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**MANIPAL UNIVERSITY****MBBS PHASE I STAGE I DEGREE EXAMINATION – MARCH 2015****SUBJECT: PHYSIOLOGY – I (ESSAY)**

Monday, March 09, 2015

Time: 09:00 – 11:00 Hrs

Max. Marks: 60

1. An 18 year old boy was brought to the hospital by his friends after a road traffic accident. The neurologist on duty observed that the patient had loss of pain and temperature sensations in the left lower limb. In the right lower limb the patient could not perceive fine touch, vibration, and proprioceptive sensations. The patient's right leg was paralyzed and radiological examination revealed lesion of one half of spinal cord at T6 level.
- 1A. Name the above condition and mention which half of the spinal cord is lesioned in the above patient.
- 1B. Give physiological basis for the sensory and motor manifestations in the above patient.
- 1C. Comment on the patient's knee jerk reflex on right side.
- (1+3+1 = 5 marks)
2. Describe coding of sensory information with respect to stimulus location using a suitable example.
- (5 marks)
- 3A. Draw a labeled diagram of the taste pathway. Define ageusia and mention one cause for it.
- 3B. Enumerate two functions of middle ear.
- (3+2 = 5 marks)
4. Linda, a 52 year old woman visited her physician with complaints of shortness of breath, fatigue upon physical activity, mild pain in upper abdomen and loss of appetite over the past few weeks. Clinical examination by the physician revealed pale skin and sclera, enlarged liver and spleen. Her blood profile was as follows: Hemoglobin = 5 g%, RBC count = 1.5 million cells / mm<sup>3</sup>, PCV = 18%, Total WBC count = 10,000 cells / mm<sup>3</sup>.
- 4A. Calculate the MCV and MCH from the values given above.
- 4B. Comment on the morphology of RBCs in Linda.
- 4C. What kind of disorder does Linda have? Justify your answer.
- 4D. What could be the possible treatment for Linda?
- (2+½+1½+1 = 5 marks)
5. Draw a neat labeled diagram of the sarcotubular system in skeletal muscle. Mention the source of Ca<sup>2+</sup> and describe its role in skeletal muscle contraction.
- (2+3 = 5 marks)

- 6A. Tabulate three differences between action potential and graded potential.  
6B. Mention the role of voltage gated sodium channels in the generation of nerve action potential.  
(3+2 = 5 marks)

7. Describe how mean arterial blood pressure is maintained in a normal adult upon standing from supine posture.  
(5 marks)

- 8A. Describe the mechanism of inspiration during normal quiet breathing.  
8B. Define residual volume and mention its significance.  
(3+2 = 5 marks)

- 9A. List any two stimuli that initiate acid secretion during the gastric phase of gastric juice secretion. Describe the mechanism of action of any one of them.  
9B. Mention two differences between hepatic bile and gall bladder bile.  
(3+2 = 5 marks)

10. **Give physiological basis for the following:**

- 10A. Reddish purple striae in Cushing's syndrome  
10B. Aldosterone escape phenomenon  
10C. Heat intolerance in hyperthyroidism  
10D. Hyperglycemia in acromegaly  
(1+2+1+1 = 5 marks)

11. A man with untreated diabetes mellitus has a GFR of 125ml/min, plasma glucose concentration of 400 mg/100ml, urinary glucose concentration of 2500 mg/100 ml and urine flow rate of 5 ml/min.  
11A. Why does glucose appear in urine in the above patient?  
11B. Calculate the amount of glucose reabsorbed in this man.  
11C. Describe the mechanism of glucose reabsorption in PCT.  
11D. Give the normal values for renal threshold and renal clearance of glucose.  
(1+1+2+1 = 5 marks)

- 12A. Mention three maternal changes during pregnancy.  
12B. Write briefly on cryptorchidism.  
(3+2 = 5 marks)



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**MANIPAL UNIVERSITY**  
**MBBS PHASE I STAGE I DEGREE EXAMINATION – MARCH 2015**  
**SUBJECT: PHYSIOLOGY – II (MCQs)**

Monday, March 09, 2015

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	1 mark is awarded
For every <b>Wrong</b> response	0.5 mark is deducted
For every <b>Don't Know</b> 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.

### **Albumin**

- 101. Helps in the transport of proteins
- 102. Synthesis is decreased in nephrosis
- 103. Functions as an osmotic regulator
- 104. Is synthesized by B lymphocytes

### **Clotting factor**

- 105. VIII deficiency results in Hemophilia B
- 106. X is activated only by intrinsic pathway of clotting
- 107. II is decreased in liver disease
- 108. X when activated catalyzes conversion of prothrombin to thrombin

### **Lymphocytes**

- 109. Have a role in immunity
- 110. Constitute 50 to 70% of the total leucocytes
- 111. Are characterized by granules in the cytoplasm
- 112. Enter blood stream via lymphatics

### **Vasomotor center**

- 113. Is located in medulla oblongata of brain
- 114. Sends excitatory input through sympathetic nerves to peripheral blood vessels
- 115. Is inhibited by peripheral chemoreceptors
- 116. Receives afferents from baroreceptors

### **Heart rate is increased**

- 117. During expiration
- 118. By thyroid hormones
- 119. When intracranial pressure is elevated
- 120. Due to stimulation of atrial stretch receptors

### **Cardiac output**

- 121. Is the product of stroke volume and heart rate
- 122. Decreases during pregnancy
- 123. Is decreased during exercise in normal individuals
- 124. Increases when intrathoracic pressure becomes more negative
- 125. Is the volume of blood ejected from each ventricle per beat

### **Second heart sound**

- 126. Is heard due to closure of atrioventricular valves
- 127. Coincides with the carotid pulse
- 128. Is shorter in duration compared to first heart sound
- 129. Is produced just after the end of ventricular systole

### **Basic electric rhythm (BER)**

- 130. Is initiated by the interstitial cells of Cajal
- 131. Coordinates peristaltic activity in gastrointestinal tract
- 132. Rate is about 16/min in stomach

### **Colon**

- 133. Absorbs water
- 134. Serves as reservoir for the residues of meals that cannot be digested
- 135. Contains large number of commensal bacteria
- 136. Exhibits mass peristalsis

### **Gastric mucosal barrier**

- 137. Destruction leads to ulcer formation
- 138. Contains bicarbonate as one of its components
- 139. Is disrupted by prostaglandins

### **Menopause is associated with**

- 140. Increase in the number of primordial follicles in ovary
- 141. Unresponsiveness of the ovaries to gonadotropins
- 142. Increased secretion of estrogen and progesterone
- 143. Decreased secretion of FSH

### **Ovulation**

- 144. Is the process of discharge of ovum into the abdominal cavity
- 145. Occurs on the 14<sup>th</sup> day of a 32 day menstrual cycle
- 146. Is inhibited by high prolactin level
- 147. Is initiated by LH surge

### **Colour blindness**

- 148. Is detected by Jaeger's chart
- 149. Results due to an abnormal gene on Y chromosome
- 150. Which results due to absence of red cones is called protanopia
- 151. Occurs in individuals with lesion of optic chiasm

### **Tympanic reflex**

- 152. Is initiated by loud sounds
- 153. Causes outward movement of foot plate of stapes from oval window
- 154. Prevents excessive stimulation of auditory receptors
- 155. Does not protect auditory receptors against brief intense sound produced by gunshots

### **Hypothalamus**

- 156. Is connected to anterior pituitary via hypothalamo-hypophyseal tract
- 157. Secretes thyroid stimulating hormone (TSH)
- 158. Secretes somatostatin
- 159. Synthesizes hormones of posterior pituitary

### **Cortisol**

- 160. Has a permissive action
- 201. In excess is associated with thin extremities
- 202. Decreases RBC count
- 203. Deficiency is characterized by reduced stress tolerance

### **Secretion of insulin is stimulated by**

- 204. Glucose
- 205. Glucagon
- 206. Somatostatin

### **Parathyroid hormone**

- 207. Concentration in blood is increased when plasma calcium level falls
- 208. Increases renal tubular reabsorption of  $Ca^{2+}$
- 209. Inhibits the formation of 1,25-dihydroxycholecalciferol

### **Juxtaglomerular**

- 210. Apparatus consists of macula densa cells
- 211. Cells secrete ADH
- 212. Cells are involved in autoregulation of blood flow to the kidney
- 213. Cells are stimulated by renal sympathetic nerves

### **Factor/s increasing glomerular filtration rate include/s**

- 214. Ureteral obstruction
- 215. Contraction of mesangial cells
- 216. Increased colloidal osmotic pressure in the Bowman's capsule
- 217. Hypoproteinemia

### **Cerebrospinal fluid**

- 218. Is present in the subarachnoid space
- 219. Is secreted by arachnoid granulations
- 220. Composition is similar to that of ECF normally
- 221. Reabsorption when decreased leads to hydrocephalus

### **Lesion of the dorsal column pathway**

- 222. Above the level of medulla results in ipsilateral sensory defects
- 223. Below the level of medulla results in contralateral sensory defects
- 224. Abolishes fine touch sensation
- 225. Results in hemiplegia

### **In the sensory homunculus**

- 226. There is detailed localization of sensory fibers from different parts of the body
- 227. Size of the cortical receiving area for impulses from a particular part of the body is proportionate to the size of that part of the body
- 228. Body is represented in an inverted manner
- 229. Cortical areas for sensations from the back and trunk are very large

### **Cerebellar lesion is/are characterized by**

- 230. Hypotonia
- 231. Complete paralysis
- 232. Diminished pain perception
- 233. Nystagmus

### **Alveolar ventilation**

- 234. Is the amount of air breathed in or out of the lungs in one minute
- 235. Decreases during exercise
- 236. Is less than pulmonary ventilation normally
- 237. Is the product of tidal volume and respiratory rate

### **Infant Respiratory Distress Syndrome is**

- 238. Due to surfactant deficiency in infants at birth
- 239. Characterized by decreased surface tension in the alveoli
- 240. Also called hyaline membrane disease
- 241. Characterized by atelectasis

### **Partial pressure of**

- 242. Oxygen in the arterial blood is 95 mmHg
- 243. Carbon dioxide in the venous blood is 40 mmHg
- 244. Oxygen in the tissues is 104 mmHg
- 245. Carbon dioxide in the alveoli is 40 mmHg

### **Curare**

- 246. Acts by competing with acetylcholine for nicotinic acetylcholine receptors
- 247. Has biological activity like acetylcholine
- 248. Is an example of depolarizing type of blocker

### **Unitary smooth muscle**

- 249. Is made up of individual muscle fibers with no gap junctions
- 250. Behaves as a functional syncytium
- 251. Is found in iris of the eye
- 252. Does not contract in the absence of neural stimulation

### **Parasympathetic stimulation causes**

- 253. Relaxation of bronchial muscle
- 254. Contraction of gall bladder
- 255. Relaxation of detrusor muscle
- 256. Secretion of watery saliva

### **Temperature regulating mechanism/s activated by cold include/s**

- 257. Increased breathing
- 258. Increased secretion of norepinephrine and epinephrine
- 259. Cutaneous vasoconstriction
- 260. Shivering

