BATCH 31

Reg. No.										

MANIPAL UNIVERSITY

MBBS PHASE I STAGE I DEGREE EXAMINATION – AUGUST 2013

SUBJECT: BIOCHEMISTRY – I (ESSAY)

Wednesday, August 14, 2013

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

1. Draw the Lineweaver-Burke plot representing non-competitive inhibition of an enzyme catalysed reaction. Mention FOUR features and give TWO examples for this type of inhibition.

(5 marks)

2. A three year old boy was brought to the OPD of the paediatric unit by his mother because she noticed puffiness around the boy's eyes and ankles. The doctor urgently ordered lab investigation which revealed the following:

Fasting plasma glucose: 85 mg/dL

Plasma albumin: 2.8 g/dL

Plasma total protein: 5.5g/dL

Serum protein electrophoresis showed a thin albumin band and a thick α 2- globulin band.

Urine protein excretion was 4g/24 hour

The doctor put the child on appropriate therapy.

2A. What is the diagnosis?

2B. Give reasons for the clinical and biochemical findings in the child.

(½+3½ = 4 marks)

3. Describe the pathway of heme synthesis in detail and explain how lead poisoning causes anemia.

(5 marks)

4A. Describe the process of iron absorption and its transport in the blood.

4B. Name TWO parameters that are used for assessing the iron status of an individual and give their clinical importance.

(4+2 = 6 marks)

5. Describe β-oxidation of long chain fatty acids.

(7 marks)

6. Write short notes on the following:

6A. Beriberi

6B. Nitrogen balance

(3×2 = 6 marks)

7. Describe with a diagram the mechanism of the calcium – phosphatidylinositol second messenger system.

(4 marks)

8. Ramanand, a 40 year old male complained to his doctor about losing weight in spite of eating well. He was also feeling weak and tired. He was drinking water more often and his frequency of urination had also increased. His blood report revealed the following:

Fasting plasma glucose: 215mg/dL

Postprandial plasma glucose: 302mg/dL

Plasma albumin: 4.0g/dL

HbA1c: 9%

8A. What is the diagnosis?

8B. Explain the biochemical basis for the clinical and laboratory findings in the patient.

(½+4½ = 5 marks)

9A. Explain the role of glycogen in maintaining normal blood glucose levels in the fasting state.

9B. Name TWO glycogen storage disorders affecting the liver and the enzyme deficiencies in those disorders.

(4+2 = 6 marks)

10. How is ammonia detoxified in the liver? List the clinical features of hyperammonemia.

(6 marks)

11. Write short notes on:

11A. Post-transcriptional modifications of hnRNA

11B. Southern blotting

(3+3 = 6 marks)

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MBBS PHASE I STAGE I DEGREE EXAMINATION – AUGUST 2013

SUBJECT: BIOCHEMISTRY – II (MCQs)

Wednesday, August 14, 2013

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 **03 pages**. Please make sure that the question paper provided to you has all the pages.

Regarding amino acids

101. Phenylalanine gives rise to tyrosine
102. Histidine contributes to buffering capacity of blood
103. Alanine is ketogenic
104. Tryptophan is nonessential
105. Valine is excreted in the urine in Hartnup disease

Hemoglobin F

106. Has lower oxygen affinity than HbA
107. Consists of $\alpha_2\beta_2$ subunits
108. Synthesis increases in β-thalassemia
109. Production in the fetus peaks in the first month of gestation

Glucose 6-phosphate dehydrogenase

110. Produces ribulose 5-phosphate as the product
111. Requires NAD^+ as coenzyme
112. Catalyses an irreversible reaction
113. Gene is upregulated by insulin

The pyruvate dehydrogenase complex

114. Is located in the cytosol
115. Is inhibited by acetyl CoA
116. Consists of five enzymes
117. Deficiency causes lactic acidosis
118. Catalyses an oxidative decarboxylation reaction

Deoxyribonucleic acid

119. Consists of two polynucleotide strands
120. Has base pairing between adenine and cytosine
121. Consists of equal number of purines and pyrimidines
122. Replication is semiconservative

The tricarboxylic acid cycle

123. Is a source of energy for mature RBCs
124. Generates 12 ATPs per acetyl CoA oxidised
125. Contributes to the synthesis of nonessential amino acids
126. Has a role in heme synthesis
127. Is regulated by succinate dehydrogenase

The following pairs correctly match the enzymes with their classes

128. Phosphofructokinase: Oxidoreductase
129. Lactate dehydrogenase: Transferase
130. Pyruvate carboxylase: Ligase
131. Phosphoglucomutase: Isomerase

Glycolysis

132. In the presence of oxygen produces two ATPs per glucose oxidised
133. Is stimulated by glucagon
134. Is inhibited by a high ATP/ADP ratio
135. Is accelerated in the presence of fructose 2, 6-bisphosphate
136. Requires niacin derived coenzyme

Enzymes involved in the digestion of dietary lipids include

137. Lipoprotein lipase
138. Cholesterol esterase
139. Hormone sensitive lipase
140. Maltase

Chylomicron/s

141. Are synthesised in the liver
142. Contain apo B-48
143. Increase in blood in Type I hyperlipoproteinemia
144. Remnants contain more cholesterol ester than triglyceride

Acetyl CoA carboxylase

145. Is involved in β -oxidation of fatty acids
146. Is activated by citrate
147. Produces succinyl CoA as the product
148. Catalyses a rate limiting step

Regarding HDL

149. It transfers apo C-II to VLDL
150. In the nascent form contains phospholipids
151. Cholesterol taken up by it is esterified by cholesterol esterase
152. Its concentration in blood is inversely proportional to risk of myocardial infarction

The following blood parameters are used as predictors of coronary artery disease

153. Total cholesterol
154. Lp(a)
155. Conjugated bilirubin
156. hsCRP

The following pairs correctly match the enzymes with their coenzymes/cofactors

157. Succinate dehydrogenase: NAD^+
158. Aspartate transaminase: PLP
159. Transketolase: Biotin
160. Xanthine oxidase: Molybdenum

Gluconeogenesis

201. From lactate takes place in the muscle
202. Is increased in the presence of insulin
203. From pyruvate requires phosphoenolpyruvate carboxykinase
204. From propionyl CoA requires vitamin B_{12}

Vitamin C

205. Requirement per day is 60 mg in adults
206. Is required for hydroxylation of lysine residues during collagen synthesis
207. Is absorbed from the small intestine through chylomicrons
208. Is involved in the synthesis of epinephrine
209. Deficiency leads to bleeding gums

Biochemical indicators of post-hepatic jaundice include

210. Increase in serum conjugated bilirubin
211. Elevated serum alkaline phosphatase
212. Dark coloured stools
213. Prolonged prothrombin time

Detoxification of ethyl alcohol

214. Takes place in the liver
215. Releases energy
216. Requires niacin derived cofactor
217. Produces acetaldehyde as an intermediate

During thyroid hormone synthesis

218. Thyroglobulin is iodinated at tyrosine residues
219. T_4 is formed by deiodination of T_3
220. Thyroperoxidase oxidises I^- to I^+
221. TSH increases the hydrolytic release of T_4

Cholera toxin

222. Catalyses ADP ribosylation of α subunit of Gs protein
223. Binds to GM_1 ganglioside on the intestinal mucosal membrane
224. Increases cAMP levels in the intestinal mucosal cell

Glucagon

225. Increases lipolysis in the adipose tissue
226. Inhibits glycogenolysis in the liver
227. Activates glycolysis
228. Levels peak in blood one hour after a meal

Vitamin D

229. Is abundantly found in cod liver oil
230. Active form is 1, 25 – dihydroxy cholecalciferol
231. Activation is stimulated by PTH
232. Causes increased excretion of phosphate in the urine

Collagen

233. Is a glycoprotein
234. Contains lysine to the extent of 33%
235. Molecule is a double helix
236. Synthesis requires copper

The normal serum level of

237. Bicarbonate is 30-34 mEq/L
238. Urea is 15-45 g/dL
239. Calcium is 9-11 mg/dL
240. HDL cholesterol is 15-25 mg/dL

The following pairs correctly match the disorders with the enzyme deficiencies

241. Tay-Sach's disease: Sphingomyelinase
242. Gaucher's disease: β-Glucosidase
243. von-Gierke's disease: Glucose 6-phosphatase
244. Lesch-Nyhan syndrome: PRPP synthetase

Important compounds derived from glycine include

245. Dopamine
246. Adenine
247 Glutathione
248. Heme

In Wilson's disease

249. Plasma ceruloplasmin is increased
250. Dietary copper absorption is impaired
251. Copper accumulates in the liver
252. There is lenticular degeneration

Prokaryotic RNA polymerase

253. Synthesises RNA in the 5'→ 3' direction
254. Incorporates uracil complementary to guanine of the template strand
255. Core enzyme contains rho factor
256. Holo enzyme recognises promoter regions on the DNA

Regarding codons

257. Changing UUU to UUC causes a silent mutation
258. One codon codes for a single amino acid
259. The codon is read in the 5'→3' direction
260. Changing of UAA to UCA results in nonsense mutation