Reg. No.										

MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

MBBS PHASE I, STAGE I DEGREE EXAMINATION – AUGUST 2005

SUBJECT: BIOCHEMISTRY – I (ESSAY)

Thursday, August 18, 2005

Time: 2 Hours | Max. Marks: 60

- **Answer ALL questions.**
- **Write brief, relevant and legible answers. Draw diagram, flow charts wherever appropriate.**

1A. With the help of a suitable graph explain the effect of substrate and temperature on enzyme activity.

1B. Draw and explain the serum electrophoretic pattern in cirrhosis of liver and nephrotic syndrome

(5+5 = 10 marks)

2. A laborer working in a lead factory for the past 15 years was admitted to the hospital with the complaints of acute abdominal pain and neuropsychiatric symptoms. Investigations revealed decrease in RBC count and increase in reticulocyte count. Urine sample contained high amounts of aminolevulinic acid.

Write in detail the pathway that is affected in the above condition and add a note on its regulation. Indicate the enzymes that are affected by lead.

(7 marks)

3. Write briefly on chemiosmotic hypothesis of oxidative phosphorylation

(3 marks)

4. Miranda 58 year old company executive, a known hypertensive and diabetic weighing 98kgs was brought to the hospital with severe chest pain and sweating. ECG showed abnormal pattern. Biochemical investigations revealed increased serum LDL cholesterol level.

What is your diagnosis? How increased LDL cholesterol concentration will lead to the above condition?

(6 marks)

5. Describe the metabolism of lipoprotein concerned with the transport of dietary triglycerides to the extrahepatic tissues. Add a note on disorders associated with the metabolism of the above lipoprotein.

(6 marks)

6. Write the biochemical basis for fatty liver and starvation hypoglycemia seen during alcohol intoxication.

(5 marks)

7. A five day old newborn upon examination by the neonatologist was found to have yellowish discoloration of skin, sclera and mucous membrane.
What is your diagnosis? Write in detail the pathway that is responsible for yellowish discoloration.

(3 marks)

8. Explain the mechanism of action of thyroid hormones. List four biochemical differences between primary hypothyroidism and primary hyperthyroidism

(6 marks)

9. With the help of a schematic diagram explain the effect of glucagon and insulin on glycogen synthase

(3 marks)

10. A four month old child began to vomit occasionally, ceased to gain weight and became drowsy. Within few days the child started getting convulsions. Analysis of urine showed high amounts of glutamine and blood ammonia levels were found to be elevated. Symptoms improved upon treatment with sodium benzoate

10A. Write in detail the pathway that is affected in the above condition.

10B. What is the biochemical basis for the treatment?

(6 marks)

11. Discuss the process of activation and initiation of translation.

(5 marks)

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MBBS PHASE I STAGE I DEGREE EXAMINATION – AUGUST 2005

SUBJECT: BIOCHEMISTRY – II (MCQs)

Thursday, August 18, 2005

Time: 1 Hour | 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.

Glycogen

101. Is made up of repeating units of glucose
102. Has both α 1,4and β 1,4 glycosidic linkages
103. Stored in liver helps to maintain blood glucose level during starvation
104. Reacts with iodine to give red color

The following pairs correctly match the amino acids with their classification :

105. Glycine : neutral
106. Aspartate: acidic
107. Lysine: purely ketogenic
108. Tryptophan: aromatic

Fatty acid 20:4:5,8,11,14

109. Has twenty carbon atoms
110. Has five double bonds
111. Is an essential fatty acid
112. Is a lipotropic factor

The immunoglobulin

113. IgG has two gamma chains and two lambda chains
114. IgA crosses the placenta
115. IgE has one each of kappa and lambda chain
116. IgM has both intra and interchain disulfide linkages

DNA

117. In human cells is a triple stranded helix under normal physiological conditions
118. Has uracil specifically pairing with adenine through two hydrogen bonds
119. Has a hydrophobic interior made up of deoxyribose and phosphate
120. Is located in the nucleus

Study the following reaction of glycolysis and respond to the statements

Fructose 6 phosphate------>x

121. The reaction is catalyzed by a transferase
122. Citrate is an allosteric activator for the above reaction
123. X is an allosteric activator of pyruvate kinase
124. The reaction is allosterically inhibited by fructose 2,6 bisphosphate

The pentose phosphate pathway

125. Is important for the integrity of RBC membrane
126. Produces NADPH required for the synthesis of cholic acid
127. Occurs in the mitochondria

Cobalamin

128. Is richly present in green leafy vegetables
129. In its coenzyme form is required for the synthesis of glucose from propionyl CoA
130. Deficiency leads to homocystinuria

Pyruvate dehydrogenase complex

131. Is located in the mitochondria
132. Is active in phosphorylated form
133. Activity is less in beriberi
134. Is inhibited by NAD

Regarding electron transport chain (ETC)

135. The redox potential is more for succinate dehydrogenase than cytochrome oxidase
136. Electrons move from oxygen to NADH
137. The chemical energy liberated in the oxidation of succinate and malate produces the same number of ATP molecules

With respect to hemoglobin

138. Increase in pH shifts the oxygen dissociation curve to the left
139. 2,3 BPG binds more tightly to HbF than HbA
140. Carbon monoxide has more affinity for Hb than oxygen

Synthesis of tyrosine from phenylalanine requires

141. Requires oxygen
142. FAD
143. Tetrahydrobiopterin
144. Tyrosine hydroxylase
145. Water

Dopamine

146. Is an excitatory neurotransmitter
147. Synthesis requires PLP
148. Deficiency leads to pheochromocytoma

Ketone bodies

149. Are synthesized in the hepatic mitochondria
150. Cannot be utilized by extrahepatic tissues because of the absence of thiophorase
151. Are detected in urine by rothera's test
152. Include acetoacetate

Regarding metabolism of purine nucleotides

153. Denovo synthesis of purine requires lysine, asparagine and tetrahydrobiopterin
154. Complete deficiency of HGPRTase causes Lesch-Nyhan syndrome
155. Catabolic product of purine nucleotides is uric acid
156. PRPP synthetase is the regulatory enzyme of purine catabolism

A mutation resulting in a codon CUU (leucine) changing to AUU (isoleucine) is a

157. Silent mutation
158. Point mutation
159. Transversion type

The following pairs correctly match the enzymes with their inhibitors

160. Allopurinol : xanthine oxidase
201. Rifampicin: DNA polymerase III
202. Streptomycin: peptidyl transferase

Synthesis of glucose from

203. Glycerol takes place in adipose tissue
204. Lactate takes place partly in the cytosol and partly in the mitochondria
205. Pyruvate is defective in von-Gierke's disease
206. Lysine requires GTP
207. Alanine requires PLP

Bilirubin which

208. Causes kernicterus is unconjugated
209. Predominantly increases in post hepatic jaundice is conjugated
210. Is excreted in urine is unconjugated

Regarding vitamins

211. Biotin is required for carboxylation reaction
212. Absorption of pantothenic acid requires chenodeoxycholic acid
213. Niacin deficiency causes pellagra
214. Coenzyme form of riboflavin is required for the biosynthesis of urea from ammonia

Marasmus is characterized by

215. Moon face
216. Hyperalbuminemia
217. Fatty liver

Regarding digestive enzymes

218. Colipase is a protein present in gastric secretion
219. Pepsin is an endopeptidase which functions optimally at pH1-2
220. Pancreatic lipase is activated by bile pigment
221. Trypsin is an exopeptidase
222. The action of carboxypeptidase yields monosaccharide as the end product

As the blood level of glucagon increases, there is subsequent

223. Decrease in liver glycogenolysis
224. Activation of liver adenylate cyclase
225. Increase in muscle glycogenolysis
226. Increase in fructose 2,6 bisphosphate

Concerning the pH regulation by the kidney

227. H^- ions are secreted in to the renal tubules in exchange for Na^+
228. Bicarbonate ions are produced by carbonic acid anhydrase in the renal tubular cells
229. H^+ are removed from the renal tubular lumen by buffering action of ammonia

Concerning vitamin D

230. Its active principle is 24,25 dihydroxycholecalciferol
231. It increases the reabsorption of calcium from the kidney
232. Renal 1 α hydroxylase activity is enhanced by parathormone
233. Its deficiency in adults leads to keratomalacia

Uncompensated metabolic acidosis is characterized by

234. Increase in plasma bicarbonate
235. HCO_3^- to carbonic acid ratio of 20:1

Creatine kinase

236. Activity in plasma peaks much later than LDH activity following a myocardial infarction
237. Isoenzyme of the heart is structurally is.identical to that in skeletal muscle and brain
238. Is a trimer

Concerning hormone and cell signaling

239. Inhibition of phosphodiesterase leads to decreased level of cAMP
240. Aldosterone uses cGMP as second messenger
241. Cholera toxin causes ADP ribosylation of α-s subunit
242. Inositol 1,4,5 trisphosphate enhances the release of calcium from endoplasmic reticulum

Regarding cholesterol

243. HMG CoA reductase catalyses the rate limiting reaction
244. The synthesis of mevalonate is competitively inhibited by lovastatin
245. Its plasma levels are increased in hyperthyroidism
246. Formation of cholic acid from cholesterol decreases in scurvy

Regarding de novo synthesis of fatty acids

247. Citrate is an allosteric inhibitor of acetyl CoA carboxylase
248. It is a pathway for the synthesis of linoleic acid
249. The intermediates are bound to coenzyme A
250. Requires NADPH

Regarding lipoproteins

251. Lipoprotein lipase deficiency results in increased plasma levels of chylomicrons and VLDL
252. Lipoprotein lipase is activated by apo CII
253. Degradation of VLDL results in the formation of HDL
254. Hepatic uptake of chylomicron remnant is mediated through apoE

Concerning fatty acid oxidation

255. Acyl CoA dehydrogenase is activated by hypoglycin
256. Complete oxidation of palmitic acid produces a net of 129ATPs
257. Refsum's disease is due to the deficiency of CAT-1
258. Creatine is required for the transport of activated fatty acids from the cytosol to the mitochondria

Vitamin C

259. Is required for the hydroxylation of proline during the maturation of collagen
260. Enhances the absorption of iron