Structural Biochemistry final exam questions

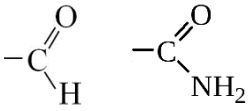
Medicine II (summer session, 2018-2019)

NOTE: Students shoud know the structures of the chemical compounds that are mentioned in the questions

1. Choose from the list the non-metal macroelements:
2. In which molecules hydrogen bonds can form?
3. Select from listed microelements the metals:
4. Select from listed microelements the non-metals:
5. Select from the list the essential microelements:
6. Select the biomacromolecules:
7. Select the biomolecules which contain the functional group –COOH:
8. Select the micromolecules:
9. Select the type of bond in the molecule of methane (CH_4):
10. Select which statements are correct for the chemical compound:

    $H_2N\text{-}CH_2\text{-}CH_2\text{-}OH$
11. Which amino acid contains sulfur?
12. Which biomolecules contain sulfur?
13. Which biomolecules contain the functional group $–NH_2$?
14. Which biomolecules contains phosphorus?
15. Which elements from listed are microelements?
16. Which functional groups are present in asparagine?
17. Which functional groups are present in cysteine?
18. Which functional groups are present in lactic acid?
19. Which functional groups are present in pyruvic acid?
20. Which functional groups are present in threonine?
21. Which is the class of chemical compounds acetone belongs to?
22. Which is the class of chemical compounds glycerol belongs to?
23. Which is the most important organogenic element?

24. Which are the names of the functional groups:

>C=O, –COOH, –NH_2, –OH, –SH, 

25. Which listed bioelement is organogenic?
26. Which listed bioelements are minerals?
27. Which listed macroelements are metals?
28. Which listed molecules contain polar covalent bond?
29. Which statement referring to nitrogen is correct?
30. Which statements are correct for covalent bond?
31. Which statements are correct for ionic bond?
32. Which statements are correct for van-der-Waals forces?
33. Which statements for hydrogen bond are correct?
34. Which statements referring to hydrogen are correct?
35. Which substance occur in gastric juice?
36. Which vitamins contain sulfur?
37. Select the acidic amino acid:
38. Select the amino acid that contains imidazol group:
39. Select the amino acid that contains the guanidino functional group:
40. Select the amino acid that contains the hydroxyl functional group:
41. Select the amino acid that contains the indol functional group:
42. Select the basic amino acids:
43. Select the biopolymer:
44. Select the correct statements about the α-amino acids.
45. Select the correct statements about α-alanine and β-alanine:
46. Select the correct statements about the tripeptide
47. Select the cyclic amino acid
48. Select the essential amino acid:
49. Select the hydrophobic non-polar amino acids:
50. Select the hydroxy amino acid:
51. Select the imino acid:
52. Select the monoaminodicarboxylic amino acid:

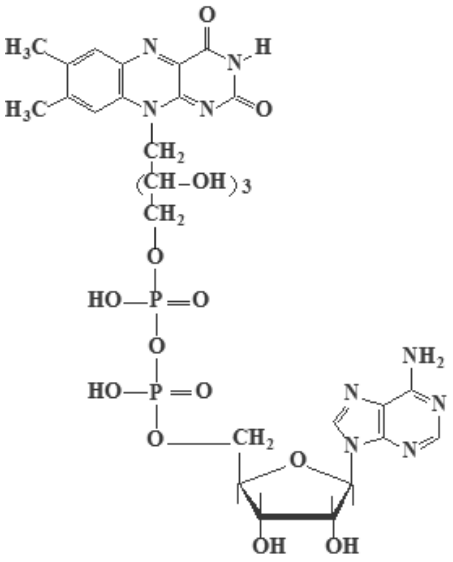
53. Select the neutral amino acid:
54. Select the non-essential amino acid:
55. Select the thio amino acid:
56. What compound is the structural unit of simple proteins?
57. What compounds contain nitrogen?
58. What compounds contain OH-groups?
59. What compounds contain SH-groups?
60. What type of amino acids is present in proteins?
61. Which amino acid has the isoelectric point in basic media?
62. Which compounds contain free amino group (NH_2)?
63. Which compounds contain free carboxylic groups (-COOH)?
64. Which of the following amino acids are hydrophylic neutral?
65. Select the correct statement regarding the classification of proteins.
66. Globulins - select the correct statement:
67. Histones- select the correct statements:
68. Peptide bond has the following properties:
69. Protein functions are:
70. Select the correct statement about the tertiary structure of proteins:
71. Select the correct statements about hemoglobin (Hb):
72. Select the correct statements about the primary structure of proteins:
73. Select the correct statements about the secondary structure of protein - α-helix:
74. Select the correct statements about the secondary structure of protein - β-structure:
75. Select the correct statements regarding albumins:
76. Select the oligomers:
77. The primary structure of proteins - select the correct statement:
78. The secondary structure of proteins - select the correct statement:
79. The tertiary structure of proteins - select the correct statements:
80. The quaternary structure of proteins - select the correct statements:
81. Which of the following compounds are calcium-binding proteins?
82. Which are conditions for protein precipitation?
83. Determine the isoelectric point (pI) of the following tripeptide:
84. Isoelectric point (pI) - select the correct statement:

85. Protein colloidal solutions have the following properties:
86. Defin protein salting-aut.
87. Protein solubility - select the correct statement:
88. Stability of the protein in a solution is determined by:
89. The total charge of a protein depends on:
90. What functional groups of proteins have acidic properties?
91. What functional groups of proteins have basic properties?
92. What happens during the denaturation of protein molecule?
93. NAD^+ coenzyme - select the correct statements:
94. $NADP^+$ coenzyme - select the correct statement:
95. Select the chemical process in which is involved vitamin C:
96. Select the correct statements about coenzymes-derivatives of vitamin B2:
97. Select the correct statements about coenzymes FAD and FMN:
98. Select the correct statements about the chemical compounds: riboflavin, thiamine, nicotinamide, pyridoxal phosphate.
99. Select the correct statements about the cofactors:
100. Select the correct statements about hydroxyproline, hydroxylysine
101. Choose the correct statement about nucleosome:
102. Choose the correct statements about RNA:
103. Choose the correct statements about mRNA:
104. Choose the correct statement about rRNA:
105. Choose the correct statement about tRNA:
106. Choose the correct statements about DNA nucleotide composition - complementarity laws:
107. Choose the correct statements about the secondary structure of DNA:
108. Choose the correct statements about the structures shown in the picture:
    - C–G,
    - A–T,
    - primary structure of ARN,
    - primary structure of DNA,
    - secondary structure of DNA.

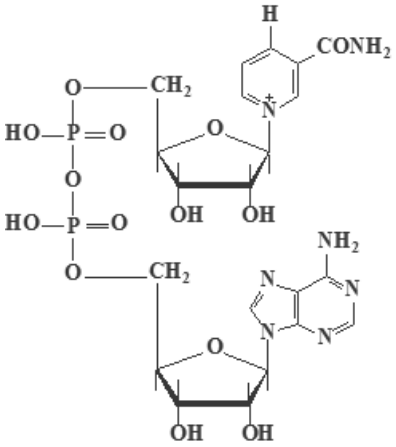
109. Choose the type of chemical bond that is not present in nucleic acids:
110. Histones - select the correct statements:
111. Select the correct statement about DNA structure:
112. Select the correct statements about the chemical structures:
    - purine bases
    - pyrimidine,
    - nucleosides,
    - nucleotides.
113. Structural components of DNA are:
114. Structural components of RNA are:
115. The major nitrogenous bases in DNA are:
116. The major nitrogenous bases in RNA are:
117. The number of hydrogen bonds in the following double-stranded DNA sequence is:

    T - C - G - A - G - A

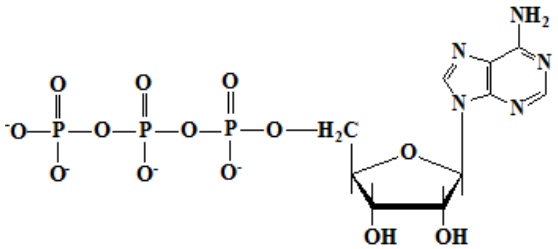
    A - G - C - T - C - T
118. The secondary structure of DNA:
119. Select the correct statements about the chemical compounds:



120. Select the correct statements about the chemical compound:



121. Select the correct statements about the chemical compound:



122. Which are the metabolic functions of vitamins?
123. Which are the possible causes of hypovitaminosis?
124. Carbohydrates of the biological membranes:
125. Chose the lipids that are components of the cell membranes:
126. Main properties of the membranes:
127. Select the correct statements regarding the proteins of biological membranes:
128. The proteins of biological membranes:
129. Choose the carbohydrate that is present in the human body:
130. Choose the correct statement about disaccharidases - enzymes that hydrolyse the disaccharides:
131. Choose the correct statement about disaccharides:
132. Choose the correct statements about homopolysaccharides:
133. Choose the correct statements about the following compounds:D-glucose, D-fructose.
134. Choose the functions of carbohydrates:
135. Disaccharides - which statements are correct regarding their properties?
136. Fructose - select the correct statement:

137. Glucose - select the correct statement:
138. Glycogen - select the correct statement:
139. Homopolysaccharides - select the correct statements:
140. Lactose - select the correct statement:
141. Maltose - select the correct statement:
142. Monosaccharides are:
143. Sucrose - select the correct statement:
144. The following 2 monosaccharides result in the digestion of sucrose:
145. The following statements about monosaccharides are true:
146. What is the type of glycosidic bond contained in sucrose?
147. What kind of glycosidic bonds enter in the cellulose macromolecule?
148. Which compounds are obtained at acid hydrolysis of lactose?
149. Which compounds are obtained at acid hydrolysis of sucrose?
150. Which compounds are obtained at hydrolysis of lactose?
151. Which disaccharide is obtained at acid hydrolysis of starch?
152. Which glycosidic bond is part of amylase macromolecule?
153. Which glycosidic bonds are characteristic for amylopectin macromolecule?
154. Which is the D-glucose active metabolic form?
155. Which is the disaccharide unit of amylose?
156. Which is the type of glycosidic bond in the macromolecule of glycogen that creates the branches?
157. Which is the type of the glycosidic bond that connects disaccharide fragments in the hyaluronic acid macromolecule?
158. Which monosaccharide at reduction forms the polyalcohol galactitol?
159. Which monosaccharide is the most spread in nature?
160. Which polysaccharide contains β-D-glucose?
161. Which polysaccharide fractions are part of starch granule?
162. Which types of glycosidic bonds are present in the macromolecule of glycogen?
163. Which oligo- or polysaccharide contains the represented compound? (β-D-galactose, β-D-glucose, β-D-fructose)
164. Which statement is correct for the following compound? (β-D-deoxiribofuranose)

165. Which statement regarding the represented structure is correct? (amylose, amylopectin, cellulose)
166. Which statements are correct for the following compound? (D-glucose, D-galactose, D-fructose, β-D-ribofuranose, β-D-galactopyranose)
167. Which statements regarding the represented structure are correct? (sucrose, α-maltose, β-lactose)
168. According to their biological role lipids are divided into the following classes:
169. According to their physico-chemical properties lipids are divided into the following classes:
170. Acylglycerols - select the correct statements:
171. Bile acids - select the correct statements:
172. Carbohydrates of the biological membranes:
173. Cerebrosides - select correct statements regarding their structure:
174. Functions of lipids are:
175. Gangliosides - select the correct statements:
176. Glycerophospholipids - choose the correct statements:
177. Glycolipids:
178. In human cells and tissues the following fatty acids prevail:
179. Lipid components of the cell membranes are:
180. Lipids are essential components of the diet, because:
181. Lipids are:
182. Main properties of the biologic membranes are:
183. Phosphatidylcholine and phosphatidylethanolamine - choose the correct answers:
184. Select the correct statement about the following compound:
185. Sphingomyelines contain:
186. Sphingosine - select the correct answer:
187. Structural classification of lipids - select the specific classes:
188. The following fatty acids are essential for humans:
189. The proteins of biological membranes:
190. Which compounds have an acidic functional group in their structure?
191. Which fatty acid has the lowest melting point?
192. Select the chemical compounds whose precursor is the presented substance: cholesterol.

193. Which statement is correct regarding the compound? (phosphatidylcholine, ceramide, phosphatidylethanolamine, phosphatidylserine, cholic acid)
194. Which statement is correct for the listed below substance? (aldosterone, calcitriol, cortisol, estradiol, progesterone, testosterone, Vit D_3)
195. Select the chemical bonds that are formed between membrane proteins and lipids:
196. Select the correct affirmation about fat-soluble vitamins:
197. Select the correct affirmation about membrane properties:
198. Select the correct statement regarding the biological membrane proteins:
199. Select the correct statement regarding the membrane carbohydrates:
200. Select the substance which is transported via membranes by translocase (facilitated diffusion):
201. Select the substances which are transported via membranes by ATPase (primary active transport):
202. Select the substances which are transported via membranes by ATPase (primary active transport):
203. Select which substances below listed can pass through the cell membrane by simple diffusion:
204. Which statement is correct regarding vitamin A?
205. Which substance is transported via membranes by sodium dependent transporters (secondary active transport)?
206. Which vitamin is liposoluble?
207. Liposoluble vitamins - choose the correct statement:
208. Metabolism of vitamin D:
209. Select the correct statements about calcitriol:
210. Vitamin A - select the correct statement:
211. Vitamin D - select the correct statement:
212. Vitamin E - select the correct statements:
213. Vitamin K - select the correct statements:
214. Biological functions of proteins are:
215. Biological value of proteins is determined by the essential amino acids including the following one:
216. Select the semi-essential amino acids from the following one:

217. Tissue usage of amino acids (AA):
218. Decarboxilation of amino acids:
219. Tetrahydrofolic acid (TFH):
220. Tetrahydrofolic acid (THF) is the acceptor and donor of the following groups:
221. Hemoglobin (Hb) - which statements characterize its structure?
222. Hemoproteins - select the correct statements:
223. Which proteins belong to the class of chromoproteins?
224. Cyclic AMP is:
225. Select the correct statements regarding the following hormone:
226. Select the sex hormones from the following one:
227. According to Arrhenius's electrolytic dissociation theory a base is:
228. According to Arrhenius's electrolytic dissociation theory an acid is:
229. Buffering capacity of plasma proteins is determined by the following amino acids:
230. Choose the correct relation for acid aqueous solutions:
231. Choose the correct relation for alkaline aqueous solutions:
232. Choose the correct relation for neutral aqueous solutions:
233. Choose the correct statements for buffer solution:
234. Choose the correct statements that characterize water:
235. Select buffer system that is present only in the erythrocytes:
236. Select buffer systems that are present both in the plasma and erythrocytes:
237. Select from the proposed list the physical properties that can characterize water:
238. Select the buffer system that is present only in blood plasma:
239. Select the correct statements for pH:
240. Serum albumin - select the correct statements regarding the compound:
241. Serum albumin - select the correct statements regarding the protein:
242. Serum albumin - select the correct statements:
243. The main blood buffer systems are:
244. What happens after adding a base (OH^-) to the acetate buffer (CH_3COOH/CH_3COONa)?
245. What happens after adding a base (OH^-) to the carbonate buffer ($H_2CO_3/NaHCO_3$)?
246. What happens after adding a base (OH^-) to the phosphate buffer (NaH_2PO_4/Na_2HPO_4)?
247. What happens after adding an acid (H^+) to the acetate buffer (CH_3COOH/CH_3COONa)?
248. What happens after adding an acid (H^+) to the carbonate buffer $H_2CO_3/NaHCO_3$?

249. What happens after adding an acid (H^+) to the phosphate buffer (NaH_2PO_4/Na_2HPO_4)?
250. What is the characteristic pH range of the blood?
251. What is the composition of intracellular buffer systems?
252. What is the composition of the extracellular plasma buffer s system?
253. What process are taking place when blood pH decreases?
254. What process are taking place when blood pH increases?
255. What values of pH listed correspond to acid environment?
256. What values of pH listed correspond to alkaline environment?
257. Which from listed is fundamental buffer systems Henderson-Hasselbach equation?
258. Which functional group in water creates acid pH?
259. Which functional group in water creates base pH?
260. Which particles from the listed have acid properties in aqueous solution according to the Bronsted-Lowry theory?
261. Which particles from the listed have base properties in aqueous solution according to the Bronsted-Lowry theory?
262. Heparin - select the correct statement regarding the compound: