



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 2nd Semester Examination, 2023

MCBACOR03T-MICROBIOLOGY (CC3)

Time Allotted: 2 Hours

Full Marks: 40

The figures in the margin indicate full marks.

Candidates should answer in their own words and adhere to the word limit as practicable.

All symbols are of usual significance.

Answer Question No. 1 and any four questions from the rest

1. Answer any **four** questions from the following:

2 × 4 = 8

- Define Gibb's free energy.
- Differentiate between an aldohexose and a ketohexose with proper example and structure.
- Calculate the approximate isoelectric pH of Aspartic acid and Lysine.
- What are essential fatty acids? Give one example of such fatty acid.
- Why does enzyme activity change with pH changes?
- Explain double reciprocal plot. What are its advantages?
- Which amino acids have two chiral C atoms? [Mention their structures]

2. (a) The linear polypeptide chain is cross linked — What are the most common cross-links? How is it formed?

1+2

- Discuss one method to identify N-terminal residue of a polypeptide chain.
- Write the structure of Glutathione. Discuss its function.

3. (a) Write down the structures of any two aromatic amino acids.

1

(b) What do you mean by pI of an amino acid?

1

(c) "The C-N bond in the peptide unit is partially double bond in character". Why is it so?

2

(d) Mention any two salient features of α -helix.

2

(e) What do you mean by tertiary structure of a protein?

2

4. (a) Write down the Michaelis Menten equation. What fraction of v_{max} is observed at $[S] = 4K_m$?

1+2

(b) What are apoenzymes and holoenzymes?

2

(c) What are prosthetic groups? Give one example.

1

(d) Mention the Lock and Key hypothesis of enzyme action.

2

5. (a) What do you mean by inversion of sucrose?

2

(b) What are the important constituents of peptidoglycan? Give their structures.

3

(c) Write down the Haworth projection formula of sucrose. Why is sucrose a non-reducing sugar?

3

6. (a) What do you mean by a buffer? Give an example of buffer. 2
 (b) Write down the Henderson-Hasselbalch equation. 2
 (c) Calculate the pH of a mixture of 0.1(M) acetic acid and 0.2(M) Na-acetate, the pK_a of acetic acid is 4.76. 2
 (d) Glucose 6P hydrolysed to Glucose + P_i at pH 7, 25°C $\Delta G^{\circ'} = -3138$ cal/mole 2
 ATP hydrolysed to ADP + P_i at same conditions $\Delta G^{\circ'} = -7700$ cal/mol
 Calculate the $\Delta G^{\circ'}$ for the reaction: $\text{Glucose} + \text{ATP} \rightleftharpoons \text{Glucose 6P} + P_i$.
7. (a) What is meant by progress curve of an enzyme? 2
 (b) What is meant by competitive inhibition? Draw the LB plot for competitive and uncompetitive enzyme inhibition. 2+2
 (c) What is the specific activity of an enzyme? 2
8. Write the differences between: 2×4 = 8
 (a) Acid number and RM number
 (b) Hydrolase and Oxidoreductase
 (c) Enthalpy and Entropy
 (d) Lock and Key Model and Induced Fit Model.

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WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 2nd Semester Examination, 2023

MCBACOR04T-MICROBIOLOGY (CC4)

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

Answer Question No. 1 and any four questions from the rest

1. Answer any **four** questions: 2×4 = 8
 - (a) Define hyper-parasitism with proper example.
 - (b) What do you mean by phosphate solubilization? Give two examples of phosphate solubilizing bacteria.
 - ~~(c)~~ Why denitrification is unwanted to farmers?
 - (d) How PGPR promote plant growth?
 - ~~(e)~~ What do you mean by soil profile? Draw the soil profile of terrestrial environment.
 - ~~(f)~~ What are the advantages of COD over BOD to indicate the water pollution level?
 - (g) A water sample has MPN index/100 ml of 1100. What does it signify?
2. (a) What do you mean by tertiary treatment of water? 2+3+3
 - (b) How an aerobic waterway becomes anaerobic after addition of wastes? Explain diagrammatically.
 - (c) Mention the various steps of municipal water purification.
3. (a) What is acid rain? 2+3+2+1
 - (b) What do you mean by phosphate immobilization? Explain with proper example.
 - (c) Composting is a efficient method for recycling solid waste. Justify the statement.
 - (d) Why activated sludge is so called?
4. (a) Why lichen is considered as a mutual association? 2+3+3
 - (b) How microbes survive in low temperatures? Explain with proper example.
 - (c) Write a comparative note on freshwater and marine microflora.

5. (a) What are the strategies of pesticide remediation? 2+(2+2)+(1+1)
(b) What are organochlorine pesticides? Give two examples of bacterial genera those degrade organochlorine pesticides.
(c) Give one example of each of nematophagous fungi and symbiotic luminescent bacterium.
6. (a) Write a comparative note between amensalism and commensalism with proper example. 3+3+2
(b) Differentiate epiphytes and endophytes with proper example.
(c) Define ecto-mycorrhiza with proper example.
7. (a) What do you mean by sulfate reduction? Explain with proper reaction and example. 3+3+2
(b) What do you mean by symbiotic and non-symbiotic interactions between microbes-plants?
(c) Define phytoremediation with proper example.
8. (a) Mention the role of mycorrhiza in plant growth. 3+2+3
(b) What do you mean by microbial succession?
(c) Mention the beneficial role of human microflora.

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