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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

**B.Tech**

SEM: III - THEORY EXAMINATION (2022 - 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**

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1. Attempt all parts:-

- |      |   |   |
|------|---|---|
| 1-a. | Which two types of chemicals are necessary buffer ingredients? (CO1)            | 1 |
|      | (a) A strong acid and a strong base   |   |
|      | (b) A weak acid or weak base and the salt of the weak acid or weak base         |   |
|      | (c) Weak acid and weak base   |   |
|      | (d) Water and a salt  |   |
| 1-b. | Which one is a process in which water changes into vapours in atmosphere? (CO1) | 1 |
|      | (a) Evaporation   |   |
|      | (b) Transpiration   |   |
|      | (c) Precipitation   |   |
|      | (d) Condensation  |   |
| 1-c. | Which enzyme catalyzes the conversion of pyruvate to oxaloacetate? (CO2)        | 1 |
|      | (a) Pyruvate carboxylase  |   |
|      | (b) Pyruvate dehydrogenase  |   |
|      | (c) Pyruvate kinase   |   |

(d) Phosphofructokinase-1

- 1-d. Which of the following organisms cannot convert acetyl-coA derived from fatty acids into glucose? (CO2) 1
- (a) Animals
  - (b) Plants
  - (c) Bacteria
  - (d) Fungus
- 1-e. The solubility of fatty acids in water? (CO3) 1
- (a) Increases with increase in chain length and fewer the double bonds
  - (b) Increase with increase in chain length and increase in double bonds
  - (c) Decrease with chain length and decrease with number of carbon bonds
  - (d) Decrease with chain length and increase with double bonds
- 1-f. Which one of the following is an essential fatty acid? (CO3) 1
- (a) Linolenic acid
  - (b) Palmitic acid
  - (c) Linoleic acid
  - (d) both a and c
- 1-g. Which of the following essential amino acids is not synthesized by the body? (CO4) 1
- (a) Arginine
  - (b) Glutamine
  - (c) Histidine
  - (d) Proline
- 1-h. Out of these, which one is the non essential amino acid? (CO4) 1
- (a) Lysine
  - (b) Threonine
  - (c) Serine
  - (d) Histidine
- 1-i. Building blocks of nucleic acids are -----(CO5) 1
- (a) Nucleotides
  - (b) Nucleosides
  - (c) Amino acids

(d) Histones

- 1-j. Number of hydrogen bonds between adenine and thymine? (CO5) 1
- (a) 1
- (b) 2
- (c) 3
- (d) 4

2. Attempt all parts:-

- 2.a. Differentiate between covalent and non covalent interaction? (CO1) 2
- 2.b. What are polysaccharides and give any two example of pentose sugar? (CO2) 2
- 2.c. What is Ramachandran plot? (CO3) 2
- 2.d. What do you mean by pka value of amino acids? (CO4) 2
- 2.e. What is a "codon"? What is "transcription" of DNA? (CO5) 2

SECTION B

30

3. Answer any five of the following:-

- 3-a. Discuss in detail the protein buffer for biological system? How does its component helps in maintaining the desired pH. (CO1) 6
- 3-b. Define the following terms with example- a) capillary action, b) adhesion forces c) cohesion forces d) dielectric constant e) Van der waal interactions (CO1) 6
- 3-c. Draw glycolysis and gluconeogenesis side by side with products, reactants and enzyme for each step. (CO2) 6
- 3-d. Why carbohydrates are called so? Draw the structure and functions of three biochemically important disaccharides? (CO2) 6
- 3.e. What is oxidative phosphorylation? Why is it called so? (CO3) 6
- 3.f. What happens to the alpha amino group of amino acids during catabolism of amino acids? Explain in detail the steps. (CO4) 6
- 3.g. Differentiaite between purines and pyrimidines catabolism? (CO5) 6

SECTION C

50

4. Answer any one of the following:-

- 4-a. Suppose that a 500 mL solution containing equal amounts of 2.5 M acetic acid and 2.5 M acetate is combined with a 500 mL solution containing 0.1 M hydrochloric acid. What is the pH of the resulting solution? The pKa of acetic acid is 4.76. (CO1) 10
- 4-b. Aspirin (acetylsalicylic acid) has a pKa of 3.5. (i) Calculate the ratio of ionized/unionized of 10

the drug in the stomach where pH is 1. (ii) Calculate the ratio of ionized/unionized in the intestine where pH is 6. (iii)Based on these calculations- where is aspirin absorbed within the body? (CO1)

5. Answer any one of the following:-

- 5-a. Explain Kreb's cycle under a) pathway b) significance c) Energetics d) inhibitors e) place of occurrence. (CO2) 10
- 5-b. Explain Classification of Carbohydrates and stereo isomerism? (CO2) 10

6. Answer any one of the following:-

- 6-a. Mitochondrial oxidation of fatty acids takes place in 3 stages? What are those explain in detail. (CO3) 10
- 6-b. What are nonsaponifiable and saponifiable lipids? Also discuss simple and complex lipids along with their example. (CO3) 10

7. Answer any one of the following:-

- 7-a. Explain in detail urea cycle with its significance? (CO4) 10
- 7-b. What is Cahill cycle? Explain the process by which amino groups from muscles are transported to liver? (CO4) 10

8. Answer any one of the following:-

- 8-a. Write brief note on composition of nucleotides. Also draw the structure of various purines and pyrimidines. (CO5) 10
- 8-b. What are the differences and similarities between a ribonucleotide and a deoxyribonucleotide? (CO5) 10