.

Printed Page:-2 **Subject Code:- BBT0301N**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: III - THEORY EXAMINATION (2025- 2026)
Subject: Biochemistry

Time: 2 Hours **Max. Marks: 50**

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 15

1. Attempt all parts:-

1-a. Where does the citric acid cycle (TCA cycle) take place in eukaryotic cells? (CO1, K1) 1

(a) Cytoplasm
(b) Nucleus
(c) Mitochondria
(d) Endoplasmic reticulum

1-b. In the systematic nomenclature of lipids, the prefix "glycero" refers to: (CO2, K1) 1

(a) Sugar
(b) Glucose
(c) Carboxyl group
(d) Glycerol

1-c. What is the role of the urea cycle in nitrogen metabolism? (CO3, K1) 1

(a) Excreting excess nitrogen as urea
(b) Synthesizing amino acids
(c) Transporting nitrogen to tissues
(d) Oxidizing nitrogen to ammonia

1-d. Salvage pathways in nucleotide metabolism involve: (CO4, K1) 1

(a) Synthesis of nucleotides from scratch
(b) Reusing nucleotides by converting them back into nucleosides
(c) Breaking down nucleotides into individual bases
(d) Storing excess nucleotides in the cell

.

1-e.	Pyrimidines are composed of: (CO4, K1) (a) Adenine and guanine (b) Cytosine and thymine (c) Adenine and cytosine (d) Guanine and thymine	1

2. Attempt all parts:-

2.a.	Name the two most common monosaccharides found in the human diet. (CO1, K1)	2
2.b.	How does an unhealthy diet contribute to obesity? (CO2, K1)	2
2.c.	What structural feature characterizes a peptide bond? (CO3, K1)	2
2.d.	Name the sulfur-containing amino acids and their significance in protein structure. (CO3, K1)	2
2.e.	Which pyrimidine base is exclusively found in RNA? (CO4, K1)	2

SECTION-B 15

3. Answer any three of the following:-

3-a.	Describe how the TCA cycle contributes to the production of ATP, NADH, and FADH. Explain the key reactions and intermediates of the citric acid cycle (TCA cycle). (CO1, K2)	5
3-b.	What are the four main stages of fatty acid oxidation, and where in the cell does this process primarily occur? (CO2, K2)	5
3-c.	Explain the structure of a fatty acid in detail. How do saturated and unsaturated fatty acids differ in their chemical structure? (CO2, K2)	5
3.d.	Discuss the role of electrostatic interactions in the formation and stabilization of protein conformations. Provide details of all four protein structures.(CO3, K2)	5
3.e.	Explain the role of salvage pathways in recycling nucleotides and their significance in cellular metabolism and energy conservation. (CO4, K2)	5

SECTION-C 20

4. Answer any five of the following:-

4-a.	Discuss the enzymatic mechanisms involved in the conversion of nucleoside monophosphates to nucleoside triphosphates. (CO4, K2)	4
4-b.	Discuss the pathways and enzymes involved in the catabolism of purine nucleotides, emphasizing uric acid formation. (CO4, K2)	4
4-c.	Discuss how Ramachandran plot analysis aids in predicting protein folding patterns and contributes to the understanding of protein structure. (CO3, K3)	4
4-d.	Discuss the processes of deamination and transamination, their roles in amino acid catabolism, and their impact on nitrogen balance. (CO3, K2)	4
4-e.	What are the genetic and environmental factors that cause obesity? What is the most effective combination of diet, exercise, and behaviour modification for obesity treatment? (CO2, K2)	4
4-f.	Discuss the regulation of fatty acid synthesis in the human body. (CO2, K2)	4
4-g.	A solution contains 0.05 M acetic acid (CH_3COOH) and 0.1 M sodium acetate (CH_3COONa). Calculate the pH of the solution. (Given: pKa=4.76) (CO1, K3)	4
4-h.	Explain the role of the bicarbonate buffer system in blood pH regulation. (CO1, K2)	4