

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

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

**SEMESTER EXAMINATION: APRIL 2023**

**(Examination conducted in May 2023)**

**MB 221: MICROBIAL BIOCHEMISTRY AND ANALYTICAL TECHNIQUES**

**(For current batch students only)**

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

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

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

1. Write the principle of electrophoresis. Which electrophoretic technique is used for separation of a) DNA and b) proteins?
2. Name one disorder caused by the deficiency of (i) Vitamin C (ii) Vitamin D (iii) Vitamin A
3. What is mRNA? What is its primary function?
4. State any three important features of the DNA double helix structure proposed by Watson and Crick.
5. What is the principle involved in the working of a centrifuge? Name any two types of centrifugation techniques.
6. Define: (a) Conformation (b) Mutarotation (c) Racemic mixture
7. Beta-pleated sheets are examples of which hierarchical organization of protein structure? How are they classified based on their direction?

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

1. Differentiate between fibrous and globular proteins. Are they classified on the basis of secondary or tertiary structures in proteins?
2. Describe how Avery, McLeod and McCarty demonstrated that DNA is the genetic material.
3. Draw the general structure of a sphingolipid. What are the three major subclasses of sphingolipids?
4. Draw the typical structure of a transfer RNA and label the parts.
5. Write a brief note on HPLC. Describe the principle on which it works.
6. The following is a TLC plate with silica gel as the stationary phase. Post TLC run, two spots (A and B) were observed on the plate. Which component do you think is relatively more polar? Explain.



1. Calculate the pKa of lactic acid, when the concentrations of lactic acid and lactate are 0.010 M and 0.087 M, respectively, and the pH is 4.80. Name the equation you used to arrive at your answer.

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

1. (a) Define buffer. What is their physiological function? Provide two examples of biological buffer systems. (5 marks)

(b) Explain Beer-Lambert’s law. (5 marks)

1. Briefly answer the following:

(a) Name any two groups of high energy compounds

(b) Define sterols. Provide an example.

(c) What is the full form of “SDS-PAGE”?

(d) What is the sample holder used with a colorimeter or spectrophotometer called? What kind of material is it generally made of?

(e) Name an uncommon amino acid that contains Selenium. Draw its structure.

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

1. Trehalose, a disaccharide in fungi, has the following structure:



Can it function as a reducing sugar? Explain.