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Printed Page:-3 **Subject Code:- AMTBT0101**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
M.Tech
SEM: I - THEORY EXAMINATION (2025 - 2026)
Subject: Applied Biochemistry & Molecular Biology

Time: 3 Hours **Max. Marks: 70**

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. Which of the following statements about nicotinamide adenine dinucleotide (NAD+) is correct? (CO1, K1) 1

(a) NAD+ is the initial electron donor in many metabolic oxidation reactions.
(b) NADH is the initial electron acceptor in many metabolic oxidation reactions.
(c) NAD+ is the initial electron acceptor in many metabolic oxidation reactions.
(d) NAD+ is a prosthetic group for several dehydrogenases.

1-b. Which of the following statements is known as the rate-limiting step in glycolysis? (CO2, K1) 1

(a) Enolase
(b) Phosphofructokinase
(c) Phosphohexose isomerase
(d) Glyceraldehyde-3-phosphate dehydrogenase

1-c. Mode of DNA replication is: (CO3, K1) 1

(a) Conservative and bidirectional
(b) Semiconservative and unidirectional
(c) Semiconservative and bidirectional
(d) Conservative and unidirectional

1-d. In NER machinery which of the following protein processes the helicase activity? (CO4, K1) 1

(a) UvrA
(b) UvrB
(c) UvrC

(d) UvrD

1-e. Mark the one which is NOT the transcription inhibitor in eukaryotes. (CO5, K1) 1

(a) Rifampicin
(b) Acridine dye
(c) Actinomycin D
(d) Rho factor

2. Attempt all parts:-

2.a. What are hexoses? (CO1, K1) 2

2.b. How are ATP and NADH similar? (CO2, K1) 2

2.c. What is the function of an electron in the electron transport chain? (CO3, K1) 2

2.d. Why is RNA primer synthesized? (CO4, K1) 2

2.e. What is transcription write in brief? (CO5, K1) 2

SECTION-B 20

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i) Define polysaccharides. Classify them and write their importance. (CO1, K2) 4

3.a.(ii) Describe the general structure of triglycerides and list their biological functions. (CO1, K2) 4

3.b. Answer any one of the following:-

3.b.(i) Why are catabolic and anabolic pathways coupled? (CO2, K2) 4

3.b.(ii) How does ATP hydrolysis release energy? (CO2, K2) 4

3.c. Answer any one of the following:-

3.c.(i) Define the terms metabolism, metabolic pathway, catabolism, and anabolism. (CO3, K2) 4

3.c.(ii) Know the fate of pyruvate under aerobic and anaerobic conditions. (CO3, K2) 4

3.d. Answer any one of the following:-

3.d.(i) Identify phosphoester bonding patterns and N-glycosidic bonds within nucleotides. (CO4, K2) 4

3.d.(ii) Compare and contrast ribonucleotides and deoxyribonucleotides. (CO4, K2) 4

3.e. Answer any one of the following:-

3.e.(i) Compare the structure of prokaryotic and eukaryotic ribosomes. (CO5, K2) 4

3.e.(ii) Explain briefly the advantages and disadvantages of the universality of the genetic code to humans. (CO5, K2) 4

SECTION-C 35

4. Answer any one of the following:-

4-a. Describe the structure of fatty acids and explain how saturated, monounsaturated, and polyunsaturated fatty acid structures differ from one another. (CO1, K3) 7

4-b. Identify the structural component that is common to all steroids and identify three important members of this class of lipids. (CO1, K3) 7

5. Answer any one of the following:-

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5-a.	Explain the multiple reasons for why ATP should not be viewed as an energy store in skeletal muscle. (CO2, K3)	7
5-b.	It has been accepted that life on the Earth started out as single celled, simple organisms, which then evolved into complex organisms. How did evolution proceed to produce such a wide variety of living organisms from a simple ancestor? (CO2, K3)	7

6. Answer any one of the following:-

6-a.	Identify the specific phosphoester and N-glycosidic bonds within an ATP molecule and explain how they change during its conversion to ADP. (CO3, K3)	7
6-b.	Identify the three steps where gluconeogenesis uses different enzymes than glycolysis to bypass a reaction. (CO3, K3)	7

7. Answer any one of the following:-

7-a.	Draw the structural formula of a dinucleotide that is formed by combining two specified nucleotides. (CO4, K3)	7
7-b.	Understand and explain how DNA replication takes place and how DNA polymerase is involved in the replication process. (CO4, K3)	7

8. Answer any one of the following:-

8-a.	How does a DNA molecule code for a protein. Describe the process completely. (CO5, K3)	7
8-b.	We now have bacteria making human insulin. Explain how this is possible. (CO5, K3)	7