Roll. No: NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA (An Autonomous Institute Affiliated to AKTU, Lucknow) **B.Tech** SEM: III - THEORY EXAMINATION - (2024 - 2025) **Subject: Biochemistry Time: 3 Hours** Max. Marks: 100 **General Instructions: IMP:** *Verify that you have received the question paper with the correct course, code, branch etc.* 1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice *Questions (MCQ's) & Subjective type questions.* 2. Maximum marks for each question are indicated on right -hand side of each question. 3. Illustrate your answers with neat sketches wherever necessary. 4. Assume suitable data if necessary. 5. Preferably, write the answers in sequential order. 6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked. 20 **SECTION-A**

Subject Code:- ABT0301

1. Attempt all parts:-

1-a. Which of the following solutions has the highest hydrogen ion concentration? (CO1, K2)

- pH 1 (a)
- pH 4 (b)
- pH 7 (c)
- pH 10 (d)
- 1-b. How do biological systems use buffers to maintain pH balance against changes in 1 CO2 levels? (CO1, K2)
 - By increasing CO2 production (a)
 - By converting CO2 into bicarbonate ions (b)
 - (c) By decreasing CO2 levels
 - By excreting bicarbonate ions (d)
- Which enzyme catalyzes the conversion of pyruvate to acetyl-CoA? (CO2, K1) 1 1-c.
 - Pyruvate dehydrogenase complex (a)
 - (b) Hexokinase
 - (c) Phosphofructokinase
 - Glyceraldehyde-3-phosphate dehydrogenase (d)
- 1-d. How many ATP molecules are directly produced in one round of the TCA cycle? 1 (CO2, K1)

Printed Page:-04

1

	(a)	1		
	(b)	2		
	(c)	3		
	(d)	4		
1-e.	What do naturally occurring fatty acids mostly contain? (CO3, K1)			
	(a)	Even number of carbons		
	(b)	Odd number of carbons		
	(c)	1 carbon		
	(d)	0 carbon		
1-f.	In what compartment does the de novo fatty acid synthesis occur? (CO3, K1)			
	(a)	Mitochondria		
	(b)	Cytosol		
	(c)	Insulin		
	(d)	Collagen		
1-g.	Which of the following is an essential amino acid? (CO4, K1)			
	(a)	Cysteine		
	(b)	Asparagine		
	(c)	Glutamine		
	(d)	Phenylalanine		
1-h.	T	wo amino acids of the standard 20 contain sulfur atoms. They are (CO4, K1)	1	
	(a)	cysteine and serine		
	(b)	cysteine and threonine		
	(c)	methionine and cysteine		
	(d)	methionine and serine		
1-i.	Η	ow many number of hydrogen bonds between adenine and thymine? (CO5, K1)	1	
	(a)	1		
	(b)	2		
	(c)	3		
	(d)	4		
1-j.	Salvage pathway is used in the synthesis of (CO5, K1)			
	(a)	Amino acid		
	(b)	Carbohydrate		
	(c)	Nucleotide		
	(d)	Fatty acid		
2. Att	empt a	all parts:-		
2.a.	D	ifferentiate between hydrogen bonding and ionic bonding. (CO1, K2)	2	
2.b.	W	That is the difference between glycolysis and gluconeogenesis? (CO2, K2)	2	

Page 2 of 4

•

2.c.	Draw the structure of triacylglycerol. (CO3, K1)	2
2.d.	Define Ramachandran plot? (CO4, K1)	2
2.e.	Draw the double helix structure of DNA (CO5, K1)	2
<u>SECTIO</u>	<u>N-B</u>	30
3. Answe	r any <u>five</u> of the following:-	
3-a.	Explain how the unique properties of water, including its structure, polarity, high heat capacity, and ability to act as a solvent are crucial for supporting life processes in biological systems, citing specific examples. (CO1, K2)	6
3-b.	Calculate the pH of mixture of 0.10 M acetic acid 0.2 M sodium acetate. The pKa of acetic acid is 4.76. Also calculate the ratio of concentration of acetic acid and acetate required in buffer system of pH 5.30. (CO1, K3)	6
3-с.	Discuss in detail about the fate of pyruvate in the presence of molecular oxygen which is formed after glycolysis? (CO2, K2)	6
3-d.	Why carbohydrates are called so? Draw the structure and functions of three biochemically important disaccharides? (CO2, K1)	6
3.e.	Explain the long-term health consequences associated with obesity, including cardiovascular diseases and diabetes. (CO3, K2)	6
3.f.	Explain Glucose-Alanine cycle? What are the roles of alanine aminotransferase? (CO4, K2)	6
3.g.	Draw a schematic representation of a dinucleotide. Label the following. (i) The component of a nucleotide (ii) 5' end (iii) N-glycosidic linkage (iv) Phosphodiester linkage. (CO5, K1)	6
<u>SECTIO</u>	N-C	50
4. Answe	r any <u>one</u> of the following:-	
4-a.	Briefly discuss the importance of Henderson equations, pH and different buffer system in biological systems. (CO1, K2)	10
4-b.	Calculate the pH of a blood plasmasample with a total CO2 concentration of 26.9 mM and bicarbonate concentration of 25.6 mM. The relevant pKa of carbonic acid is 6.1. (CO1, K3)	10
5. Answe	er any <u>one</u> of the following:-	
5-a.	Explain Classification of Carbohydrates with their structure and examples. Also define stereo isomerism in carbohydrates with example? (CO2, K2)	10
5-b.	Describe in details what happens in glycolysis? How many steps are there? Explain with the help of intermediates, cofactors and enzymes involved. (CO2, K2)	10
6. Answe	r any <u>one</u> of the following:-	
б-а.	Mitochondrial oxidation of fatty acids takes place in 3 stages? Explain in detail. (CO3, K2)	10
6-b.	Differentiate between electron transport chain and oxidative phosphorylation in detail? (CO3, K2)	10

•

- 7. Answer any one of the following:-
- 7-a. Explain the series of enzymatic reactions by which ammonia is converted into 10 urea. Where does this process takes place? (CO4, K2)
- 7-b. Illustrate the various ways by which catabolism of protein takes place in human 10 body? (CO4, K2)
- 8. Answer any one of the following:-
- 8-a. What is generated in salvage pathway? What is the primary mechanism of 10 pyrimidines salvage? Elaborate the pathway. (CO5, K2)
- 8-b. Write brief note on composition of nucleotides. Also draw the structure of various 10 purines and pyrimidines. (CO5, K1)

op. July phone and the second