

MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

MBBS PHASE I, STAGE I DEGREE EXAMINATION – FEBRUARY 2005**SUBJECT: PHYSIOLOGY – I (ESSAY)**

Monday, February 14, 2005

Time : 2 Hours

Max. Marks: 60

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

1. Mr. Philip, a 70 year old chronic alcoholic sought neurologist's help when he noticed difficulty in balancing himself while walking. He told that he was not able to precisely perform daily routines such as buttoning his shirt, holding fork in hand while eating, write a few letters legibly. When he tried to do these tasks, his hands started shaking which he could not control by himself. These movements became more intense as he attempted to reach the targets. His son told the doctor that he had noticed clumsiness in his father's gait. Mr. Philip used to walk with legs apart and had tendency to sway to both the sides. On examination, neurologist found hypotonia in all limbs but no paralysis. Examination of reflexes revealed no abnormalities except for the pendular knee jerk. Babinski's sign was absent. There were no sensory abnormalities. Cranial nerves were normal.
- 1A. Which part of the brain could have been affected in Mr. Philip? Why?
- 1B. Describe the gait of the patient if the lesion involved only one side (unilateral) of the above part of brain
- 1C. Why did the above patient have hypotonia?
- 1D. Explain the speech abnormality of this patient
- 1E. Describe one clinical test done to assess the functioning of the part of the brain affected in Mr. Philip

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(1+1+1+1+2=6 marks)

2. Mr. Haw was suffering from low backache for more than two years. He had undergone all possible treatments, but none of them helped much. His friend, Mr. Chea suggested him to go for acupuncture therapy. Mr. Haw found some kind of relief after acupuncture therapy.
- 2A. Describe the type of pain from which Mr. Haw was suffering from.
- 2B. Name the afferent nerve and the pathway that carries the above type of pain .
- 2C. Explain the physiological basis for pain relief by acupuncture therapy.

(1+1+2=4 marks)

- 3A. Describe the steps by which clotting takes place when plain blood is kept in a test tube.
- 3B. Name one in vivo anticoagulant. Mention the mechanism of action of the same.

(3+2=5 marks)

4. In the form of a flow chart, explain the steps involved in excitation-contraction coupling as well as relaxation in a skeletal muscle.

(5 marks)

5. Mrs. Ruth was admitted to medical ward with shortness of breath (dyspnoea). Her pulmonary function test reports were as follows:

Tidal volume = 350 ml	Dead space volume=200 ml/breath
Respiratory rate = 22/minute	%FEV1 = 65%
P_{aO_2} = 88 mmHg	P_{aCO_2} = 44 mmHg

- 5A. Calculate the alveolar ventilation of Mrs. Ruth
- 5B. From which type of hypoxia was Mrs. Ruth suffering from? Justify your answer

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MBBS PHASE I STAGE I DEGREE EXAMINATION – FEBRUARY 2005

SUBJECT: PHYSIOLOGY – II (MCQs)

Monday, February 14, 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:

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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 **04 pages**. Please make sure that the question paper provided to you has all the pages.

Absolute refractory period during an action potential

101. Is the period during which second stimulus, however strong will not be able to produce another action potential
102. Corresponds to the period from the time the firing level is reached until repolarization is about two-third complete in a nerve fiber
103. Is longer in cardiac muscles than skeletal muscles

Multiunit smooth muscles

104. Are also called visceral smooth muscles
105. Do not respond to circulating hormones
106. Are nonsyncytial in function
107. Contain troponinC as calcium binding protein

Force of contraction is increased in a skeletal muscle by

108. Increasing the plasma calcium level
109. Stretching the muscle before contraction within physiological limits
110. Increasing the strength of stimulus above the maximal level

Osmolarity of plasma is

111. About 300 mOsm/liter
112. Equal to that of intracellular fluid

Core body temperature

113. Is same as the temperature of the skin
114. Increases during fever
115. Changes with environmental temperature
116. Is fixed at a constant value by cerebral cortex

During erythropoiesis

117. The cell size gradually decreases
118. Hemoglobin synthesis is complete at late normoblast stage
119. Color of cytoplasm gradually changes from basophilic to acidophilic type

Monocytes

120. Make about 20% of leucocytes in circulation
121. When migrated to tissues are called macrophages
122. Secrete immunoglobulin
123. Remove antigens by phagocytosis

Hazards of mismatched transfusion include

124. Acute renal failure
125. Development of jaundice
126. Volume overload and right heart failure

Residual volume

127. Is the volume of air in the lungs after quiet expiration
128. Can not be measured by simple water spirometer
129. Increases in fibrosis of lungs

About lung surfactants

130. They lower the surface tension in the alveoli
131. They help to prevent pulmonary edema
132. Maturation of surfactants in the lungs is accelerated by glucocorticoids

Pulmonary blood flow

133. Is more in the base of lungs than apex in supine posture
134. Is same as cardiac output
135. Decreases in areas of lung which are having less ventilation

Regarding ventilatory responses to carbon dioxide

136. A rise in arterial PCO₂ stimulates ventilation
137. Cutting afferents from carotid chemoreceptors stop ventilatory response to changing PCO₂
138. A rise in PaCO₂ along with hypoxia is a better stimulant than the rise in PaCO₂ alone for central chemoreceptors

PR interval in ECG

139. Is about 0.12-0.20 second
140. Indicates the time taken for ventricular depolarization

During isovolumetric ventricular contraction

141. All valves are closed
142. There is a sharp rise in the intraventricular pressure
143. Bulging of atrioventricular valves into atrial cavity produce 'c' wave in atrial pressure tracing
144. The volume of blood in each ventricle is same as end diastolic volume

Myocardial contractility

145. Refers to the myocardial contraction independent of length of myocardium
146. Increases by circulating catecholamines
147. Decreases by digitalis
148. Increases by an increase in end diastolic volume

Velocity of blood flow is

149. Maximum in capillaries
150. Directly proportional to total area of cross section of a given type of vessel
151. Increased during exercise
152. Same in both aorta and vena cava

Arterial baroreceptors

153. Are stretch receptors, located in the walls of blood vessels
154. In the carotid sinus are supplied by vagus nerve
155. When stimulated, reduce the peripheral resistance by reflex mechanism
156. Are reset at an elevated blood pressure in a patient with hypertension

Regarding effects of thyroid hormones

157. They increase oxygen consumption in all tissues in the body including brain
158. They are essential for hepatic conversion of carotene to vitamin A
159. They increase heart rate and force of contraction

Effects of insulin include

160. Increased glucose entry into the adipose tissue
201. Activation of hormone sensitive lipase in adipose tissue
202. Increased protein catabolism in muscles
203. Stimulation of growth in childhood

Aldosterone secretion is stimulated by

204. High plasma potassium
205. Angiotensin II
206. Hypervolemia

Parathyroid hormone (PTH)

207. Is secreted by oxyphil cells of parathyroid gland
208. Acts directly on bone and causes bone resorption
209. Secretion is inhibited by 1,25 dihydroxycholecalciferol

Stimuli that increase growth hormone secretion include

210. Hypoglycemia
211. REM sleep
212. Increased free fatty acids in blood

Regarding sexual differentiation

213. Mullerian inhibiting substance is secreted by Leydig cells of fetal testes
214. In the absence of testosterone, female type of internal genitalia develops
215. The testosterone metabolite, dihydrotestosterone induces the development of male external genitalia

Testosterone

216. Binds to an intracellular receptor
217. Is useful as an anabolic agent in patients with wasting diseases

Hormone, estrogen

218. Stimulates the growth of lobular and alveolar parts of the mammary gland
219. Is responsible for fern pattern of cervical mucus on 21st day of normal menstrual cycle

Basal electrical rhythm (BER)

220. Is the spontaneous rhythmic fluctuation in membrane potential in GI tract
221. Is initiated by the intestinal cells of Cajal
222. By itself produces smooth muscle contractions in GI tract

Cholecystokinin-Pancreozymin (CCK-PZ)

223. Is a single hormone
224. Stimulates the pancreas to secrete a juice which is rich in water and electrolytes
225. Is secreted by 'S' cells of the small intestinal mucosa

About bile acids/bile salts

226. The two primary bile acids are cholic acid and deoxycholic acid
227. They form structures called micelles inside the intestinal mucosal cells
228. Bile salts themselves are the most important physiologic cholagogues
229. Hormone, secretin increases the water and bicarbonate content of bile

Glomerular filtration rate (GFR)

230. Increases by a decrease in colloidal osmotic pressure of plasma
231. Is same as the clearance value of glucose
232. Decreases by a rise in hydrostatic pressure in Bowman's capsule

Substances secreted by the renal tubules include

233. Para-aminohippuric acid (PAH)
234. Bilirubin

Regarding handling of water by the kidney

235. Of the total filtered water, maximum amount is reabsorbed in proximal convoluted tubules
236. Water reabsorption occurs in the collecting duct only in the presence of anti-diuretic hormone
237. A high protein diet increases the ability of the kidneys to concentrate urine

Muscle spindles are

238. The extrafusal fibers in the skeletal muscles
239. Innervated by Ia fibers as afferent nerves
240. Stimulated by increasing activity of gamma motor neurons supplying them
241. Tension transducers in the skeletal muscles

Regarding coding of sensations

242. According to doctrine of specific nerve energies, the sensation is always felt at the site of location of the receptors
243. Weber-Feshner's law explains the basis of phenomenon of phantom limb
244. Recruitment of sensory units takes place as the strength of stimulus increases

In Huntington's disease

245. Hyperkinetic, choriform movements appear
246. There is loss of intrastriatal dopaminergic neurons

A lesion in the corticospinal tract at the level of upper medulla produces

247. Contralateral hemiplegia
248. Upper motor neuron type of facial nerve paralysis

About the abnormalities of functions of hypothalamus

249. Lesion in the ventromedial nucleus results in obesity
250. Damage to suprachiasmatic nucleus leads to loss of circadian rhythm

Implicit memory

251. Includes skills and habits which, once acquired, become automatic
252. Is associated with consciousness or awareness of the individual

During accommodation to near objects

253. Curvature of the lens increases due to the increased tension in the suspensory ligaments
254. Medial recti on both sides contract
255. Dioptric power of the eye increases

In hypermetropia

256. The far point becomes finite
257. Image falls in front of the retina

Regarding olfaction

258. Axons of olfactory receptor neurons make olfactory tract
259. Olfactory cortex includes piriform cortex, orbitofrontal gyrus
260. Distorted sense of smell is called anosmia

