

II B.Tech II Semester Supplementary Examinations,
November/December 2005
INSTRUMENTATION METHODS OF ANALYSIS
(Bio-Technology)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

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 [3+3+6+4]
2. (a) Why far UV region is called vacuum ultra region?
(b) Discuss the advantages and disadvantages of spectrophotometry in the vacuum-ultraviolet region of the spectrum
(c) Why are the absorption bands appear instead of sharp lines in UV spectra? [4+8+4]
3. (a) Calculate the lowest molar concentration of a solute that can be determined Spectrophotometrically. Assume that the minimum absorbance accurately measurable is 0.01 and that a cell with a 10 cm light path is available.
(b) Explain why the ultraviolet spectrum of benzene vapor contains many sharp bands whereas the same spectrum of benzene solution in alcohol lacks fine detail and consists only of broad peaks.
(c) Which will have greater λ_{\max} ? And Explain
 - i. $C_6H_5 - CH=CH - C_6H_5$ and $C_6H_5 - CH=CH-CH=CH - C_6H_5$
 - ii. $C_6H_5 - NH_2$ and $C_6H_5 - NH_3Cl$ [4+6+6]
4. (a) What are the components of a atomic absorption spectrometer and write briefly about each component of it with a block diagram?
(b) What are spectral and chemical interferences and how they are prevented or corrected in atomic absorption determination? [8+8]
5. Write notes on
 - (a) Direct reading spectrometers
 - (b) Flame excitation
 - (c) Interferences
 - (d) Temperature of the plasma [16]
6. Explain how the peak areas are related to molecular formula [16]

7. Discuss ESR instrumentation with a block diagram [16]
8. Describe theoretical principles and applications of GPC [16]

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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[5+5+6]
2. (a) Why far UV region is called vacuum ultra region?
(b) Discuss the advantages and disadvantages of spectrophotometry in the vacuum-ultraviolet region of the spectrum
(c) Why are the absorption bands appear instead of sharp lines in UV spectra?[4+8+4]
3. (a) Discuss the origin of color in organic compounds. What are chromophores and auxochromes?
(b) Explain with suitable examples ,the meaning of blue and red shifts [8+8]
4. (a) In atomic absorption, the elements such as Al, Ti, Mo, V, Si can not be detected when a flame is used to produce the atomic state. Why?
(b) Write notes on :
 - i. Doppler broadening
 - ii. Pressure broadening
 - iii. Atomic fluorescence[4+12]
5. (a) Explain briefly the electrical sources
(b) How the samples are introduced [8+8]
6. Draw a schematic diagram of an nmr instrument and discuss the parts [16]
7. Discuss ESR instrumentation with a block diagram [16]

8. Discuss the efficiency principles of chromatographic process

[16]

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1. (a) What are the suitable instrumental methods used for the analysis of
 - i. gaseous mixtures,
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 - i. Problems in analysis
 - ii. Methods of analysis[5+5+6]
2. (a) Explain and give examples of the types of transitions which occur in organic compounds
(b) Arrange the following transitions in order of decreasing energy
 $n \rightarrow \pi^*, \pi \rightarrow \pi^*, \sigma \rightarrow \sigma^*$
(c) What are the requirements for a solvent to be used in UV spectroscopy and why is ethanol considered as good solvent in UV. [8+3+5]
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? [8+8]
4. (a) What are the advantages in atomic absorption of a heated graphite atomiser over a flame atomiser
(b) Why are spectral interferences less severe in atomic absorption and atomic fluorescence spectroscopy than in flame emission spectroscopy?
(c) What is the purpose of densitometer and how is it used in quantitative determination [4+6+6]
5. (a) Explain the differences between emission spectroscopy and flame photometry
(b) How the elements are detected in emission spectroscopy [8+8]
6. Write notes on:

- (a) Proton exchange
- (b) Magnet in nmr
- (c) RF Generator
- (d) Detector [16]

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 [16]

8. Describe theoretical principles and applications of GPC [16]

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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 [16]
2. (a) Why far UV region is called vacuum ultra region?
(b) Discuss the advantages and disadvantages of spectrophotometry in the vacuum-ultraviolet region of the spectrum
(c) Why are the absorption bands appear instead of sharp lines in UV spectra? [4+8+4]
3. (a) Discuss the origin of color in organic compounds. What are chromophores and auxochromes?
(b) Explain with suitable examples ,the meaning of blue and red shifts [8+8]
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. [4+4+4+4]
5. (a) Explain preburn time with examples
(b) Matrix effects in emission spectroscopy [8+8]
6. Explain how the peak areas are related to molecular formula [16]
7. Discuss aminoacids separation by paper chromatography [16]
8. Describe three detectors with diagrams used in GC [16]
