

II B.Tech. II Semester Regular Examinations, April/May -2005
INSTRUMENTATION METHODS OF ANALYSIS
(Bio-Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. What are the instrumental methods? How are they classified? Name two or three instrumental methods for each of the physical property
2.
 - (a) What are the reasons for the deviations of Beer's law?
 - (b) Explain each of the factors responsible for deviations
 - (c) Why do most photometers and spectrophotometers give linear read out in transmittance rather than a linear readout in absorbance ?
 - (d) Why wave number in cm^{-1} is mostly used to measure the positions of a given infra red absorption ?
3.
 - (a) Why are complexes used to quantitatively determine metal ions?
 - (b) What are the requirements of complex ions to be used in a spectrophotometric determinations?
4.
 - (a) What factors are responsible for the precision of Atomic absorption spectroscopy
 - (b) What is sputting and self absorption
 - (c) Why a low temperature flame is used for the analysis of alkali and alkaline earth metals.
 - (d) Why acetylene-nitrous acid flame is suitable for element such as Al, Be, rare earths.
5.
 - (a) Explain the differences between emission spectroscopy and flamephotometry
 - (b) How the elements are detected in emission spectroscopy
6. Draw a schematic diagram of an nmr instrument and discuss the parts
7. Write short notes on:
 - (a) Detection and visualization in TLC
 - (b) R_F and R_M values in paper chromatography
 - (c) Detection and determination of amines by paper chromatography
 - (d) Detection and determination of carbohydrates by TLC
8. Write notes on:

- (a) Eddy diffusion
- (b) Split and splitless injection system
- (c) Flame Ionisation Detector
- (d) Response Factor

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1. (a) What are the suitable instrumental methods used for the analysis of
 - i. gaseous mixtures,
 - ii. alloys and ores
 - iii. traces of metal ions
- (b) Write notes on
 - i. Comparison with standards
 - ii. Standard addition method
- (c) Write notes on
 - i. Problems in analysis
 - ii. Methods of analysis
2. (a) Write briefly about origin and theory of UV spectroscopy.
- (b) What are the various components of UV spectrophotometer and discuss each of them in detail and briefly describe the scanning of UV spectrophotometer
3. (a) Why are complexes used to quantitatively determine metal ions?
- (b) What are the requirements of complex ions to be used in a spectrophotometric determinations?
4. (a) What factors are responsible for the precision of Atomic absorption spectroscopy
- (b) What is sputting and self absorption
- (c) Why a low temperature flame is used for the analysis of alkali and alkaline earth metals.
- (d) Why acetylene-nitrous acid flame is suitable for element such as Al, Be, rare earths.
5. (a) Explain the differences between emission spectroscopy and flamephotometry
- (b) How the elements are detected in emission spectroscopy
6. Write notes on:
 - (a) Proton exchange

- (b) Magnet in nmr
 - (c) RF Generator
 - (d) Detector
7. Discuss the theory and mechanism of paper chromatography. Describe the technique with suitable examples
8. Draw a block diagram of HPLC instrumentation and discuss various parts

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1. What are the instrumental methods? How are they classified? Name two or three instrumental methods for each of the physical property
2. Write short notes on :
 - (a) Molar extinction coefficient
 - (b) laws of absorption
 - (c) Photometric titrations
 - (d) Photometric accuracy
3. Write short notes on the following UV applications:
 - (a) Chemical kinetics
 - (b) Charge transfer transitions
 - (c) Dissociation constants of acids and bases
4. Write short notes on:
 - (a) Total consumption burner
 - (b) Premix burner
 - (c) Nebulizers
5. Discuss emission spectroscopic technique with a block diagram
6. Write notes on:
 - (a) Spin angular momentum
 - (b) Larmor equation
 - (c) Saturation
 - (d) Homogeneous field
7. Discuss ESR instrumentation with a block diagram
8. Write notes on:
 - (a) Gradient Elution
 - (b) Thermal Conductivity Detector
 - (c) Reverse phase chromatography

(d) Electron Capture Detector

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1. (a) Distinguish between accuracy and precision
(b) What are determinate and indeterminate errors?
(c) Write briefly about determinate and indeterminate errors
(d) Distinguish between relative and absolute error
2. (a) Define the following terms: Photometer, Spectrophotometer and Colorimeter
(b) Define Lambert's law and Beer's law and derive the equations
(c) What is the difference between molar absorptivity and absorbance?
3. (a) Why are complexes used to quantitatively determine metal ions?
(b) What are the requirements of complex ions to be used in a spectrophotometric determinations?
4. (a) Describe the procedure for quantitation in Atomic absorption spectroscopy
(b) Why is the internal standard procedure seldom used in atomic absorption determination?
(c) Why the technique of atomic absorption is only limited to metals?
5. Write notes on
 - (a) Direct reading spectrometers
 - (b) Flame excitation
 - (c) Interferences
 - (d) Temperature of the plasma
6. Write notes on:
 - (a) Spin angular momentum
 - (b) Larmor equation
 - (c) Saturation
 - (d) Homogeneous field
7. Discuss ESR instrumentation with a block diagram
8. Write short notes on:

- (a) Capillary columns
- (b) Bonded phase systems
- (c) Universal detectors in GC
- (d) Stationary phases in GC

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