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Question Paper Code: 41555

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2016

Fifth Semester

Electronics and Instrumentation Engineering

14UEI505 - ANALYTICAL INSTRUMENTS

(Common to Instrumentation and Control Engineering)

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Globar rod is the source of _____ spectrometer.
(a) infrared spectrometer (b) mass spectrometer
(c) UV-visible spectrometer (d) atomic absorption spectrometer
2. Wave number of near infrared spectrometer is
(a) 12500 - 4000 (b) 4000 - 200 (c) 200 - 10 (d) 200 - 20
3. If the concentration of solution increases, then the absorption _____
(a) remains same (b) decreases (c) increases (d) unpredictable
4. _____ is the substance that carries the analyte.
(a) Solute (b) Eluent (c) Eluate (d) Solvent
5. Paramagnetic oxygen analyser is a _____ kind of oxygen measurement.
(a) physical method (b) chemical method
(c) electrochemical-oxygen analyzer (d) analytical method

6. In which of the following 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. 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
10. Quadrupole analyzer is one type of
- (a) NMR spectrometer (b) X-ray spectrometer
(c) Mass spectrometer (d) IR spectrometer

PART - B (5 x 2 = 10 Marks)

11. What are the sources used in UV spectrometers?
12. List out the different types of gas chromatographic detectors.
13. State the principle of working of an infra-red gas analyzer.
14. Define ion-selective electrode. List its types.
15. What is the basic principle of mass spectrometers.

PART - C (5 x 16 = 80 Marks)

16. (a) With a neat diagram explain the construction and working of single beam and double-beam UV spectrophotometer. (16)

Or

- (b) Elaborate in detail about the working principle of flame emission photometer with neat diagram. (16)

17. (a) With a neat diagram discuss the role of instrumentation system in high pressure liquid chromatography. (16)

Or

(b) (i) Brief about the working principle of flame ionization detector. (8)

(ii) Illustrate the operating principle of thermionic emission detectors. (8)

18. (a) Describe the working principle of paramagnetic oxygen analyzer with a neat sketch. Also, mention its applications. (16)

Or

(b) List out the various methods for dust and smoke measurement. Discuss any two methods in detail. (16)

19. (a) Describe the working principle of pH measurement with neat diagram and briefly discuss the need of using a primary reference electrode. (16)

Or

(b) Explain in detail about how the concentration of sodium can be found using a sodium analyzer. (16)

20. (a) Describe the working principle of different mass spectrometers with neat diagrams. (16)

Or

(b) Explain about the different nuclear magnetic resonance spectrometers with appropriate diagrams. (16)
