QP Code: U25DR010

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

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

I SEMESTER (FYUGP) DEGREE REGULAR EXAMINATIONS, NOVEMBER 2025

BTY1MN102 : Bio-Instrumentation

2025 Admission Onwards

(Credits: 4)

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

Section A

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

1. Explain the working of flame photometry. How it is used to determine the concentration of metal ions in a solution.
2. Define Thin Layer Chromatography(TLC). How is it used in separating mixtures?
3. What is a centrifuge? Explain its basic working principle.
4. Explain the working of UV-Vis spectrophotometer. How does it help in determining the concentration of a solution?
5. What is the basic principle of a Light Microscope? Mention one key application.
6. Explain the working of laminar air flow. Why it is crucial in maintaining a sterile environment in laboratories?
7. You are asked to preserve a temperature-sensitive plant extract using a lyophilizer. How would you prepare the sample and operate the lyophilizer for effective freeze-drying?
8. Describe the working principle of HPLC. How is it different from other types of chromatography?
9. Describe the role of SDS in protein electrophoresis?
10. How would you perform a paper chromatography experiment to separate plant pigments? Describe the procedure and method for identification of the separated compounds.

Section B

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

11. Describe the steps you would follow to properly sterilize a set of surgical instruments using an autoclave.
12. Explain the difference between molar and normal solutions and describe when each is used in different types of chemical reactions.

Turn Over

13. Analyze the affect of factors like column temperature, carrier gas flow rate, and column length in the separation of compounds in Gas Chromatography. How would you optimize these parameters to achieve the best resolution for a complex mixture?
14. Analyze the effect of changes in pH and voltage settings affect the migration of biomolecules in paper electrophoresis. How would you interpret variations in the migration patterns of amino acids or proteins based on their isoelectric points?
15. You are tasked with separating proteins of varying molecular weights using SDS-PAGE. How would you prepare the sample, set up the gel, and analyze the protein bands? Describe each step and its importance in achieving separation.
16. During incubation, you notice excess condensation inside the Petri dishes. Analyze how this might affect microbial growth and suggest preventive techniques.
17. Given a set of standard colored solutions and an unknown sample, explain how you would use a colorimeter to find the concentration of the unknown solution.
18. Describe the working principle of a hot air oven.

Section C

Answer ***any one****.* ***(1x10=10marks)***

19. Evaluate how the accuracy and sensitivity of immunoelectrophoresis impact its use in identifying specific antibodies in complex mixtures?
20. Compare the effectiveness of different stationary phases in column chromatography for separating a mixture of compounds. Comment on the factors influence the separation efficiency?

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