Reg. No.										

MANIPAL ACADEMY OF HIGHER EDUCATION

(Deemed University)

MBBS PHASE I, STAGE I DEGREE EXAMINATION – FEBRUARY 2005

SUBJECT: BIOCHEMISTRY – I (ESSAY)

Wednesday, February 16, 2005

Time: 2 Hours Max. Marks: 60

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

1. When an unknown compound was added to an enzyme catalyzed reaction mixture, it caused inhibition of the reaction with an increase in Km value of the enzyme.

1A. Identify the type of inhibition caused by the unknown compound. Justify your answer.

1B. Draw the Lineweaver-Burke plot for the above type of inhibition.

1C. Name ***two*** drugs that act through the above mechanism and the enzymes inhibited by them.

(1+2+2 = 5 marks)

2. Draw and label the general structure of an immunoglobulin.

(3 marks)

3. Classify phospholipids giving ***two*** examples for each class. Name the predominant phospholipid in the lung surfactant and give its function.

(3 marks)

4. Describe the importance of glucose 6-phosphate dehydrogenase (G6PD) in the erythrocytes.

(3 marks)

5. What is plasma total iron-binding capacity (TIBC)? What is its clinical significance?

(2 marks)

6. What is the significance of citric acid cycle?

(5 marks)

7. Write the sequence of reactions that oxidize palmitic acid.

(6 marks)

8. Write a note on the regulation of cholesterol biosynthesis.

(2 marks)

9. Ali, a worker in the local factory, was brought to the emergency department one night in an unconscious state. Doctor on duty noticed alcohol smell in his breath and immediately sent his blood for glucose estimation, which was found to be 30 mg/dl. His friends told the doctor that he was a chronic alcoholic and on physical examination, the doctor found that Ali had hepatomegaly.

Describe the biochemical basis of the findings in Ali.

(5 marks)

10. Give biochemical reasons for the following:

10A. Intake of milk by a person with lactose intolerance leads to flatulence, abdominal cramps and diarrhea

10B. In patients with obstructive jaundice, bilirubin is found in the urine but urobilinogen is absent

(2+2 = 4 marks)

11. A patient was admitted to the hospital in a state of coma with a fruity odor in his breath. The doctor came to know from the patient's relatives that he had not taken his regular insulin injections for the past three days. Blood investigations revealed the following:
Glucose: 560 mg/dl
pH: 7.15
HCO_3^-: 15 mmol/l
pCO_2: 40 mm Hg

12. What is your diagnosis? Explain the clinical and biochemical findings in this patient.

(5 marks)

13. With the help of diagrams, describe the functioning of adenylate cyclase second messenger system.

(6 marks)

14A. Outline the importance of phenylalanine in the human body.

14B. Mention the biochemical defect and its consequences in classical galactosemia.

(3+3 = 6 marks)

15. Describe the steps involved in polymerase chain reaction (PCR) with the help of diagrams. Mention the applications of this technique.

(5 marks)

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MBBS PHASE I STAGE I DEGREE EXAMINATION – FEBRUARY 2005

SUBJECT: BIOCHEMISTRY – II (MCQs)

Wednesday, February 16, 2005

Time: 1 Hour Max. Marks: 120

INSTRUCTIONS

1. For each statement, select **T** (True) or **F** (False) as your choice.
1. 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.

Conjugate proteins

101. Contain a non protein prosthetic group attached to the protein part
102. Include myoglobin
103. Possess a tertiary structure

The alpha helix

104. Is the predominant secondary structure in hemoglobin
105. Is stabilized by disulfide bonds
106. Contains the R groups of the amino acid residues projecting outwards

Maltose

107. Is a reducing disaccharide
108. Contains glucose and galactose
109. Is formed during digestion of starch

Heparin

110. Is an intracellular glycosaminoglycan
111. Is necessary for coagulation of blood
112. Consists of repeating units of glucose and fructose

Deoxyribonucleic acid

113. Contains long chain of ribonucleotides linked by phosphodiester bonds
114. Is stabilized by base pairing between adenine and uracil
115. Double helix contains ten base pairs per turn

Following pairs correctly match the enzymes with the classes to which they belong

116. Glucokinase : Transferase
117. Pyruvate carboxylase : Lyase
118. Alanine transaminase : Oxidoreductase

Albumin

119. Normal level in plasma is 3.5-5 mg/dl
120. Band appears thicker than normal on electrophoresis of serum from a patient with nephrotic syndrome
121. Transports fatty acids in blood
122. Binds to unconjugated bilirubin

Glycolysis

123. In aerobic condition, yields a net of 2 ATPs per molecule of glucose oxidized
124. In the erythrocytes cannot proceed unless the pyruvate produced is converted to lactate
125. Is inhibited by increased intracellular levels of citrate
126. Is regulated at the reaction catalyzed by fructose 1,6-bisphosphatase
127. Is the source of a compound that is necessary for unloading of oxygen from hemoglobin

In acute intermittent porphyria

128. There is excessive formation of heme
129. The patient exhibits photosensitivity

Cobalamin

130. Is richly present in green leafy vegetables
131. Is required for synthesis of methionine from homocysteine
132. Deficiency causes microcytic hypochromic anemia

Regarding the electron transport chain

133. Complex I contains a coenzyme derived from riboflavin
134. Complex III has greater redox potential than complex IV
135. Electrons from coenzyme Q are accepted by cytochrome oxidase
136. The P:O ratio for NADPH is 3
137. Cyanide uncouples oxidation from phosphorylation

Hemoglobin

138. Has a buffering action in the erythrocytes
139. Contains heme attached to the proximal histidine
140. S contains two alpha and two delta chains
141. F has higher oxygen affinity then hemoglobin A
142. Oxygen dissociation curve is shifted to the right by lower pH

Low density lipoprotein (LDL)

143. Supplies cholesterol to extrahepatic tissues
144. Is recognized by cells through apo B-48 receptors
145. Migrates fastest towards the anode during electrophoresis of lipoproteins
146. Level in blood is increased in patients with abetalipoproteinemia
147. In the oxidized form is taken up by macrophages through scavenger receptors

After a myocardial infarction, serum level of

148. Lactate dehydrogenase-1 increases to a peak value within 24 hours
149. CK-MB starts increasing after 48 hours

Ascorbic acid

150. Is synthesized in the human body from the uronic acid pathway
151. Is required for posttranslational modification of collagen
152. Deficiency results in nyctalopia

Regarding de novo synthesis of fatty acids

153. Acetyl CoA carboxylase is active in its polymeric form
154. Fatty acid synthase complex produces linoleic acid as the end product

Triacylglycerol

155. Synthesized in the liver is transported to other tissues by chylomicrons
156. In the adipose tissue is hydrolyzed by lipoprotein lipase

Basal metabolic rate is

157. The amount of heat produced by the body during muscular exercise
158. Increased by triiodothyronine

Regarding proteins in nutrition

159. Egg albumin has high biological value since it contains sufficient amounts of alanine and tyrosine
160. Positive nitrogen balance is seen during pregnancy

Following pairs correctly match the vitamins with their deficiency manifestations

201. Pantothenic acid : Cheilosis
202. Niacin : Dermatitis
203. Thiamine : Spongy and bleeding gums

Trypsin

204. Is converted to trypsinogen by enteropeptidase
205. Cleaves peptide bonds on the carboxyl side of aromatic amino acids
206. Is secreted by the parietal cells

Glycocholic acid is

207. Synthesized in the liver from cholesterol
208. Necessary for the absorption of vitamin E
209. Converted to deoxycholic acid by 7 α-hydroxylase

Gluconeogenesis from

210. Alanine takes place partly in the cytosol and partly in the mitochondria of muscle cells
211. Glycerol requires the action of phosphoglycerate kinase
212. Glutamate does not occur in patients with von-Gierke's disease
213. Lysine occurs in the liver

Bilirubin

214. Is formed in the reticuloendothelial cells
215. Is conjugated to glucuronic acid in the kidney
216. Level in plasma does not exceed 1 mg/dl under normal conditions

Bicarbonate

217. Is the most important urinary buffer
218. Buffer system has a base to acid ratio of 20:1 in plasma
219. Reclamation is defective in lactic acidosis

Plasma urea level

220. In normal persons is in the range of 0.7-1.5 mg/dl
221. Is increased in acute glomerulonephritis
222. Is dependent on the muscle mass of the individual

Ammonia is

223. A good buffer in the blood
224. Released from glutamine by glutaminase

Glycogen

225. In the muscle is depleted during starvation
226. Synthase is activated by insulin
227. Phosphorylase is active in the phosphorylated form
228. Accumulates in the liver in McArdle's disease

Collagen

229. Contains lysine in every third position
230. Is stabilized by covalent cross-links between proline residues
231. Synthesis is defective in rickets

Insulin

232. Is secreted from the pancreas as preproinsulin
233. Receptor is capable of autophosphorylation
234. Increases uptake of glucose by erythrocytes

Regarding thyroid hormone synthesis

235. Uptake of iodide by the thyroid is stimulated by perchlorate
236. Coupling of iodotyrosyls takes place in the colloid

In Cushing's syndrome due to a

237. Pituitary cause, plasma cortisol level is increased in the evening
238. Adrenal carcinoma, administration of a high dose of dexamethasone does not suppress cortisol secretion

Dopamine

239. Is an excitatory neurotransmitter in the brain
240. Synthesis increases in Parkinson's disease
241. Synthesis from tyrosine requires PLP

Sources of ammonia in the body include

242. Urea cycle reactions
243. Bacterial action in the intestine
244. Transamination of glutamate

Retinoic acid

245. Is responsible for maintenance of epithelium of respiratory tract
246. Is richly found in green leafy vegetables
247. Binds to membrane receptors in target organs

Phenylketonuria is

248. Caused by deficiency of tryptophan hydroxylase
249. Characterized by the smell of burnt sugar in urine
250. Characterized by excessive pigmentation of skin

Purine salvage pathway

251. Converts hypoxanthine into AMP
252. Requires N^{10}-formyl tetrahydrofolate
253. Is defective in Lesch-Nyhan syndrome

During replication

254. Origin of replication is recognized by sigma factor
255. DNA polymerase I synthesizes the primer
256. Topoisomerases relax supercoils
257. Leading strand is synthesized as Okazaki fragments
258. DNA polymerase III proofreads the newly synthesized DNA strand

During translation

259. Amino acid is attached to the tRNA at the anticodon loop
260. The codon UAG codes for phenylalanine

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