Batch-34
March 2015

Reg. No.										

MANIPAL UNIVERSITY

MBBS PHASE I STAGE I DEGREE EXAMINATION – MARCH 2015

SUBJECT: BIOCHEMISTRY – I (ESSAY)

Saturday, March 07, 2015

Time: 09:00 – 11:00 Hrs. Max. Marks: 60

1. Explain in detail the steps of activation, transport and oxidation of fatty acids in the mitochondria.

(7 marks)

2. Write in detail the reactions that produce NADPH in erythrocytes and discuss its role in erythrocytes with suitable biochemical reactions.

(5 marks)

3. **Write short notes on the following:**

3A. Absorption, transport and storage of iron

3B. Substrate level phosphorylation with two examples

(4+3 = 7 marks)

4. Fifty year old Rajesh visited the medicine OPD for his routine health checkup. Doctor advised him to carry out few blood investigations. Reports revealed that he had markedly elevated levels of a lipid in his serum. He was advised to take statin drugs on a regular basis.

4A. Name the lipid elevated in the blood in Rajesh.

4B. Write in detail the reaction inhibited by statin drugs.

4C. With the help of a suitable graph, describe the characteristic features of the type of enzyme inhibition as exhibited by this drug.

(½+1+4½ = 6 marks)

5. Describe the actions of proteolytic enzymes in the small intestine.

(5 marks)

6. Write the reactions of alcohol metabolism and give the biochemical basis for fasting hypoglycemia seen during alcohol intoxication.

(5 marks)

7. Write the Henderson-Hasselbalch equation for bicarbonate buffer. Give the diagrammatic representations of the process of bicarbonate generation in distal tubular cells of kidney using two suitable buffers.

(7 marks)

8. Diagrammatically represent the steps of thyroid hormone synthesis in detail.

(6 marks)

9. An unusually fair child was brought to the hospital with the complaints of mental retardation. Laboratory investigations revealed abnormally high serum phenylalanine level and presence of phenylketones in urine in large amount.

9A. Identify the disorder in the above child.

9B. Explain in detail the biochemical basis for the various findings in the above child.

(½+5½ = 6 marks)

10. **Write short notes on:**

10A. Point mutation with two suitable examples

10B. Post-transcriptional modifications of hnRNA

(3+3 = 6 marks)

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MBBS PHASE I STAGE I DEGREE EXAMINATION – MARCH 2015

SUBJECT: BIOCHEMISTRY – II (MCQs)

Saturday, March 07, 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 **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.

D-Galactose and D-Glucose are

101. Enantiomers
102. C-4 epimers
103. Reducing sugars
104. Linked by α1→6 glycosidic linkage in lactose
105. Aldohexoses

The fatty acid 18:2:9,12

106. Is non-essential
107. Is arachidonic acid
108. Contains two double bonds
109. Contains twelve carbon atoms
110. Is a precursor for prostaglandins

Regarding serum protein electrophoresis

111. Albumin migrates towards the cathode
112. Fibrinogen band appears near the origin
113. Immunoglobulins form a diffuse band at the origin
114. β-γ bridging is seen in multiple myeloma
115. Albumin band appears thinner than normal in nephrotic syndrome

The pyruvate dehydrogenase complex

116. Requires thiamine pyrophosphate
117. Converts pyruvate to acetyl CoA
118. Catalyses a reversible reaction
119. Has pyruvate carboxylase as one of its components
120. Is inhibited by acetyl CoA

Following pairs correctly match the amino acids with the nature of their side chain

121. Alanine: branched chain
122. Serine: acidic
123. Tryptophan: aromatic
124. Lysine: basic
125. Glutamine: imino

In the electron transport chain

126. NADH donates a pair of electrons to complex I
127. CoQ is a part of complex II
128. Oligomycin helps in the entry of protons into the mitochondrial matrix
129. 2,4-dinitrophenol uncouples electron transport from ATP synthesis
130. Complex IV is inhibited by cyanide

Glucose 6- phosphate dehydrogenase

131. Is a mitochondrial enzyme
132. Is induced by insulin
133. Produces ribulose 5-phosphate
134. Provides NADPH for phagocytosis
135. Deficiency causes hemolytic anemia

Among apolipoproteins

136. Apo E is the activator of ACAT
137. Apo AI is the activator of LCAT
138. Apo B-48 is a component of chylomicrons
139. Apo E is required for the binding of chylomicron remnants to hepatic receptors
140. Apo C-II is donated to nascent VLDL by circulating HDL

HMG CoA

141. Is an intermediate in ketogenesis
142. Synthesis requires acetyl CoA
143. Synthesis needs NADPH
144. Reductase is active in its phosphorylated form

Regarding gluconeogenesis

145. It maintains blood glucose level during prolonged fasting
146. Conversion of fructose to glucose is gluconeogenesis
147. Acetyl CoA is a precursor
148. Fructose 2,6-bisphosphate activates the pathway
149. Fructose 1,6-bisphosphatase is a key enzyme

Obstructive jaundice is characterized by

150. Increased serum alkaline phosphatase
151. Predominant increase in plasma unconjugated bilirubin
152. Prolonged prothrombin time
153. Positive Hay's test
154. Clay colored stools

Following pairs correctly match disorders of lipoprotein metabolism with their defects

155. Familial type I hyperlipoproteinemia : LDL receptor defect
156. Familial hypercholesterolemia: Lipoprotein lipase deficiency
157. Wolman's disease: Deficiency of cholesterol ester hydrolase
158. Abetalipoproteinemia: Defective loading of apo B with lipids
159. Familial type III hyperlipoproteinemia: Abnormality in apo E

Basal metabolic rate

160. Represents the energy spent for skeletal muscle contraction
201. Increases with age after puberty
202. Decreases in fever
203. Increases in hyperthyroidism
204. Is proportional to body surface area

Regarding lipases

205. Lingual lipase is active in the stomach
206. Pancreatic lipase hydrolyzes TAG to 2-MAG
207. Lipoprotein lipase is induced by insulin
208. Proenzyme form of phospholipase A_2 is activated by trypsin
209. Hormone sensitive lipase converts phospholipids to lysophospholipids

Diabetic ketoacidosis is characterized by

210. Positive Benedict's test
211. Negative result for Rothera's test
212. Blood pH more than 7.35
213. Serum bicarbonate less than 22 mEq/L
214. Fruity odour in the breath

Cortisol

215. Increases the delivery of amino acids from peripheral tissues to the liver
216. Induces the key enzymes of gluconeogenesis
217. Promotes lipolysis
218. Increases glycogenesis in the liver
219. Has a protein anabolic effect

Regarding the calcium-phosphatidylinositol second messenger system

220. Binding of the hormone to its receptor activates phospholipase C
221. Phosphatidylinositol is converted to inositol trisphosphate and diacylglycerol
222. Diacylglycerol opens calcium channels in the endoplasmic reticulum
223. Inositol trisphosphate activates protein kinase C
224. Glucagon acts through this system

Regarding glycogenolysis

225. It begins at the non-reducing end of glycogen
226. The major end product in liver is glucose
227. The major end product in muscle is glucose 6-phosphate
228. Glycogen phosphorylase breaks the α $(1\rightarrow6)$ linkages
229. Regulation in the muscle is brought about by glucagon

Collagen

230. Synthesis requires copper
231. Synthesis is defective in Ehler Danlos syndrome
232. Is rich in cysteine
233. Type IV is present in the basement membrane
234. Synthesis takes place in cytosol

Enzyme defects that lead to gout include

235. HGPRTase
236. Glucose 6-phosphatase
237. PRPP synthetase
238. Adenosine deaminase

Urea synthesis

239. Takes place in the kidney
240. Requires aspartate
241. Requires ATP
242. Is regulated at the reaction catalyzed by argininosuccinate synthetase
243. Is increased in citrullinemia

In the brain

244. A major portion of glucose is utilized via uronic acid pathwa
245. Glucose is used for the synthesis of fatty acids
246. Hexokinase has a lower Km than the hexokinase of liver
247. Glucose entry is insulin dependent except in the satiety centre
248. Ketone bodies act as a fuel during prolonged starvation

Regarding translation

249. Initiation is facilitated at the Shine-Dalgarno sequence in prokaryotes
250. AUG is a termination codon
251. The first amino acid to be added is glycine in eukaryotes
252. Tetracyclines inhibit termination of translation
253. Release factors cause release of mRNA from DNA
254. Translocation process involves movement of ribosome on mRNA in 5'$\rightarrow$3' direction

During DNA replication

255. Template strand is read in the 5' to 3' direction
256. DNA ligase relaxes supercoils
257. Leading strand is synthesized in the direction of the replication fork
258. RNA primer is synthesized by DNA polymerase I
259. DNA polymerase III has 5' to 3' exonuclease action
260. SSB proteins help in rewinding of parent DNA duplex