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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: III - CARRY OVER THEORY EXAMINATION - APRIL 2023

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.

SECTION A

20

1. Attempt all parts:-

1-a. What is the molecular weight of water (CO1)

1

(a) 10 g/mol

(b) 15 g /mol

(c) 18 g/mol

(d) 20 g/mol

1-b. The neutral pH is always. (CO1)

1

(a) Less than 7

(b) More then 7

(c) None of the above

(d) Equal to 7

1-c. Which of the following enzyme does not take part in the TCA cycle? (CO2)

1

(a) Citrate synthase

(b) Iso-citrate dehydrogenase

(c) Pyruvate dehydrogenase

- (d) Malate dehydrogenase
- 1-d. The first intermediate in TCA cycle is? (CO2) 1
- (a) succinate
 - (b) Fumarate
 - (c) Citrate
 - (d) Malate
- 1-e. ____ is a precursor of amino acid synthesis. (CO3) 1
- (a) fatty acids
 - (b) alpha ketoglutaric acid
 - (c) mineral salts
 - (d) volatile acids
- 1-f. Which of the following processes can saponification be used for? (CO3) 1
- (a) To make soap
 - (b) For the production of plastics
 - (c) In blow glass artistry
 - (d) The formation of alloys
- 1-g. ____ amino acids is not synthesized by the body? (CO4) 1
- (a) Arginine
 - (b) Glutamine
 - (c) Lysine
 - (d) Histidine
- 1-h. The general structure of all amino acids are same except for ____ (CO4) 1
- (a) Lysine
 - (b) Glycine
 - (c) Proline
 - (d) Alanine
- 1-i. Number of hydrogen bonds between guanine and cytosine? (CO5) 1
- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
- 1-j. Immune disorders Include (CO5) 1
- (a) Hypersensitivity

- (b) Auto-immune diseases
- (c) Immunodeficiency
- (d) All of the above

2. Attempt all parts:-

- | | | |
|------|---|---|
| 2.a. | Water is a polar molecule. Explain the reason? (CO1) | 2 |
| 2.b. | What are reducing and non reducing sugars? Explain with example (CO2) | 2 |
| 2.c. | What are two kinds of protein quaternary structure? (CO3) | 2 |
| 2.d. | Write short note on amino acid degradation? (CO4) | 2 |
| 2.e. | How are triphosphates formed from monophosphates? (CO5) | 2 |

SECTION B

30

3. Answer any five of the following:-

- | | | |
|------|--|---|
| 3-a. | Write a brief note on water and its physical and chemical properties? (CO1) | 6 |
| 3-b. | You need to produce a buffer with pH of 5.75. You have a solution with 30.0g of acetic acid ($pK_a=4.75$). How many moles of sodium acetate must you add to achieve the desired pH? (CO1) | 6 |
| 3-c. | What do you understand by Diabetes Mellitus. Explain its types also (CO2) | 6 |
| 3-d. | In the first stage of glycolysis, fructose-1,6-bisphosphate is cleaved to form glyceraldehyde-3-phosphate and dihydroxyacetone phosphate. The latter molecule can then be converted to glyceraldehyde-3-phosphate. Illustrate the mechanisms whereby these reactions occur (CO2) | 6 |
| 3.e. | In animals, amino acids undergo oxidative degradation in three different metabolic circumstances. What are those? (CO3) | 6 |
| 3.f. | Explain the synthesis of amino acids in detail. (CO4) | 6 |
| 3.g. | What are the various steps involved in the synthesis of purines? Name the molecule which is the immediate precursor for the formation of AMP and GMP? (CO5) | 6 |

SECTION C

50

4. Answer any one of the following:-

- | | | |
|------|--|----|
| 4-a. | How can carbonic acid with a pK_a of 3.6 act as a buffer component at pH 7.5? What are three different ways to make buffer solution? (CO1) | 10 |
| 4-b. | The partial pressure of CO_2 in the lungs can be varied rapidly by the rate and depth of breathing. For example, a common remedy to alleviate hiccups is to increase the concentration of CO_2 in the lungs. This can be achieved by holding one's breath, by very slow and shallow breathing (hypoventilation), or by | 10 |

breathing in and out of a paper bag. Under such conditions, $p\text{CO}_2$ in the air space of the lungs rises above normal. Qualitatively explain the effect of these procedures on the blood pH. What is the role of hemoglobin buffer system in human body. (CO1)

5. Answer any one of the following:-

- 5-a. Discuss the oxidation of glucose via pentose phosphate pathway and mention its significance, precursors and energetics equations. (CO2) 10
- 5-b. Why is Pentose phosphate pathway important and what is the location of HMP shunt in our body? Also discuss the mechanism of HMP shunt. (CO2) 10

6. Answer any one of the following:-

- 6-a. Describe the reactions of fatty acids oxidation? (CO3) 10
- 6-b. Apart from beta oxidation, what are the two other oxidation pathways for fatty acids? What are the salient features of alpha oxidation pathway?(CO3) 10

7. Answer any one of the following:-

- 7-a. Explain in detail the catabolism of amino acids in human body?(CO4) 10
- 7-b. Differentiate between urea cycle and glucose alanine cycle along with their significance? (CO4) 10

8. Answer any one of the following:-

- 8-a. Explain de novo synthesis of purines nucleotides? (CO5) 10
- 8-b. Explain the process of synthesis of AMP and GMP from IMP? Name the enzymes responsible for AMP synthesis. (CO5) 10