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## MANIPAL UNIVERSITY

### MBBS PHASE I STAGE I DEGREE EXAMINATION – MARCH 2016

#### SUBJECT: PHYSIOLOGY – I (ESSAY)

Monday, March 07, 2016

Time: 09:00 – 11:00 Hrs

Max. Marks: 60

1. Damien, a 42 year old man noticed that he gets tired easily from the past few weeks and was losing weight. He consulted a physician with complaints of weakness and loss of appetite. During examination, the doctor noticed hyperpigmentation of gums in Damien and his blood pressure was found to be low. Laboratory tests revealed high plasma ACTH levels, low plasma sodium levels and hyperkalemia.
  - 1A. Name the endocrine disorder in Damien.
  - 1B. Give the physiological basis for hyperkalemia and hypotension in Damien.
  - 1C. Is this a primary or secondary endocrine disorder? Justify your answer.

(1+3+1 = 5 marks)
  
- 2A. Draw a neat labeled diagram of a skeletal muscle sarcomere.
- 2B. List the types of smooth muscles and mention any one difference between them.

(3+2 = 5 marks)
  
- 3A. Describe the intrinsic pathway of blood coagulation in the form of a flow chart.
- 3B. State the role of vitamin B<sub>12</sub> in erythropoiesis.

(4+1 = 5 marks)
  
4. Draw a neat labeled diagram of SA nodal action potential and give the ionic basis for the same.

(5 marks)
  
5. Draw and label oxygen-hemoglobin dissociation curve. Mention the significance of different parts of this curve.

(3+2 = 5 marks)
  
6. Albert, a 40 year old chain smoker and alcoholic, comes to the hospital with the complaint of difficulty in swallowing. Investigations revealed dilation of esophagus and constriction of lower esophageal sphincter.
  - 6A. Name the above clinical condition and give its basis.
  - 6B. Which phase of deglutition is primarily affected in Albert? Describe the same phase in a normal person.

(2+3 = 5 marks)

7. Define GFR. Describe any two factors affecting GFR.

(1+4 = 5 marks)

8. Describe any five actions of testosterone in males.

(5 marks)

9. Give physiologic basis for the following:

9A. Type 'A' nerve fibers conduct impulses faster than type 'C' nerve fibers.

9B. Regeneration of neurons is rare in the central nervous system.

9C. Repolarization phase in nerve action potential.

9D.  $\text{Na}^+$ - $\text{K}^+$  ATPase is electrogenic in nature.

9E. Absolute refractory period.

(1 mark  $\times$  5 = 5 marks)

10A. Explain the descending analgesic system (endogenous pain relief system).

10B. Describe presynaptic inhibition.

(3+2 = 5 marks)

11. Draw a labeled neural circuit of inverse stretch reflex. Add a note on its significance.

(4+1 = 5 marks)

12A. Explain how pitch discrimination of sound occurs in the cochlea.

12B. Mention the changes occurring in the eye during accommodation reflex.

(2+3 = 5 marks)



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## MANIPAL UNIVERSITY

MBBS PHASE I STAGE I DEGREE EXAMINATION – MARCH 2016

SUBJECT: PHYSIOLOGY – II (MCQs)

Monday, March 07, 2016

Time: 11:30 – 12:30 Hrs.

Max. Marks: 120

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### 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 <b>Correct</b> response	<b>1</b> mark is awarded
For every <b>Wrong</b> response	<b>0.5</b> mark is deducted
For every <b>Don't Know</b> response	<b>No</b> 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.

### **Anterior hypothalamus**

- 101. Controls the reflex responses activated by cold
- 102. When stimulated causes cutaneous vasodilation and sweating
- 103. Lesion causes hyperthermia

### **Parasympathetic nervous system**

- 104. Is craniosacral in origin
- 105. Has long preganglionic and short postganglionic fibers
- 106. Releases acetylcholine at the preganglionic nerve endings
- 107. On stimulation increases the heart rate

### **During excitation-contraction coupling in skeletal muscle**

- 108. ATP is required for calcium release from L tubules
- 109. Calcium binds to tropomyosin
- 110. The action potential is transmitted to all fibrils via the L tubules
- 111. Sarcomere length decreases

### **Myasthenia gravis is**

- 112. An autoimmune disease
- 113. Characterized by abnormal muscle weakness
- 114. Associated with reduction in nicotinic acetylcholine receptors

### **Reticulocyte**

- 115. Is the immediate precursor cell of a mature RBC
- 116. Contains remnants of cytoplasmic RNA
- 117. Count is increased when RBCs are rapidly produced
- 118. Is smaller in size when compared to RBC

### **Erythropoietin**

- 119. Is synthesized only in liver

- 120. Production is stimulated by tissue hypoxia
- 121. Is involved in the release of RBCs from bone marrow
- 122. Production is suppressed by androgens

### **T- Lymphocytes**

- 123. Are processed in thymus
- 124. Are responsible for humoral immunity
- 125. Have membrane bound immunoglobulins on their surface
- 126. Attack intracellular pathogenic bacteria

### **Second heart sound**

- 127. Is produced by closure of atrioventricular valves
- 128. Has a longer duration compared to that of first heart sound
- 129. Is heard best over mitral area
- 130. Has a higher pitch compared to that of first heart sound

### **Stroke volume**

- 131. Is the amount of blood that is pumped out by each ventricle per minute
- 132. Is normally around 120 ml
- 133. Increases when preload is increased
- 134. When increased, increases cardiac output

### **Regarding the biophysical aspects of circulation**

- 135. Arterioles are the major site of peripheral resistance
- 136. Velocity of blood flow is greatest in the capillaries
- 137. Blood flow is laminar when Reynold's number is more than 3000
- 138. Veins are called capacitance vessels

### **Vasomotor center/area is stimulated by**

- 139. Hypoxia
- 140. Increased mean arterial blood pressure
- 141. Increased baroreceptor activity

**Hypovolemic shock is characterized by**

- 142. Hypotension
- 143. Rapid thready pulse
- 144. Decreased respiratory rate

**Carbon monoxide**

- 145. Poisoning is an example for histotoxic hypoxia
- 146. Combines with hemoglobin to form carbaminohemoglobin
- 147. Poisoning is characterized by a reduction in the total hemoglobin content of blood
- 148. Affinity for hemoglobin is more when compared to that of oxygen

**In a man with tidal volume of 300 mL, respiratory rate of 30 breaths/min and normal anatomical dead space volume, his**

- 149. Alveolar ventilation is 4.5L/min
- 150. Respiratory rate is low
- 151. Pulmonary ventilation is 9L
- 152. Tidal volume is normal

**Ventilation/Perfusion ratio**

- 153. Is 0.8 for the whole lung at rest in the upright posture
- 154. Depends on gravity
- 155. Is high at the base of lung in the upright posture
- 156. Decreases in a person with poorly ventilated but normally perfused alveoli

**Gastric secretion is stimulated by**

- 157. Vagal stimulation
- 158. Acid in the duodenum
- 159. Histamine
- 160. Products of protein digestion in small intestine
- 201. Somatostatin

**Migrating motor complex (MMC)**

- 202. Is initiated by motilin
- 203. Migrates from stomach to distal ileum
- 204. Occurs during interdigestive period
- 205. Becomes stronger and faster by the entry of food into stomach
- 206. Helps to clear the luminal contents of stomach and small intestine

**Glucose reabsorption in the renal tubules**

- 207. Is an example for secondary active transport
- 208. Increases when the tubular load exceeds  $T_{max}$  glucose
- 209. Is inhibited by phlorhizin
- 210. Occurs in the early portion of the proximal tubule

**When compared to plasma osmolarity, fluid leaving the**

- 211. Proximal tubule is hypo-osmotic
- 212. Thick ascending limb of loop of Henle is hyperosmotic
- 213. Medullary portion of collecting duct is hyperosmotic in presence of ADH
- 214. Distal convoluted tubule is hypo-osmotic

**Thyroid hormone/s**

- 215. Lower plasma cholesterol level
- 216. Are essential for normal growth and skeletal maturation
- 217. In excess decrease the basal metabolic rate
- 218. Deficiency causes weight loss
- 219. Are necessary for hepatic conversion of carotene to vitamin A

**Acromegaly is associated with**

- 220. Decreased growth hormone levels in blood
- 221. Hypoglycemia
- 222. Organomegaly
- 223. Prognathism
- 224. Hirsutism

### **Insulin promotes**

- 225. Fatty acid and triglyceride synthesis in adipose tissue
- 226. Proteolysis
- 227. Cell growth
- 228. Peripheral utilization of glucose in skeletal muscle

### **Menopause is associated with**

- 229. Hot flushes in some women
- 230. Increased plasma levels of estrogen and progesterone
- 231. Increased plasma cholesterol
- 232. Reduction in the number of primordial follicles

### **Leydig cells**

- 233. Form the blood- testis barrier
- 234. Secrete mullerian inhibiting substance (MIS)
- 235. Are stimulated by luteinizing hormone (LH)
- 236. Nourish developing sperms

### **State whether the following clinical features and their descriptions are true or false**

- 237. Akinesia: Slowness of movements
- 238. Athetosis : Continuous, slow writhing type of involuntary movements
- 239. Chorea : Characterized by rapid involuntary dancing movements

### **Basal ganglia is involved in**

- 240. Planning of motor activity
- 241. Sensory perception
- 242. Control of muscle tone and posture

### **Explicit memory**

- 243. Is also called non declarative memory
- 244. Involves factual knowledge about places and things
- 245. Includes episodic memory

### **Cerebrospinal fluid (CSF)**

- 246. Is produced by choroid plexus of lateral ventricles
- 247. Volume in humans is about 150 mL
- 248. Absorption rate when reduced results in hydrocephalus
- 249. Provides buoyancy effect to the brain

### **Regarding motor homunculus**

- 250. Body parts are represented in the motor area in proportion to their size
- 251. It has representation of feet at the top of the precentral gyrus
- 252. It is represented in the primary motor cortex

### **A lesion in the visual pathway at the level of**

- 253. Geniculocalcarine tract near to cortex produces homonymous hemianopia with macular sparing
- 254. Optic tract causes complete blindness on the affected side
- 255. Optic chiasm results in binasal hemianopia
- 256. Optic nerve produces heteronymous hemianopia

### **Regarding light reflex**

- 257. It is absent in Argyll Robertson pupil
- 258. Fibres from pretectal nucleus project to Edinger-Westphal nuclei
- 259. Ciliary ganglion receives fibres from the optic nerve
- 260. It involves dilation of pupil

