

**ST JOSEPH’S COLLEGE (AUTONOMOUS), BENGALURU-27**

**B.Sc. (MICROBIOLOGY) – IV SEMESTER**

**SEMESTER EXAMINATION: APRIL 2023**

**(Examination conducted in May 2023)**

**MB 422: MICROBIAL ENZYMOLOGY AND METABOLISM**

**(For current batch students only)**

**Time: 2 Hours Max Marks: 60**

**This paper contains 2 printed page and 4 parts**

**I. Answer any Five of the following 5 x 3 = 15**

1. Name the metabolic pathways employed by microorganisms to catabolize glucose to pyruvate.
2. Define methanogenesis. Which organisms can carry out this process?
3. How do chemolithotrophs carry out hydrogen oxidation?
4. What are the reaction centers involved in oxygenic photosynthesis in cyanobacteria?
5. What chemical intermediate links pyruvate to the TCA cycle? Write the overall reaction catalyzed by the pyruvate dehydrogenase complex.
6. Define the following: a) Enzyme unit, b) Specific activity, c) Turnover number.
7. What is nitrogen fixation? What are the different groups of organisms that carry out nitrogen fixation?

**II. Answer any Five of the following 5 x 6 = 30**

1. Explain how pyruvate is converted to ethanol in alcohol fermentation?
2. Explain the steps involved in denitrification carried out by *Paracoccus denitrificans.*
3. In cyclic photophosphorylation, ATP is produced, even though water is not split. Explain how the process takes place.
4. Discuss the different components of ATP synthase.
5. Write the Michalis-Menten equation and derive the Lineweaver Burk equation from it.
6. Justify the statement: “Pentose phosphate pathway is an amphibolic pathway.”
7. What are anaplerotic reactions? Explain the importance of anaplerotic reactions in citric acid cycle.

**III. Answer any One of the following 1 x 10 = 10**

1. a) Suggest a reason why heating an enzyme solution decrease its activity. 4

b) How does assimilatory nitrate reduction differ from dissimilatory nitrate reduction? 6

1. a) Compare aerobic respiration, anaerobic respiration and fermentation. 6

b) Which reactions of glycolysis produce ATP? 4

**IV. Answer the following 1 x 5 = 5**

17. An antibiotic bind to the active site of an enzyme but does not change the structure of

that enzyme. Once the antibiotic is removed, the enzyme returns to normal function. Identify

the enzyme inhibition mechanism and explain the same.