

B.E DEGREE EXAMINATIONS: APRIL/MAY 2012

Sixth Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

EIE110: Analytical Instruments

Time: Three Hours

Maximum Marks: 100

Answer ALL Questions:-

PART A (10 x 1 = 10 Marks)

1. The radiation source of IR rays is
A. Hydrogen discharge lamp B. Incandescent lamp
C. Nernst filament D. Hollow cathode lamp
2. A Golay Cell or Golay Detector is a type of detector mainly used for
A. Infrared spectroscopy B. UV spectroscopy C. Flame photometry D. ATR technique
3. The ratio of the mass of the compound in the stationary phase relative to the mass of the compound in the mobile phase is called
A. Separation Factor B. Phase Ratio C. Distribution Constant D. Capacity factor
4. Refractive type RI detectors depend on ----- at the interface between the cell wall and the liquid
A. Beer's law B. Lambert's law C. Fresnel's law D. Snell's law
5. Photometric Analyzer is based on the principle of
A. absorption of light by a gas B. reflection of light by a gas
C. deflection of light by a gas D. refraction of light by a gas
6. In this method the Nitrogen oxides are analyzed based upon the reaction of the matter with the ozone
A. Phosphorescence B. chemiluminescence
C. fluorescence D. electro chemical method
- 7.----- is an electrode which responds to change in the activity of the analyte ion.
A. calomel electrode B. Hydrogen electrode
C. indicator electrode D. Ion selective electrode
8. In a sodium analyzer ammonia buffer is used
A. to liberate bound Na ions B. for cleaning the electrode
C. for concentration measurement D. for pH adjustment
9. Quadrupole analyzer is one type of
A. NMR spectrometer B. X-ray spectrometer C. Mass spectrometer D. IR spectrometer

10. Scintillators are chemicals used to convert
- A. chemical energy to radiant energy B. radiant energy to light
C. radiant energy to chemical energy D. light to radiant energy

PART B (10 x 2 = 20 Marks)

11. What is meant by colorimetry?
12. State Beer-Lambert law
13. Define retention volume & retention time.
14. Define Chromatography. Give the classification of Chromatographic methods.
15. State the principle of working of an Infra-Red gas analyzer.
16. Mention the types of H₂S analyzers.
17. Write a note on calomel electrodes
18. What is meant by Ion-selective Electrode? List the types.
19. List the different types of radiation detectors
20. State the principle of mass spectrometers

PART C (5 x 14 = 70 Marks)

21. a) With a neat diagram explain the construction and working of Single beam and Double-beam UV Spectrophotometer.

(OR)

- b) (i) Discriminate Classical methods and instrumental methods of analysis. (7)
(ii) Write short notes on IR sources. (7)

22. a) (i) With neat sketch explain the operation of Flame ionization Detectors. (7)
(ii) With neat sketch explain the operation of Thermionic Emission Detectors. (7)

(OR)

- b) With a neat diagram explain the instrumentation of HPLC.

23. a) Explain the principle & working of Paramagnetic oxygen analyzer with a neat sketch.

(OR)

- b) Explain the various methods of dust and smoke measurement with necessary sketch

24. a) With neat diagram explain the principle of pH measurement and also explain working of primary reference electrode.

(OR)

- b) Explain how the concentration of sodium can be found using a sodium analyzer.
25. a) Describe briefly about the construction and working of X-ray spectrometers.

(OR)

- b) Explain about the nuclear magnetic resonance spectrometers with neat diagram.
