QP Code: U25DIS006

Reg. No : ....
Name : ....

ST MARY'S COLLEGE (AUTONOMOUS), THRISSUR-20

I SEMESTER (FYUGP) DEGREE EXAMINATIONS, NOVEMBER 2025

(Improvement/Supplementary)

BTY1MN102 : Bio-Instrumentation

2024 Admission Only

(Credits: 4)

Time: 2 Hours **Maximum Marks: 70**

Section A

*Answer **all**. Each question carries **3** Marks.* ***(Ceiling: 24 Marks)***

1. What is an autoclave? Describe how it is used for sterilization.
2. What are the main components of a Gas Chromatography instrument?
3. How does a Spectrophotometer determine the concentration of a solute?
4. Name any two compounds that can be separated using ion-exchange chromatography.
5. How would you analyze the effectiveness of an incubator versus a lyophilizer for microbial culture growth and sample preservation? Consider the impact on sample quality and experimental outcomes.
6. Analyze how solvent polarity and plate activation time affect the movement of compounds in TLC. How would these factors influence Rf values?
7. Compare the principles behind nucleic acid vs. protein separation in electrophoresis. How do charge and size influence their movement in the gel?
8. Demonstrate how you would use paper chromatography to test and compare different ink samples in a laboratory setting.
9. Compare phosphate buffer and acetate buffer in terms of their pH stability under acidic conditions.
10. Criticize the use of Bright-Field Microscopy for observing unstained cells and point out how does Phase Contrast Microscopy help to overcome the limitations to provide better contrast.

Section B

*Answer **all**. Each question carries **6** Marks.* ***(Ceiling: 36 Marks)***

11. What is flame photometry? Describe its working principle and list the steps involved in determining the concentration of metal ions using this technique.

Turn Over

12. List the steps involved in setting up a vertical slab gel electrophoresis system, including gel preparation, sample loading, and running the electrophoresis.

13. Describe how a shaking incubator differs from a static incubator.

14. Why is it important to monitor the water level in a water bath during use?

15. Explain the principle of Paper Chromatography. Describe the process of separating different pigments in a plant extract using this technique. How do the polarity and solubility of compounds affect the separation?

16. Determine how to correctly store enzymes requiring -20°C and plasma samples requiring -80°C by applying your knowledge of laboratory freezer use and organization.

17. Analyze the results of an immunoelectrophoresis experiment where you observe poorly defined precipitin lines. What could be the potential causes, and how would you troubleshoot the technique to improve the resolution of the antigen-antibody complexes?

18. Assess the impact of mobile phase composition on accuracy and precision of HPLC analysis for pharmaceutical quality control.

Section C

*Answer **any one**. Each question carries **10** Marks.* ***(1x10=10marks)***

19. Explain how laminar air flow helps to maintain a sterile environment.

20. Analyze the advantages and limitations of using a double beam spectrophotometer over a single beam spectrophotometer in quantitative analysis.

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