

Reg. No.

## MANIPAL UNIVERSITY

## MBBS PHASE I STAGE I DEGREE EXAMINATION – AUGUST 2011

## SUBJECT: PHYSIOLOGY – I (ESSAY)

Tuesday, August 16, 2011

Time: 09:00 – 11:00 Hrs

Max. Marks: 60

✍ Answer ALL questions. Write brief, relevant and legible answers.

✍ Draw diagram, flow charts wherever appropriate.

1A. Draw a labeled diagram of the sensory pathway that carries fine touch sensation from the great toe of left leg to the brain.

1B. Give the physiological basis for dissociated anesthesia in syringomyelia.

(3+2 = 5 marks)

2A. Explain presynaptic inhibition with the help of diagrams.

2B. Describe the doctrine of specific nerve energies with the help of an example.

(3+2 = 5 marks)

3. Write the sequence of events that occur during 'excitation-contraction coupling' in skeletal muscles.

(5 marks)

4. Give the physiological basis for the following statements:

4A. In a hot and humid environment, one feels hotter compared to a dry environment with the same temperature

4B. Liver disease is associated with edema

4C.  $\text{Na}^+$ - $\text{K}^+$  ATPase pump is called electrogenic pump

4D. Action potential obeys "All or None law"

4E. Conduction velocity is greater in myelinated nerve fibers

(1×5 = 5 marks)

5. Define 'hemostasis'. Write the sequence of reactions leading to clot formation in the intrinsic system of clotting.

(1+4 = 5 marks)

6. Describe the deglutition reflex and add a note on achalasia.

(3+2 = 5 marks)

7. Rita, a 35 year old woman consulted her physician with complaints of tiredness and loss of appetite. During the past month she had lost around 6 kg. On physical examination, she was found to have hyperpigmentation especially of the oral mucosa and gums. She was

hypotensive and laboratory tests revealed hyponatremia, hyperkalemia and fasting hypoglycemia.

- 7A. What is your possible diagnosis?
- 7B. Which hormone is responsible for the hyperpigmentation? Is the level of this hormone high or low in Rita?
- 7C. Give the basis for fasting hypoglycemia in Rita.
- 7D. Give the physiological basis for hyponatremia and hyperkalemia in Rita?

(1+1+1+2 = 5 marks)

- 8. Compare the changes in arterial  $PO_2$ , percentage saturation of hemoglobin, total oxygen content and oxygen carrying capacity of blood in hypoxic and anemic hypoxia.

(5 marks)

- 9. Peter met with a road traffic accident and had severe bleeding. He was brought to the emergency department.

- 9A. What type of circulatory shock would have occurred in Peter? Mention FOUR characteristic features of this type of shock.

- 9B. Mention TWO rapid compensatory mechanisms that would have occurred in his circulatory system to overcome the effect of the shock.

(3+2 = 5 marks)

- 10A. Describe the regulation of testicular function in the form of a flow chart.

- 10B. Describe TWO tests for ovulation.

(3+2 = 5 marks)

- 11A. Explain why albuminuria occurs in renal diseases.

- 11B. Describe the autoregulation of renal blood flow.

(2+3 = 5 marks)

- 12A. Describe dark adaptation.

- 12B. Describe the traveling wave theory of hearing.

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**MANIPAL UNIVERSITY****MBBS PHASE I STAGE I DEGREE EXAMINATION – AUGUST 2011****SUBJECT: PHYSIOLOGY – II (MCQs)**

Tuesday, August 16, 2011

Time: 11:30 – 12:30 Hrs.

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 <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.

### Facilitated diffusion

- 101. Is a carrier mediated transport
- 102. Occurs when substances are transported along their concentration gradient
- 103. Uses ATP as energy to move substances
- 104. Is the mechanism by which glucose is reabsorbed in renal tubules

### Type B nerve fibers

- 105. Are myelinated
- 106. Have conduction velocity of 70-120 m/s
- 107. Carry proprioceptive impulses
- 108. Innervate muscle spindles

### Red type of skeletal muscles

- 109. Are fast muscles
- 110. Have high glycolytic capacity
- 111. Fatigue faster than white muscles
- 112. Are involved in maintaining posture

### End plate potential

- 113. Is a depolarizing potential
- 114. Occurs at neuromuscular junction
- 115. Is produced by influx of potassium ions into the postjunctional membrane
- 116. Obeys all or none law

### Platelets

- 117. Lack nuclei
- 118. Adhere to damaged endothelium
- 119. Are formed from megakaryocytes in the bone marrow
- 120. Decrease in number following splenectomy

### Plasma proteins

- 121. When decreased lead to edema
- 122. Contribute to the viscosity of blood
- 123. Exert colloidal osmotic pressure in the vascular compartment
- 124. Transport hormones

### Erythropoiesis

- 125. Is stimulated by hypoxic conditions
- 126. Occurs mainly in yellow bone marrow during adult life
- 127. Decreases in chronic renal diseases
- 128. Requires normal levels of folic acid

### Basic electrical rhythm (BER)

- 129. Co-ordinates peristaltic activity
- 130. Decreased by parasympathetic stimulation
- 131. Rate is about 4/min in stomach

### Bile

- 132. From liver is less alkaline than that from gall bladder
- 133. Secretion is stimulated by the hormone secretin
- 134. Is concentrated in the liver

### Cholecystokinin

- 135. Is secreted by hepatocytes
- 136. Stimulates the secretion of enzyme-rich pancreatic juice
- 137. Is a cholagogue
- 138. Relaxes sphincter of Oddi

### Surfactant lining the alveoli

- 139. Is produced by type II alveolar epithelial cells
- 140. Increases alveolar surface tension
- 141. Prevents collapse of smaller alveoli during expiration
- 142. Prevents pulmonary edema

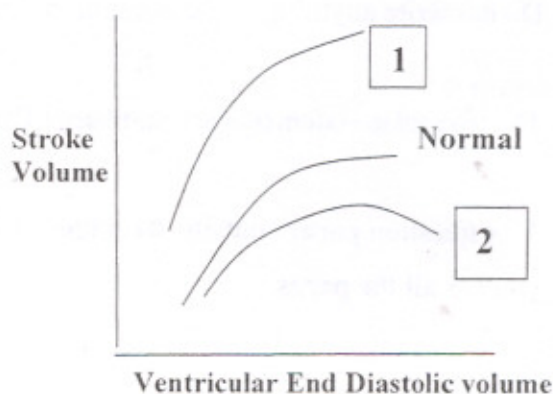
### Vital capacity

- 143. Is maximum in supine position
- 144. Depends on the body surface area
- 145. Includes residual volume of lungs
- 146. Increases if the lung compliance is low
- 147. Decreases in restrictive lung disease

### Pneumothorax on one side causes

- 148. An increase in the residual volume on the affected side
- 149. Dullness when percussed on the affected side
- 150. Shifting of mediastinum towards the normal side

The following graph depicts the effect of changes in contractility on the Frank-Starling curve



- 151. The curve shifts downward and to the right when the contractility is decreased
- 152. Curve numbered 1 represents parasympathetic stimulation

- 153. Positive inotropic agents/drugs shift the curve to the left and upward
- 154. Curve numbered 2 represents the negative inotropic effect
- 155. Hypoxia shifts the normal curve upward and to the left

#### Tachycardia is caused by

- 156. Adrenaline infusion
- 157. Stimulation of cardioinhibitory centre
- 158. Excitement
- 159. Hypothyroidism
- 160. Sudden standing from supine position

#### In an electrocardiogram (ECG) from lead II

- 201. Prolonged P-R interval indicates conduction blocks
- 202. A tall and slender 'T' wave indicates hypokalemia
- 203. Elevated ST segment is an indication of myocardial ischemia
- 204. 'QRS' complex corresponds to atrial depolarization
- 205. P wave is caused by ventricular depolarization

#### A patient with hyperthyroidism is likely to have

- 206. Increased pulse pressure
- 207. Weight gain
- 208. Increased appetite
- 209. Cold intolerance
- 210. Constipation

#### Glucagon

- 211. Causes glycogenolysis in muscle
- 212. Inhibits insulin secretion
- 213. Causes lipolysis
- 214. Secretion is stimulated by glucose

#### A short stature results from

- 215. Deficiency of IGF-I
- 216. Gonadal dysgenesis with XO chromosomal pattern
- 217. Hypothyroidism in children
- 218. Late closure of epiphyses

#### Testosterone

- 219. Is secreted by Sertoli cells
- 220. Is synthesized from cholesterol
- 221. Is catabolic in nature
- 222. Increases plasma LH level

#### Ovulation

- 223. Is associated with LH surge
- 224. Is followed by a slight fall in basal body temperature
- 225. Occurs on the 14<sup>th</sup> day of menstrual cycle irrespective of the length of the cycle
- 226. Is followed by thickening of cervical mucus

#### Regarding tubular reabsorption in the kidneys

- 227. Glucose is reabsorbed by primary active transport in proximal convoluted tubules
- 228. 60% - 70% of the water reabsorption occurs in the PCT
- 229. Sodium reabsorption in the proximal tubules is regulated by aldosterone
- 230. Urea reabsorption in collecting duct is increased in the presence of ADH

#### Glomerular Filtration

- 231. Is normally 180L/minute
- 232. Is increased by decrease in hydrostatic pressure in glomerular capillaries
- 233. Decreases upon constriction renal arteriole
- 234. Rate is determined by inulin

#### Regarding hearing

- 235. High pitched sounds maximally stimulate the apex of basilar membrane
- 236. Tympanic reflex protects the ear from gunshot sounds
- 237. Female voice is high pitched compared to male voice
- 238. The frequency of action potentials in the auditory nerve fibers determines the loudness of the sound

#### Lesions

- 239. In optic tract causes bitemporal hemianopia
- 240. Of occipital cortex is associated with macular sparing
- 241. In right optic nerve causes blindness of the right eye
- 242. In optic chiasma causes homonymous hemianopia

#### Excitatory postsynaptic potentials

- 243. Are produced by hyperpolarization of the postsynaptic membrane
- 244. Do not obey 'all or none' law
- 245. Undergo temporal and spatial summation
- 246. Are produced by Na<sup>+</sup> influx into the postsynaptic membrane



### **Sleep of**

- 247. Slow wave type is associated with sleep spindles
- 248. Rapid eye movement type is associated with dreams
- 249. Rapid eye movement type is characterized by low threshold for arousal
- 250. Slow wave type is associated with delta waves

### **State whether the following matches are true or false**

- 251. Fluent aphasia: Broca's area
- 252. Non fluent aphasia: Wernicke's area
- 253. Conduction aphasia: Arcuate fasciculus

### **Lesion of the corticospinal tract in the right internal capsule produces**

- 254. Hyperactive stretch reflexes on the left side of body
- 255. Spastic paralysis on the right side
- 256. Babinski sign present on the same side

### **Function/s of the basal ganglia include/s**

- 257. Associated movements
- 258. Thermoregulation
- 259. Planning voluntary movement
- 260. Sensory integration

