

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

B.A./B.Sc. FOURTH SEMESTER EXAMINATION, MAY 2025

SECOND YEAR [BATCH 2023-27]

MICROBIOLOGY

Paper : 4MCBMJC4

Date : 10/05/2025

Time : 11 am – 1 pm

Full Marks : 50

1. Answer **any ten** questions:

[2×10]

- Briefly define feedback inhibition with example.
- Define abzyme with example.
- Differentiate between green & purple sulfur bacteria.
- Write down the name of two inhibitors of Electron transport chain.
- Explain the importance of K_m or Michaelis Menten constant for an enzyme catalysed reaction.
- What are the differences between linear and branched fermentation pathway.
- What do you mean by methanogenesis?
- What do you mean by dissimilatory nitrate reduction?
- What is the significance of pentose phosphate pathway?
- What is siderophore?
- Write down the rate limiting steps of glycolysis.
- What do you mean by oxygenic photosynthesis?
- What do you mean by non-competitive inhibition?
- What is Stickland fermentation?
- Mention the location of HMP Shunt in Eukaryotic as well as in prokaryotic system.

Answer **any three** questions:

[3×10]

2. The following set of data was recorded in a monosubstrate enzyme-catalysed reaction:

[S]	v
(M)	(nmoles \times liter ⁻¹ \times min ⁻¹)
6.25×10^{-6}	15.0
7.50×10^{-5}	56.25
1.00×10^{-4}	60
1.00×10^{-3}	74.9
1.00×10^{-2}	75

- Estimate V_{max} and K_m .
 - What would be the “v” at $[S] = 2.5 \times 10^{-5}$ M and at $[S] = 5 \times 10^{-5}$ M.
 - What would be the “v” at $[S] = 5 \times 10^{-5}$ M if the enzyme concentration were doubled.
 - The “v” given in the above table was determined by measuring the concentration of product that has accumulated over a 10-minute period. Verify that “v” represents a true initial/instantaneous velocity. [2+2+3+3]
3. a) How purple bacteria perform photosynthesis.
b) What is Ribozyme?
c) What is the function of lactate dehydrogenase?
d) How does heterofermentative pathway differ from homofermentative pathway?
e) What is denitrification? [2+2+2+2+2]

4. a) Why an arsenic compound is so poisonous for animals?
b) List out the reactional sequences of oxidative phase in PPP.
c) What is oxoglutarate dehydrogenase complex?
d) Succinate dehydrogenase enzyme is inhibited by malonate. Explain this fact. [2+4+2+2]
5. a) Write down the utility of Rapaport-Leubering cycle in biological system.
b) ATP is the substrate as well as regulator of PFK1. Why does it so?
c) After the successfully metabolized of one molecule of glucose in muscle tissue total how many molecule of ATP will be produced? Write down the detail energetics of it. [3+2+(1+4)]
6. a) Explain the term membrane potential in relation to mass and charge gradient.
b) Name a symporter present in cells membrane, the inhibitor of which is widely used as diuretics in managing water retention disease in humans.
c) Cystic fibrosis is a hereditary disease which is due to defect in chloride ion channel function – comment.
d) State two important differences between ion channels and ion transporters.
e) Briefly state the essential features of endosymbiosis. [2+2+2+2+2]

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