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MANIPAL UNIVERSITY
MBBS PHASE I STAGE I DEGREE EXAMINATION – FEBRUARY 2014
SUBJECT: BIOCHEMISTRY – I (ESSAY)
 Wednesday, February 12, 2014

Time: 09:00 – 11:00 Hrs.

Max. Marks: 60

1. List and explain the biochemical findings in nephrotic syndrome. (3 marks)

2. Describe the synthesis and activation of the vitamin necessary for prevention of rickets. (3 marks)

3. A 40 year old woman visited her doctor with complaints of excessive weight gain, lethargy, constipation, cold intolerance and extremely dry skin. Her heart rate was found to be decreased. Her lab reports showed markedly elevated TSH with very low levels of T_3 and T_4 .
 - 3A. What is the diagnosis?
 - 3B. Describe with the help of a diagram, the biosynthesis of the hormone deficient in this patient. ($\frac{1}{2} + 5\frac{1}{2} = 6$ marks)

4. Explain the clinical importance of glycated hemoglobin measurement. (2 marks)

5. Explain the biochemical basis of the following:
 - 5A. Sodium benzoate and phenylbutyrate are used in the treatment of hyperammonemia.
 - 5B. Hypopigmentation and mental retardation are seen in phenylketonuria. (3+3 = 6 marks)

6. Give the steps in the synthesis of cDNA from an mRNA with the help of diagrams. (3 marks)

7. Describe the characteristic features of gout. Classify metabolic gout with one example for each class. (4 marks)

8. Describe the effect of substrate concentration on an enzyme catalyzed reaction with the help of a graph. Define K_m and mention how it varies in different types of enzyme inhibition. (4 marks)

9. Give the composition and functions of any two phospholipids. (3 marks)

10. Explain with a diagram how transport of electrons through the ETC is coupled to ATP synthesis in the inner mitochondrial membrane.

(3 marks)

11. A two year old boy presented to the emergency department with a one day history of malaise and irritability. His parents had noticed yellowish discoloration of his sclera and dark-colored urine. He had eaten fava beans two days ago. Laboratory investigations revealed low hemoglobin level in blood and presence of hemoglobin in urine. A peripheral smear showed presence of Heinz bodies in erythrocytes.

11A. What is the diagnosis?

11B. Explain the biochemical basis of the different clinical and laboratory findings mentioned in the above case.

($\frac{1}{2} + 5\frac{1}{2} = 6$ marks)

12. Write the steps of the pathway that oxidizes long chain fatty acids to yield energy. Add a note on its regulation.

(8 marks)

13. Justify the following statements with biochemical reasons.

13A. 2, 3-bisphosphoglycerate has an important role in erythrocytes.

13B. A balanced diet should contain adequate amounts of fibre.

13C. Alcohol intoxication causes hypoglycemia and lactic acidosis.

($3 \times 3 = 9$ marks)



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MANIPAL UNIVERSITY

MBBS PHASE I STAGE I DEGREE EXAMINATION – FEBRUARY 2014

SUBJECT: BIOCHEMISTRY – II (MCQs)

Wednesday, February 12, 2014

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.

Histidine

101. Acts as a buffer at physiologic pH
102. In its zwitterion form carries a net positive charge
103. Is a component of glutathione
104. On decarboxylation forms histamine

The α -helix

105. Consists of R groups of amino acid residues projecting outwards from the central axis
106. Is stabilized by ionic linkages
107. Is the major secondary structure in hemoglobin
108. Is disrupted by the presence of proline in the polypeptide

Glycosaminoglycan/s

109. Chondroitin sulfate contains fructosamine
110. Give a slippery consistency to mucous secretions
111. Are responsible for the resilience of cartilage
112. Heparin promotes blood coagulation

The immunoglobulin

113. IgM is the primary response to an antigen
114. IgE is synthesized in the fetus
115. IgG binds to antigen in the variable region of heavy and light chains
116. IgA is present in tears

Heme synthesis is

117. Regulated by ALA synthase in the liver
118. Inhibited by lead
119. Decreased by administration of phenobarbitone
120. Decreased in jaundice

Glycolysis in the erythrocytes

121. Is the only source of energy?
122. Produces lactate to regenerate the NAD^+
123. Yields a compound necessary for unloading oxygen from hemoglobin
124. Is inhibited by cyanide

Regarding investigations of iron status

125. Total iron binding capacity (TIBC) is decreased in iron deficiency
126. Serum transferrin is increased in pregnancy
127. Serum ferritin is decreased in iron overload
128. Serum iron levels are decreased in hemolytic anemia

Regarding the results of lipid profile of a patient which states, Total cholesterol = 350 mg/dL, HDL-cholesterol = 30 mg/dL and LDL-cholesterol = 270 mg/dL

129. The patient has a high risk of developing coronary heart disease

130. The patient has high level of the lipoprotein responsible for reverse cholesterol transport
131. Administration of lovastatin will be beneficial to this patient

The lipoprotein that transports dietary lipids in blood

132. Contains apo B-100
133. Exchanges apo C-II with circulating HDL
134. Is acted upon by hormone-sensitive lipase in adipose tissue
135. Is seen in the fasting serum sample of a healthy individual

Regarding diagnostic markers in serum for myocardial infarction

136. CK-MB levels start increasing 12-24 hours after onset of chest pain
137. LDH-1 levels reach a peak around 12 hours after the infarction
138. Cardiac troponin I levels remain elevated for upto a week after the infarction
139. Myoglobin is specific for damage to heart muscle

De novo synthesis of fatty acids

140. In the liver is regulated by acetyl CoA carboxylase
141. Produces oleic acid as the end product
142. Requires NADPH from the HMP shunt
143. Requires pantothenic acid

Cholesterol biosynthesis

144. Requires acetyl CoA
145. Is regulated by cellular cholesterol levels
146. Is increased by insulin
147. Occurs in mitochondria

Sickle cell disease

148. Is caused by a nonsense mutation in the β globin gene
149. Is characterized by chronic hemolytic anemia
150. Results in polymerization of hemoglobin in the oxygenated state
151. In the fetus is detected using RFLP analysis

ω -3 fatty acids

152. Include linoleic acid
153. Decrease serum LDL-cholesterol level
154. Suppress cardiac arrhythmias
155. Are richly found in fish oils

Lactose intolerance

156. Of the primary type is seen in infants

- 157. Results in increase in breath hydrogen after consumption of lactose
- 158. Occurs secondarily due to gastroenteritis
- 159. Patients will benefit from consumption of yogurt instead of milk

In the differential diagnosis of jaundice

- 160. Markedly elevated serum ALT and AST are suggestive of pre-hepatic jaundice
- 201. Mild increase in serum ALP occurs in hepatic jaundice
- 202. Bilirubin is present in urine in obstructive jaundice
- 203. Clay colored stools are characteristic of post-hepatic jaundice

Cyclic AMP

- 204. Synthesis is increased by TSH
- 205. Levels in the intestinal mucosal cells are decreased by cholera toxin
- 206. Causes inhibition of glycogen phosphorylase
- 207. Is degraded by phosphoprotein phosphatase
- 208. Binds to the catalytic subunits of protein kinase A

A patient with a fasting plasma glucose value of 195 mg/dL and post prandial plasma glucose value of 269 mg/dL

- 209. Is diagnosed with diabetes mellitus
- 210. Will show a negative Benedict's test with urine
- 211. Has decreased hepatic glucose output
- 212. Shows increased uptake of glucose by adipose tissue

Cushing's syndrome

- 213. Is caused by excessive therapeutic use of corticosteroids
- 214. Patient will show decreased plasma cortisol in an evening sample
- 215. Results in accumulation of fat in the face and trunk regions
- 216. Caused by an adrenocortical tumour results in high plasma ACTH level

Collagen

- 217. Present in the bone forms fibrils
- 218. Triple helix is stabilized by disulfide linkages
- 219. Synthesis requires ascorbic acid
- 220. Synthesis is defective in osteomalacia
- 221. Type IV forms a meshwork in basement membranes

Glycogen storage disorder/s

- 222. Von Gierke's disease is characterized by increased blood lactate levels
- 223. Affecting the muscle result in fasting hypoglycemia
- 224. Type III is characterized by accumulation of glycogen with very few branches
- 225. McArdle's disease results in excretion of myoglobin in urine

Metabolic acidosis with normal anion gap

- 226. Is seen in ketoacidosis
- 227. Is compensated by hyperventilation
- 228. Occurs due to acetazolamide therapy
- 229. Occurs in renal failure

Serum creatinine levels

- 230. Normally range between 15-45 mg/dL
- 231. Are increased in acute renal failure
- 232. Are higher in children than in adults
- 233. Increase after intake of a protein-rich meal

Serotonin

- 234. Is synthesized from tyrosine
- 235. Acts as an excitatory neurotransmitter
- 236. Synthesis is increased in pheochromocytoma
- 237. Is degraded by monoamine oxidase
- 238. Synthesis requires tetrahydrobiopterin

Regarding obesity

- 239. Android type is associated with increased amount of visceral fat
- 240. Abdominal obesity increases the risk of insulin resistance
- 241. It is defined as a body mass index greater than 30
- 242. Leptin released from adipose tissue increases the appetite

Cerebrospinal fluid.

- 243. Appears yellowish in normal conditions
- 244. Glucose level is increased in tuberculous meningitis
- 245. Protein level is decreased in bacterial meningitis
- 246. Protein level is same as that in plasma

The process of replication

- 247. Begins at a single origin in eukaryotes
- 248. Requires the unwinding of DNA by helicase
- 249. In the leading strand is carried out by DNA polymerase III in prokaryotes

250. Of mitochondrial DNA is carried out by Pol α in eukaryotes

251. In prokaryotes is inhibited by rifampicin

Post-transcriptional modifications undergone by eukaryotic mRNA include

252. Addition of a CCA sequence to the 3' end

253. Removal of exon sequences

254. Addition of 7-methylguanosine cap to the 5' end

255. Modification of bases to form unusual bases

During translation

256. The tRNA with formylmethionine binds to the P site in the ribosome

257. Peptidyltransferase forms peptide bonds

258. The ribosome moves a distance of three nucleotides at a time along the mRNA

259. A given tRNA binds only to its specific amino acid

260. Presence of the codon AUG in the A site results in termination

