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BRAINWARE UNIVERSITY

Term End Examination 2025-2026

Programme – B.Sc.(BT)-Hons-2024/B.Sc.(BT)-Hons-2025

Course Name – Bioanalytical Tools and Techniques

Course Code - BBT27002 (T)

(Semester II)

Full Marks : 40

Time : 2:0 Hours

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A

(Multiple Choice Type Question)

1 x 10=10

1. Choose the correct alternative from the following :

- (i) Tell what does R_f stands for in thin-layer chromatography?
- | | |
|--------------------|---------------------|
| a) Relative front | b) Relative factor |
| c) Retention front | d) Retention factor |
- (ii) Define what is the primary principle behind the separation in HPLC?
- | | |
|----------------|--------------------|
| a) Filtration | b) Partitioning |
| c) Sublimation | d) Crystallization |
- (iii) Report which type of stationary phase would be used to separate cations from a mixture in ion exchange chromatography, ?
- | | |
|-------------------------|--------------------------|
| a) Anion exchange resin | b) Cation exchange resin |
| c) Neutral resin | d) Hydrophobic resin |
- (iv) Report, resolving power of a microscope is a function of _____
- | | |
|-----------------------------|---|
| a) Wavelength of light used | b) Numerical aperture of lens system |
| c) Refractive index | d) Wavelength of light used and numerical aperture of lens system |
- (v) Identify which of the following are true for electron microscopy?
- | | |
|--|--|
| a) specimen should be thin and dry | b) image is obtained on a phosphorescent screen |
| c) electron beam must pass through evacuated chamber | d) specimen should be thin and dry, image is obtained on a phosphorescent screen and electron beam must pass through evacuated chamber |
- (vi) The secondary electrons radiated back in scanning microscope is collected by?
- | | |
|-------------------|------------|
| a) specimen | b) anode |
| c) vacuum chamber | d) cathode |
- (vii) Identify the part of a microscope that controls the amount of light entering into the condenser?

- a) Objective
 - b) Diaphragm
 - c) Light source
 - d) Condenser
- (viii) Rewrite the role of immersion oil in microscopy?
- a) Reduces refraction and increases resolution
 - b) Enhances magnification
 - c) Acts as a stain for contrast
 - d) Cleans the lens
- (ix) Write what is the molar absorptivity (ϵ) in absorption fluorimetry?
- a) The concentration of the fluorescent substance
 - b) The molar mass of the fluorescent substance
 - c) The ability of the substance to absorb light at a specific wavelength
 - d) The path length of light through the solution
- (x) Determine which of the following is a commonly used medium for density gradient centrifugation?
- a) Sucrose
 - b) Cesium chloride
 - c) Percoll
 - d) Iodixanol

Group-B

(Short Answer Type Questions)

3 x 5=15

2. Indicate the limitations of TLC compared to column chromatography? (3)
3. Interpret the purpose of the buffer in electrophoresis? (3)
4. Explain the role of the Beer-Lambert Law in UV and visible spectrophotometry, including its significance in quantitative analysis. (3)
5. Illustrate the different regions of the infrared spectrum and their significance in chemical analysis. (3)
6. Conclude the role of sedimentation in centrifugation? (3)

OR

Explain the principle behind centrifugation and how it is used for the separation of two liquids in a mixture. How does the application of centrifugal force aid in this process? (3)

Group-C

(Long Answer Type Questions)

5 x 3=15

7. Describe the intricate mechanisms involved in SDS-PAGE, elucidating how it denatures proteins and enables accurate molecular weight determination, and its applications in protein analysis and purification. (5)
8. Explain the concept of image resolution in electron microscopy. How is resolution determined, and what factors can affect the resolution of electron microscope images? (5)
9. Evaluate the different types of centrifuges based on their operation (5)

OR

Explain the principle behind Analytical Centrifugation and its applications in quantitative analysis of macromolecules. (5)

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