changes in responses in each of the patients. Students were thrilled by the explanation.

- 1A. Draw and label the neural circuit of the reflex elicited by the professor. Name this reflex.
- 1B. Mention one clinical condition for each of the above patients.
- 1C. What are the explanations (physiological basis) given by the professor for the change in the responses observed in each of the above three patients?

(2½+1½+3 = 7 marks)

2A. Describe the regulation of testicular function in the form of a flow chart.

2B. Give the physiological basis for the following:

- i) 5α-reductase deficiency causes male pseudohermaphroditism.
- ii) Hypogonadic males are mildly anaemic.
- iii) Removal of the ovaries during first three months of pregnancy leads to abortion.

(3+3 = 6 marks)

3. Discuss oxygen transport under the following headings:

3A. Forms of transport.

3B. Labelled graph of oxygen-haemoglobin dissociation curve and explain the significance of steep and flat portions in the graph.

3C. List two factors that shift oxygen-haemoglobin dissociation curve to the right.

(1+4+1 = 6 marks)

4. A normal person is asked to drink one litre of plain water. Describe the physiological changes that occur in his body fluid compartments. Explain how kidneys deal with the disturbance to maintain the homeostasis.

(2+3 = 5 marks)

5A. Draw a labelled graph of the ventricular action potential. Give ionic basis for each of the phases.

5B. Give the physiological basis for the following:

- i) Cardiac muscle cannot be tetanised.
- ii) In polycythemia, diastolic blood pressure increases.

(3+2 = 5 marks)

6. A 25 year old woman consulted her physician with complaints of sleepiness, constipation, cold intolerance, irregular menstrual cycles and weight gain in spite of loss of appetite. On examination the patient appeared puffy with swollen face, limbs and trunk. She had a non pitting type of oedema. Her heart rate was found to be 46 per minute; her blood pressure was recorded to be 90/60 mmHg. Her plasma cholesterol was very high. Her basal metabolic rate was estimated to be 24 Kcals/Kg/M².

6A. Name the clinical condition and mention the endocrine disorder in the patient.

6B. Give the physiological basis for any three clinical features in the above patient.

6C. What test can be done to evaluate the functioning of the endocrine gland that has been affected in the patient?

(1+3+1 = 5 marks)

7. Define a motor unit. Explain how motor unit recruitment increases the force of contraction in a skeletal muscle. How do you demonstrate motor unit recruitment by recording EMG?

(1+3+1 = 5 marks)

8. A child with prolonged bleeding tendency was brought to the paediatrician when he sustained an injury while playing. Tests for haemostasis revealed normal clotting mechanisms. Paediatrician counselled the parents and treated the child symptomatically.

8A. List any two possible causes for the prolonged bleeding tendency in the child. Give physiological basis for each one.

8B. Name one laboratory test that would have helped the paediatrician to diagnose the above abnormality.

(4+1 = 5 marks)

9A. With the help of a diagram, describe the mechanism of hydrochloric acid secretion by stomach.

9B. Name any two gastrointestinal hormones. Mention one action of each of them.

(3+2 = 5 marks)

10. An elderly patient was brought to the neurological outpatient when he was not able to balance himself. The patient was not able to balance himself when he closes his eyes. The clinical examination revealed no abnormalities of cerebellar and vestibular functions. Romberg's sign was positive. Sensory examination revealed loss of sense of proprioception in both the lower limbs. Patient was not able to sense the position of his lower limbs at various joints. The same sensations as well as other sensations in his upper limbs were normal. Motor system examination showed no abnormalities.

10A. Draw and label the pathway that could have damaged in the above patient from the receptor till cortex.

10B. What could be the level of lesion? Justify your answer.

(3+1 = 4 marks)

11. Examination of a patient for visceral reflexes showed bilateral loss of light reflexes, both direct and indirect with normal response for accommodation reflex.

11A. Name the above clinical condition.

11B. Where could be the possible lesion?

11C. Trace the neural pathway for the defective reflex in the above patient.

(1+1+2 = 4 marks)

12. List any three differences between the functioning of sympathetic and parasympathetic systems.

(3 marks)



Reg. No.

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MBBS PHASE I STAGE I DEGREE EXAMINATION – AUGUST 2005

SUBJECT: PHYSIOLOGY – II (MCQs)

Tuesday, August 16, 2005

Time: 1 Hour

Max. Marks: 120

INSTRUCTIONS

1. For each statement, select **T** (True) or **F** (False) as your choice.
2. Indicate your choice by darkening the appropriate circle in the answer sheet provided.
3. Use only HB or 2B pencils to darken the circle.
4. Leave blank for Don't Know response.
5. Scoring systems is as follows:

For every Correct response	1 mark is awarded
For every Wrong response	0.5 mark is deducted
For every Don't Know response	No mark is deducted
6. Indicate your roll number (Registration Number) clearly and correctly.
7. Do not write anything in the question paper.
8. The true/false statements are numbered 101 to 160 and 201 to 260 (Total 120 statements).
9. This question paper contains **03 pages**. Please make sure that the question paper provided to you has all the pages.

Functions of the hypothalamus include

101. Control of body temperature
102. Regulation of water intake
103. Regulation of acid-base balance
104. Synthesis of anterior pituitary hormones

Sensations carried by the spinothalamic tract in the spinal cord include

105. Crude touch
106. Temperature
107. Proprioception
108. Stereognosis

In Parkinson's disease

109. The lesion is in the nigro-striatal pathway
110. There is decrease in the neurotransmitter, acetylcholine
111. There is hypotonia
112. There is intentional tremor

Functions of the limbic system include

113. Coordination of movements
114. Learning and memory
115. Emotional exteriorization

Middle ear

116. Is filled with fluid
117. Is separated from the external auditory canal by basilar membrane
118. Is responsible for impedance matching
119. Amplifies the pressure of the sound waves which it transmits to the inner ear

Regarding optics of vision

120. The cornea contributes maximum refractory power in the eye than lens
121. Astigmatism is corrected by a biconvex lens
122. Far point of an emmetropic eye is infinite
123. Nodal point in a normal reduced eye is located on the retina

Regarding deglutition

124. There is temporary cessation of breathing
125. Its center is located in the spinal cord
126. The upper oesophageal sphincter (UES) is made up of smooth muscles
127. When lower oesophageal sphincter (LES) remains relaxed, heart burn occurs

Basal electrical rhythm (BER)

128. Is an action potential
129. Has a lower frequency in stomach than in small intestine
130. Is affected by neurohumoral factors
131. Is due to a rhythmic change in sodium pump activity

Regarding defecation reflex

132. It is induced by distention of rectum
133. Its center is located in the spinal cord
134. It is characterized by contraction of internal anal sphincter

Regarding renal circulation

135. Average renal blood flow is about 600 ml/min
136. Renal medulla receives higher blood flow than renal cortex
137. Renal blood flow is autoregulated
138. Blood flow through the vasa recta in the renal medulla is slow

Regarding micturition

139. People with paralyzed diaphragm and abdominal muscles fail to micturate
140. First urge to micturate occurs when urinary bladder has more than 200 ml of urine
141. When sensory nerve fibers from urinary bladder are interrupted it results in atonic bladder.
142. Centers for micturition are located in spinal cord, medulla and cortex

Cortisol

143. Has permissive effect
144. Is secreted by posterior pituitary
145. In excess leads to a condition called acromegaly
146. Has anti-inflammatory effect in physiological doses
147. Secretion follows diurnal rhythm

Growth hormone

148. Decreases protein synthesis
149. Inhibits cell division
150. Is secreted by anterior pituitary
151. Effect on cartilage is mediated via insulin-like growth factors
152. In excess in adults leads to a condition called Cushing's syndrome

Parathyroid hormone

153. In excess leads to muscle spasm
154. Secretion increases in response to decreased plasma calcium level
155. Inhibits bone resorption
156. Increases reabsorption of calcium in the distal convoluted tubule

Corpus luteum

157. Is formed before ovulation
158. Secretes progesterone alone
159. Has a life span of 10 to 14 days in a non-pregnant woman
160. Undergoes atrophy due to withdrawal of luteinizing hormone (LH) support

Patient with Turner's syndrome

- 201. Has only one 'X' sex chromosome
- 202. Has well developed ovaries
- 203. Is usually short statured

Active transport

- 204. Occurs along a concentration gradient
- 205. Utilizes energy
- 206. Of sodium-potassium is inhibited by digitalis

Action potential

- 207. Has no threshold
- 208. Is conducted decrementally
- 209. Occurs only in muscles and neurons
- 210. Is normally a hyperpolarizing potential

Factors promoting heat loss include

- 211. Shivering
- 212. Exercise
- 213. Cutaneous vasodilation
- 214. Faster movement of air around the body

Smooth muscles

- 215. Have an unstable resting membrane potential (RMP)
- 216. Present in the ciliary muscles of the eye are of multiunit type
- 217. Are supplied by somatic nervous system

Red muscle fibers

- 218. Fatigue quickly
- 219. Are ideally suited for sustained contraction

Erythroblastosis foetalis

- 220. Occurs when a Rh positive mother conceives a Rh negative foetus
- 221. Is characterized by hemolysis of the maternal red blood cells
- 222. Can be prevented by giving the mother anti-Rh antibodies during pregnancy
- 223. Is treated by giving exchange transfusion of Rh negative blood to the baby

Regarding white blood cells

- 224. Neutrophils are phagocytic in nature
- 225. Eosinophil count in blood decreases during allergic conditions
- 226. Monocytes produce heparin
- 227. Lymphocytes when converted into mast cells start producing immunoglobulin

Regarding plasma proteins

- 228. Albumin helps for blood coagulation
- 229. Their level decreases in dehydration
- 230. Of all, fibrinogen contributes maximum to blood viscosity

Regarding cardiac cycle

- 231. Normally, systole lasts longer than diastole
- 232. Left ventricle generates a peak pressure of about 120 mmHg during systole
- 233. Volume of blood that remains in the ventricle at the end of diastole is about 40 ml
- 234. Both semilunar and atrioventricular valves are open during isometric relaxation phase

Coronary blood flow

- 235. Is about 250 ml/min
- 236. Increases during systole than during diastole
- 237. Increases following sympathetic nerve stimulation
- 238. Is decreased by accumulation of metabolites in the myocardial interstitial fluid

Regarding conduction system of heart

- 239. Purkinje fibers are fastest conducting fibers
- 240. Cardiac impulse normally originates from AV node
- 241. There is an AV delay
- 242. Rate of discharge of SA node determines the heart rate

First heart sound

- 243. Is produced due to closure of semilunar valves
- 244. Has a shorter duration than that of the second heart sound
- 245. Is heard better over aortic and pulmonary areas
- 246. Has a lower frequency than that of the second heart sound

Cardiac output depends on the

- 247. Myocardial contractility
- 248. Heart rate

Airway resistance

- 249. Is greatest in the medium sized airways
- 250. Is lower during inspiration than expiration
- 251. Increases when the lungs expand
- 252. Decreases on parasympathetic stimulation

Regarding carbon dioxide transport

- 253. Major form of transport is bicarbonate form
- 254. Effect of P_{O_2} on carbon dioxide transport is called Bohr's effect
- 255. Partial pressure of CO_2 in venous blood is about 30 mmHg
- 256. Carbon dioxide binds to the hemoglobin forming carbamino compound

Pulmonary surfactant

- 257. Is secreted by type II alveolar cells
- 258. Increases the surface tension in the alveoli
- 259. Deficiency leads to respiratory distress syndrome in adults
- 260. Decreases the distension of lungs

