

**ST JOSEPH’S UNIVERSITY, BENGALURU -27**

**M.Sc (MICROBIOLOGY) – II SEMESTER**

**SEMESTER EXAMINATION: APRIL 2023**

**(Examination conducted in May 2023)**

**MB 8121: MICROBIAL PHYSIOLOGY**

**(For current batch students only)**

**Time: 2 Hours Max Marks: 50**

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

**I. Answer any Five of the following 5X3=15**

1. Name the four classes of ATP-powered pumps that produce active transport of ions and molecules.
2. Sketch the formation of a peptide bond between two amino acids.
3. What are the forces that stabilize the tertiary structure of proteins?
4. How does the conversion of pyruvate to ethanol take place in alcohol fermentation?
5. Where are the control points in the glycolytic pathway?
6. Differentiate between substrate-level phosphorylation and oxidative phosphorylation.
7. If a 0.1 M solution of glucose-1-phosphate is incubated with phosphoglucomutase, the glucose-1-phosphate is converted to glucose-6-phosphate. At equilibrium, the concentrations of glucose-1-phosphate is 4.5 x 10-3 M and that of glucose-6-phosphate is 9.6 x 10-2 M. Calculate K’eq and ΔG’o for this reaction. T= 298K,

R = 8.315 J/K/mol.

 Glucose-1-phosphate Glucose-6-phosphate 

1. **Answer any Two of the following 2X5=10**
2. Explain how does the organisms deal with oxidative stress?
3. How does light drive the synthesis of ATP, generation of NADPH and O2?
4. Derive the Lineweaver Burk equation from the Michaelis-Menten equation? Draw the plot for the same.

**III. Answer any Two of the following 2X10=20**

11. Describe the structure of ATP synthase and explain how it functions.

12 a) Distinguish between the lock-and-key and induced-fit models for binding of a

 substrate to an enzyme. 4

 b) Why does a competitive inhibitor not change Vmax? Represent the same graphically. 6

 13. a) Describe the β-oxidation pathway of palmitic acid. 6

 b) Explain the different types of rancidity in lipids. 4

1. **Answer the following 1X5=5**

14 a. Glycine is a highly conserved amino acid residue in proteins (i.e., it is found in the

 same position in the primary structure of related proteins). Suggest a reason why this

 might occur. 2

 b. Lactose, a disaccharide made of galactose and glucose residues behaves as

 reducing sugar. Justify the statement. 3