Reg. No.										

MANIPAL UNIVERSITY

MBBS PHASE I STAGE I DEGREE EXAMINATION – AUGUST 2012

SUBJECT: BIOCHEMISTRY – I (ESSAY)

Thursday, August 16, 2012

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

1. Draw and explain the Michaelis-Menten plot exhibited by HMG CoA reductase in the presence and absence of statin drugs.

(5 marks)

2. Write a note on lung surfactant and comment on the consequence of its deficiency.

(3 marks)

3. Severe lead poisoning leads to anemia. Justify this statement with biochemical reasons.

(2 marks)

4. Describe the steps of complete oxidation of the end product of aerobic glycolysis.

(9 marks)

5. Discuss the metabolic fate of fatty acids released into circulation after lipolysis in the adipose tissue.

(8 marks)

6. Devadas, a chronic alcoholic from past 10 years, reported to a physician with abdominal pain and jaundice. Liver biopsy showed fatty changes.

6A. Discuss alcohol metabolism in this patient.

6B. Explain the basis for fatty changes in his liver.

(3+3 = 6 marks)

7. Discuss nitrogen balance in detail with suitable examples.

(4 marks)

8. A baby girl was cranky, irritable and demanded food frequently. Blood investigations revealed hypoglycemia, hyperuricemia and hyperlipidemia. Physical examination revealed enlarged liver and liver biopsy showed massive deposition of a particular storage polysaccharide.

8A. Identify the disorder and name the defective enzyme.

8B. Explain with biochemical reasons the causes for changes in blood parameters.

(1+5 = 6 marks)

9. Describe the role of ammonia buffer in the generation of bicarbonate by the distal tubular cells.

(4 marks)

10. A five month old infant was brought to the pediatrician by its mother with complaints of periodic bouts of vomiting and failure to gain weight. She complained about the lethargy and irritability in the infant. Subsequent examination and lab investigations revealed abnormal EEG and high levels of plasma ammonia and glutamine levels. The doctor diagnosed the condition and put the infant on phenylbutyrate treatment.

10A. Describe in detail the reactions of the metabolic pathway affected in this infant.

10B. Explain the biochemical reason for increased plasma ammonia and glutamine levels.

10C. Describe the basis for phenylbutyrate treatment.

(5+2+1 = 8 marks)

11. Describe the process of initiation of prokaryotic transcription.

(5 marks)

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MBBS PHASE I STAGE I DEGREE EXAMINATION – AUGUST 2012

SUBJECT: BIOCHEMISTRY – II (MCQs)

Thursday, August 16, 2012

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.

Adenosine deaminase

101. Converts adenosine to inosine
102. Deficiency decreases the level of dATP
103. Is an enzyme of pyrimidine catabolism
104. Deficiency leads to sudden infant death syndrome
105. Is inhibited by 5-fluorouracil

Replication

106. Is the synthesis of RNA from DNA
107. Involves reading of parent DNA strand in the 5'→3' direction
108. Requires unwinding of DNA strand with the help of helicase
109. Is inhibited by actinomycin D
110. Requires topoisomerases for relaxation of supercoils

Regarding translation

111. Shine-Dalgarno sequence on mRNA is recognized by 30S ribosome
112. Translocation involves movement of ribosome by a distance of one codon on mRNA in 3'→5' direction
113. Elongation is inhibited by puromycin
114. Termination occurs when UAA occupies P site on ribosome

Regarding metabolism in various organs

115. Ketone bodies are the alternative source of energy to the liver during prolonged starvation
116. Brain uses free fatty acids during starvation
117. Glucose utilization in cornea is maximum via the HMP shunt pathway
118. Skeletal muscle uses lactate as the energy source during strenuous exercise

Following pairs correctly match various disorders with their corresponding defects

119.	Refsum's disease	:	Medium chain acyl CoA dehydrogenase
120.	Gilbert's syndrome	:	Defect in UDP glucuronyl transferase I
121.	Hemolytic anemia	:	Deficiency of pyruvate kinase
122.	Pompe's disease	:	Deficiency of glucose 6-phosphatase
123.	Gaucher's disease	:	Deficiency of sphingomyelinase

Regarding vitamin A

124. 11-cis retinol is a component of rhodopsin
125. β-carotene is a source of retinal
126. Retinyl palmitate is stored in the liver
127. Retinoic acid is used for the treatment of acne

Following pairs correctly match the type of thyroid disorders with biochemical findings in blood

128.	Secondary hypothyroidism	:	Decreased level of TSH
129.	Primary hyperthyroidism	:	Increased level of total T_4
130.	Hashimoto's disease	:	Autoantibodies against thyroid gland
131.	Grave's disease	:	Increased plasma cholesterol

Insulin

132. Increases uptake of glucose at satiety centre
133. Resistance leads to type 1 diabetes mellitus
134. Increases lipolysis in adipose tissue
135. Stimulates glycolysis

Following pairs correctly match the various parameters in the blood with their normal values

136.	Fasting glucose	:	60-110 g/dl
137.	Sodium	:	136-145 mEq/L
138.	LDL cholesterol	:	150-220 mg/dl
139.	Total calcium	:	7.35- 7.45 mg/dl

Antioxidants include

140. Ascorbic acid
141. Superoxide dismutase
142. Selenium
143. β-carotene

Limiting amino acid

144. In gelatin is tryptophan
145. Of egg albumin is phenylalanine
146. Is an indicator of biologic value of a protein

Regarding digestion of carbohydrates

147. Pancreatic α-amylase hydrolyses α1→4 bonds present in glycogen and starch
148. Lactase acts on β1→4 glycosidic bond
149. It requires bile acids
150. Stomach is the major site of digestion

Characteristic features of Kwashiorkor include

151. Hair changes
152. Old man's face
153. Fatty liver
154. Edema

Following pairs correctly match the enzymes with their coenzymes

155.	Acyl CoA dehydrogenase	:	NAD^+
156.	Alanine transaminase	:	PLP
157.	Thymidylate synthase	:	Methylcobalamin
158.	Acetyl CoA carboxylase	:	Biotin

Regarding electron transport chain

159. Components are arranged in decreasing order of standard redox potential
160. Ubiquinol is an iron-sulfur protein
201. Complex III contains cytochrome b
202. Cytochrome oxidase contains copper
203. Complex II is inhibited by dinitrophenol

Glucose 6-phosphate dehydrogenase

204. Is a mitochondrial enzyme
205. Activity is high in lactating mammary glands
206. Is an oxidoreductase
207. Is induced by insulin

Enzymes that facilitate substrate level phosphorylation include

208. Succinate thiokinase
209. Pyruvate kinase
210. Glucokinase
211. Phosphoglycerate kinase

Glycolysis

212. Is activated by citrate
213. In erythrocytes yields two molecules of pyruvate as end product for every glucose oxidised
214. Is inhibited by glucagon
215. Is inhibited by fluoride

Among RNAs

216. tRNA binds to amino acid at its 5' end
217. rRNA contains anticodons
218. mRNA contains uracil
219. Small nuclear RNA is needed for post-transcriptional modifications

Regarding starch

220. Amylopectin is branched
221. Answers positive for iodine test
222. Is the storage form of energy in liver
223. Is a heteropolysaccharide

Following pairs correctly match the enzymes with their respective classes

224.	Pyruvate carboxylase	:	ligase
225.	Trypsin	:	hydrolase
226.	Glucokinase	:	transferase
227.	Malate dehydrogenase	:	lyase

Among amino acids

228. Ornithine is an intermediate of urea cycle
229. Glycine is optically active
230. Arginine is basic
231. Alanine is glucogenic

Regarding phospholipids

232. They are derived lipids
233. Phosphatidylinositol is a precursor for second messengers
234. Sphingomyelin is a glycerophospholipid
235. They are amphipathic
236. Lecithin is a lipotropic factor

Folic acid is

237. Required in the synthesis of RNA
238. Richly present in green leafy vegetables
239. Stored in the liver
240. Deficiency causes neural tube defects in foetus

Regarding collagen

241. Every third amino acid is cysteine
242. Hydroxylation of proline requires ascorbic acid
243. Glycosylation includes addition of mannose residues
244. Triple helix is stabilized by hydrogen bonds

Vitamin D

245. Acts through cAMP second messenger system
246. Increases absorption of calcium from intestine
247. Activation is decreased in chronic renal failure
248. Deficiency is characterized by ochronosis

Steroid hormones

249. Are transported in plasma by proteins
250. Include parathyroid hormone
251. Have longer plasma half life than protein hormones
252. Have cell membrane receptors

Chylomicrons

253. On electrophoresis move farthest from the origin
254. Levels in serum are high in type I hyperlipoproteinemia
255. Transport dietary lipids to extrahepatic tissues
256. Have higher protein content than HDL

The following pairs correctly match the lipoproteins with their apolipoproteins

257. High density lipoprotein : Apo B-48
258. Low density lipoprotein : Apo C-II
259. Very low density lipoprotein : Apo B-100
260. Mature chylomicrons : Apo E