

Time: 3 Hours

Marks : 75

Note:

1. Draw neat labelled diagrams wherever applicable

1. Multiple choice questions 20M
1. Beer Lambert's law gives the relation between which of the following? 1M
 - a. Reflected radiation and concentration
 - b. Scattered radiation and concentration
 - c. Absorbed radiation and concentration
 - d. Emitted radiations and concentration
2. A UV spectrum is a plot of 1M
 - a. Transmittance versus wavenumber
 - b. Absorbance versus wavelength
 - c. Absorbance versus wavenumber
 - d. Transmittance versus wavelength
3. Increase in the conjugation of chromophore causes _____ affects the absorption spectrum in the following way 1M
 - a. Has no change on the position of the absorption spectrum
 - b. Shifts the absorption spectrum to shorter wavelength
 - c. Makes the absorption spectrum disappear
 - d. Shifts the absorption spectrum to longer wavelength
4. Which of the following is a UV spectroscopic quantitative analysis method used for single component analysis which does not need reference standard 1M
 - a. Calibration graph method
 - b. Single point standardization
 - c. Use of standard absorptivity value
 - d. Double point standardization

5. In Fluorimetry, the wavelength of the fluorescent radiation _____ 1M
- Is equal to the wavelength of the absorbed radiations
 - Is more than the wavelength of the absorbed radiations
 - Is less than the wavelength of the absorbed radiations
 - Does not have any relation with the absorbed radiations
6. Amongst the following, _____ can be analyzed by IR spectroscopy 1M
- O₂
 - H₂
 - N₂
 - H₂O
7. _____ is the detector commonly used in IR spectroscopy 1M
- Golay Cell
 - Photo multiplier tube
 - Barrier Layer cell
 - Photo cell
8. In flame photometric analysis of Iron, the iron line at 3247.28 Angstrom overlaps with the copper line at 3247.54 Angstrom. Copper is thus causing _____ interference 1M
- Spectral interference
 - Ionization interference
 - Oxide formation interference
 - Chemical interference
9. In atomic absorption spectroscopic techniques, absorption of radiation takes place by the sample which is in the _____ 1M
- Solid state
 - Gaseous state
 - Liquid state
 - Semisolid state

10. In turbidimetric measurement, _____ light is measured 1M
- a. Absorbed
 - b. Emitted
 - c. Transmitted
 - d. Scattered
11. In TLC if the R_f value of a compound is 0.99, the component is 1M
- a. Is having more affinity towards the stationary phase
 - b. Is having more affinity in the mobile phase
 - c. Has equal affinity for both stationary and mobile phase
 - d. Has no affinity for both stationary and mobile phase
12. In planer chromatography, when movement of mobile phase is in downward direction, the development is called 1M
- a. Ascending
 - b. Descending
 - c. Two dimensional
 - d. Radial
13. In electrophoresis, if the charge on the particle is increased, 1M
- a. rate of migration increases
 - b. rate of migration decreases
 - c. No change in the migration rate
 - d. Particle becomes stationary
14. In Gas Chromatography, SCOT column means 1M
- a. Secondary Coated Open Tubular Column
 - b. Support Coated Open-Table Column
 - c. Support-Coated Open Tubular Column
 - d. Support Coated On Table Column

15. Head Space analysis is used for the 1M
- Determination of particle size of the sample
 - Analysis of residual solvents in the sample
 - Determination of solubility of the compound
 - Determination of particulate matter in the sample
16. What is the main characteristic of an isocratic elution compared to a gradient elution method 1M
- The mobile phase composition remains constant
 - The proportion of aqueous solvents in mobile phase is increased
 - The proportion of organic solvents in mobile phase is increased
 - The pH of mobile phase changes continuously
17. Which of the following statement is incorrect with reference to HPLC 1M
- Smaller the particle size of stationary phase, better is the separation
 - Less the HETP, better is the separation
 - Shorter the column length, better is the separation
 - Higher the number of theoretical plates, better is the separation
18. In ion exchange chromatography, a molecule with a high charge density will 1M
- Elute earlier in the process
 - Flow through without binding
 - Bind more tightly to the stationary phase
 - Bind weakly to the stationary phase
19. In which chromatography are the components of the mixture separated as per their molecular size? 1M
- Paper Chromatography
 - TLC
 - HPTLC
 - Gel Chromatography

20. The detector used in HPLC which allows simultaneous detection of absorbance at multiple wavelengths 1M
- Photo Diode Array
 - Variable wavelength UV detector
 - Fixed wavelength UV detector
 - Fluorescence Detector
- II. Long answer questions (Attempt any two complete questions out of three) 20M
- Explain the term Quenching. Enlist types of Quenching giving one example of each. Draw a neat labelled diagram of the spectrofluorimeter. 5M
 - Give any one differentiating point between dispersive IR and FTIR spectrometer. What is FT with reference to FTIR spectrophotometer? Give its significance. Give one application of IR spectroscopy. 5M
 - Write a note on paper electrophoresis. Give any two applications of paper electrophoresis. 5M
 - Enlist the different types of pumps used in HPLC. Explain with the help of a neat labeled diagram, the construction and working of any one pump in detail. 5M
 - Enlist the steps involved in Gel chromatography. Name any two stationary phases used in the same. State the significance of inclusion limit and exclusion limit with reference to the separation using Gel chromatography. 5M
 - Compounds X and Y were analyzed on a 30 cm ODS column. Their retention time value 12.15 min and 20.5 min respectively. An unretained species passed through the column in 1.8 min. The peak width measured at the base were 0.45 min for X and 0.25 min for Y. Calculate the number of theoretical plates and HETP for compound X. Indicate if this column is suitable for the analysis of X. 5M
- III. Short answer questions (Attempt any seven out of nine) 35M
- Enlist the detectors used in UV-Visible spectroscopy. Specific absorbance of Paracetamol at λ_{max} 257 nm is 715. When 1 mL of Injection containing Paracetamol was diluted to two liter for an analysis, diluted gave an absorbance of 0.678 at λ_{max} 257 nm using 4 cm cell. Calculate the amount of Paracetamol in mg/mL. 5M
 - Enlist any four methods for multicomponent analysis in UV - Visible spectroscopy. Explain any one method in detail. 5M
 - Write a note on derivatization in Gas Chromatography. 5M
 - Draw a neat labelled diagram of a flame photometer. Explain the role of each component in it. Give one application of flame photometry. 5M
 - Explain the term Radial Chromatography with a suitable diagram. Give example of one spraying agent used in paper chromatography, with the analyte for which it is used. 5M

6. Give the principle of separation of compounds using Thin Layer Chromatography. 5M
Give a detailed account of the methods used for detection of separated compounds in Thin Layer Chromatography
7. Enlist any four detectors used in Gas Chromatography. Explain any one detector in detail. 5M
8. Explain various interferences observed in atomic absorption spectroscopy 5M
9. With reference to the Affinity Chromatography, give an account of the stationary phases and mobile phases used. Write one application of Affinity chromatography. Comment on the specificity and sensitivity of this chromatographic technique. 5M