

(3 Hours)

[Total Marks: 75]

Note:**Draw neat labeled diagrams wherever applicable.**

- I. Multiple choice questions. 20M**
1. Conjugation in a chromophore results in: 1M
- Shifting of absorption band to shorter wavelengths
 - No change in position of the absorption band
 - Disappearance of absorption band
 - Shifting of absorption band to longer wavelengths
2. For any compound to get analyzed by IR spectroscopy, the compound should have: _____ 1M
- Existence of dipole moment
 - Double bond
 - Triple bond
 - Benzene Ring
3. A mixture of compounds X, Y and Z was separated on 12 cm silica gel TLC plate. Solvent front was allowed to run up to 9 cm. If X, Y and Z travelled distances of 2cm, 7cm and 5cm, the order of polarity of X, Y and Z will be 1M
- $X > Y > Z$
 - $X < Y < Z$
 - $X > Z > Y$
 - $X = Y = Z$
4. Main characteristic of an isocratic method as compared to gradient elution method is 1M
- composition of mobile phase remains constant
 - pH of mobile phase is changed
 - proportion of aqueous solvent in mobile phase is increased
 - proportion of organic solvent in mobile phase is increased

5. Resins of ion exchange are formed by polymerization of styrene and _____ 1M
- Benzene
 - Chlorobenzene
 - Divinylbenzene
 - Toluene
6. In a Fluorimeter, the filter placed after the sample cell is called as 1M
- Secondary filter
 - Primary Filter
 - Interference Filter
 - Excitation filter
7. _____ is used as a source in Atomic absorption spectroscopy 1M
- UV lamp
 - Mercury Arc lamp
 - Hollow cathode lamp
 - Flame
8. R_f value in thin layer chromatography is 1M
- Less than zero
 - Between 1 to 10
 - Always more than 1000
 - Always less than 1 but more than 0
9. Name the terminology which involves increasing the temperature of a gas chromatograph column as a function of time 1M
- Isothermal run
 - Temperature programming
 - Isocratic elution
 - Gradient elution

10. Best technique which can be used for separation of different sizes of peptides from a mixture can be 1M
- Thin layer chromatography
 - Ion-exchange chromatography
 - Gel filtration chromatography
 - Affinity chromatography
11. A UV spectrum is a plot of? 1M
- Peak intensity versus wavenumber
 - Absorbance versus wavelength
 - Absorbance versus wavenumber
 - Peak intensity versus wavelength
12. In nephelo turbidimetry, the intensity of scattered light is measured at _____ angle 1M
- 60°
 - 180°
 - 90°
 - 30°
13. Name the technique in electrophoresis in which the stationary phase employed is in liquid state 1M
- Polyacrylamide Gel electrophoresis
 - Paper electrophoresis
 - Capillary electrophoresis
 - Cellulose acetate Gel electrophoresis
14. Which detector is used in Gas chromatography? 1M
- Electron capture detector
 - Bolometer
 - Photomultiplier
 - Pyroelectric detector

15. Recognizers used in Affinity chromatography are: 1M
- a. Specific type of molecules bound to stationary phase
 - b. Specific type of molecules to be included in the mobile phase
 - c. Multiple utility type of molecules bound to stationary phase
 - d. Multiple utility type of molecules to be included in the mobile phase
16. Which one of the following is an example of a monochromator used in UV-vis spectroscopy? 1M
- a. Interferometer
 - b. Filter
 - c. Prism
 - d. Light source
17. _____ colour flame is shown by sodium ions Flame photometry? 1M
- a. Blue
 - b. Green
 - c. Yellow
 - d. Red
18. Ultrasonication of HPLC mobile phase is performed to 1M
- a. Increase its resolving power
 - b. Increase its temperature
 - c. Remove dissolved gases
 - d. Remove entrapped ions
19. Which of the following is used as light source in fluorimetry? 1M
- a. Mercury vapor lamp
 - b. Incandescent wire
 - c. Xenon arc lamp
 - d. Deuterium discharge lamp

20. Atomic absorption spectroscopy is used for the detection of? 1M
- Organic compounds
 - Metals
 - Residual solvents
 - Non-metals

II. Long answer questions (Attempt any two out of three) 20M

- Define quenching. List types of quenching and explain any one in detail with example 5M
 - Write a detailed note on interferences in atomic absorption spectroscopy 5M
- Enlist and discuss various steps involved in separation by Thin Layer chromatography. Give one point of differentiation between isocratic and gradient elution. 5M
 - Give an account of column packings which can be used for Gel chromatography. Discuss applications of Gel chromatography 5M
- Enlist the various types of columns used in HPLC. Draw the diagram of rheodyne injector in 'Load' and 'Inject' position. 5M
 - Mixture of compounds A and B was separated on a 25 cm Normal phase silica gel Column Chromatogram obtained provided the following data 5M

	Retention time (mins)	Peak width at base (w) (mm)
Unretained	1.3	
Retained A	11.7	8
Retained B	17.1	10

Answer the following:

- Calculate the selectivity factor for this separation
- Calculate the capacity factor for A
- Comment on which compound is more polar and why.

III. Short answer questions (Attempt any seven out of nine) 35M

1. Explain the term quantum efficiency with reference to fluorescence spectroscopy. Specific absorbance of Paracetamol at its wavelength maxima is 723. 1 mL of an injection containing Paracetamol, when diluted to one liter for an analysis, gave an absorbance of 0.87 at I_{\max} when measured in 2 cm cell. Calculate the amount of Paracetamol in mg/mL of the injection. 5M
 2. Discuss the basic modes of interaction of molecules with IR radiation. Enlist various components of an spectrophotometer. 5M
 3. With the help of suitable diagram, explain methodology involved in Radial Paper chromatography. Write the name of one paper used in the Paper chromatography. 5M
 4. Explain the working of electron capture detector in gas chromatography. Give any one advantage and one disadvantage of this detector. 5M
 5. Give the principle of ion-exchange chromatography. Classify ion-exchange resins with suitable example. 5M
 6. Give the block diagram of a double beam UV-Visible spectrophotometer. Write a detailed note on monochromators used in UV-Visible spectrophotometer. 5M
 7. Draw a labelled schematic diagram of an atomic absorption spectrophotometer and explain role of each of its component. Give any two applications of Atomic absorption spectroscopy technique. 5M
 8. What is electrophoretic mobility? Discuss in detail factors affecting the same 5M
 9. Enlist the bulk property detectors employed in HPLC. Discuss any one of them in detail. 5M
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