BRAINWARE UNIVERSITY

Term End Examination 2024-2025
Programme – M.Sc.(BT)-2024
Course Name – Biomolecules and Biochemistry
Course Code - MBT10101
(Semester I)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) Injection of dinitrophenol (DNP) into a rat causes an immediate increase in its body temperature because

a) DNP acts as an inhibitor of mitochondrial ATPase
b) DNP blocks the electron transport chain
c) DNP inhibits succinate dehydrogenase
d) DNP uncouples electron transport from oxidative phosphorylation

(ii) Roughly how many amino acids are there in one turn of an alpha helix?

a) 1
b) 2.8
c) 3.6
d) 4

(iii) Assess: Di-sulfite are formed between

a) cysteine residues that are close together
b) proline residues that are close together
c) cystine residues that are close together
d) histidine residues that are close together

(iv) What is the maximum wavelength that Tryptophan and tyrosine absorb?

a) 250nm
b) 260nm
c) 280nm
d) 290nm

(v) Select which of the amino acid participate in 'O' glycosylation

a) Serine
b) Glycine
c) Alanine
d) All of these

(vi) Select the basic amino acid among the provided options

a) Glutamic acid
b) Aspertic acid
c) Arginine,
d) Glycine

(vii) Saponification is a process by which triglycerides are reacted with

a) Sodium or potassium hydroxide
b) Zinc
c) Iron
d) None of these

(viii) Classify which of the following is a phospholipid?

a) Cardiolipin
b) Plasmalogen
c) Lecithin
d) None of these

(ix) Analyze the requirement of glycerol in the formation of _____
a) Glucose
b) Triglyceride
c) Cholesterol
d) glycoprotein

(x) Assess the statement: All are non -essential fatty acids except
a) Oleic acid
b) Linolenic
c) Palmitic acid
d) Stearic acid

(xi) Assess the correct function of enzyme, Peptidase?
a) Cleave phosphodiester bond
b) Cleave amino bonds
c) Remove phosphate from a substrate
d) Removal of H2O

(xii) Inhibition of lactase by galactose is an example of which kind of inhibition?
a) Uncompetitive inhibition
b) Substrate inhibition
c) Mixed inhibition
d) Competitive inhibition

(xiii) Choose which of the following is not a factor that can influence enzyme activity?
a) Temperature
b) pH
c) Substrate concentration
d) Color of the enzyme

(xiv) When the temperature of an enzyme-catalyzed reaction increases, predict what typically happens to the reaction rate?
a) It decreases
b) It remains constant
c) It depends on the enzyme
d) It increases

(xv) Choose what is the term for the specific region on an enzyme where a substrate binds?
a) Active site
b) Inactive site
c) Cofactor site
d) Regulatory site

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Explain how does the Krebs Cycle contribute to the overall production of ATP in cellular respiration, and what are the key molecules generated during the cycle. (3)
3. Differentiate between epimer and anomer. (3)
4. The reaction catalyzed by succinyl-CoA synthetase produces the high energy compound GTP. Explain how the free energy contained in GTP incorporated into the cellular ATP pool. (3)
5. Describe the amphoteric nature of amino acid (3)
6. Greek philosopher and mathematicians Pythagoras allergic to fava beans due to genetic defect in G-6-P dehydrogenase which lead to favism where erythrocyte begin to lyse 24 to 48 h after ingestion of the beans, releasing free Hemoglobin into the blood due to which jaundice and kidney failure can occur. Evaluate the root cause of this clinical manifestation. (3)

OR

Justify: Gluconeogenesis is energetically expensive, but essential (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Explain the oxidative decarboxylation of pyruvate to acetyl-CoA by the PDH complex. (5)
8. Differentiate between inhibitors and uncouplers of electron transport chain with suitable examples (5)
9. Illustrate osazone formation reaction of glucose and its use in carbohydrate identification. (5)
10. Explain the significance of Ramachandran Plot in interpreting the possible secondary structures in proteins. (5)
11. What do you mean by optically active compounds? Tabulate the difference between enantiomer and diastereomers. (5)

12. Illustrate the mechanism of the reaction between ninhydrin and serine. (5)

OR

A biochemist wants to separate two peptides by ion-exchange chromatography. At the pH of the mobile phase to be used on the column, one peptide (A) has a net charge of −3 due to the presence of more Glu and Asp residues than Arg, Lys, and His residues. Peptide B has a net charge of +1. Which peptide would elute first from a cation-exchange resin? Which would elute first from an anion-exchange resin? (5)

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