YILDIZ TECHNICAL UNIVERSITY
FACULTY OF ELECTRICAL AND ELECTRONICS ENGINEERING
DEPARTMENT OF BIOMEDICAL ENGINEERING

BME 2901 – BIOCHEMISTRY
2020 – FALL

RESIT EXAM

Student Name:

ID:

1. L-carnitine, a dipeptide consisting of Lys-Met, transports the chains of fatty acids into the mitochondrial matrix allowing the cells to break down fat and get energy from the stored fat reserves. Since it speeds up fat burning in the body it is used for weight loss and for improved exercise performance of athletes.

   a) Draw the structure of L-carnitine. (5 pts)

   b) Name the dipeptide using dipeptide nomenclature rules. (3 pts)

   c) Indicate N- and C-terminal aminoacids in L-carnitine structure. (2 points)

d) Calculate the theoretical pI of the dipeptide using the pKa values in the following table. (10 pts)

Aminoacid	pK_1(-COOH)	pK_2(-NH_3^+)	pK_R
Alanine	2,34	9,69	
Arginine	2,17	9,04	12,48
Asparagine	2,02	8,80	
Aspartic Acid	2,09	9,82	3,86
Cysteine	1,71	10,78	8,33
Glutamic Acid	2,19	9,67	4,25
Glutamine	2,17	9,13	
Glycine	2,34	9,60	
Histidine	1,82	9,17	6,00
Isoleucine	2,36	9,60	
Leucine	2,36	9,60	
Lysine	2,18	8,95	10,53
Methionine	2,28	9,21	
Phenylalanine	1,83	9,13	
Proline	1,99	10,60	
Serine	2,21	9,15	
Threonine	2,63	10,43	
Tryptophan	2,83	9,39	
Tyrosine	2,20	9,11	10,07
Valine	2,32	9,62	

e) Why do you think burning fat improves exercise performance of athletes? (5 pts)

2. Explain levels of protein structure? (10 points)

3. Describe directionality of proteins, nucleic acids and carbohydrates briefly. (10 points)

4. What are the constituents of a nucleotide and which bond types bond those constituents together? (10 points)

5. What are the fates of pyruvate produced as the end product of glycolysis pathway? What are the contributions of those fates to cell? (10 points)

6. Describe conformation of DNA. What are the contributions of bases in the nucleic acid structure to the double helical conformation of DNA? Comment on the antiparallelity of the DNA strands. (10 points)

7. Describe the structure of biological membranes. Which parts of the biological membranes are involved in transport of molecules across membranes? (10 points)

8. Answer the questions below.

   a) What is the theory behind energy production in oxidative phosphorylation? Explain. (10 points)

   b) What happens if the body breaks down fatty acids in excess amount in situations of starvation and untreated diabetes? (5 points)

GOOD LUCK ☺

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