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Question Paper Code: 45505

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

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. The UV/VIS spectroscopy
 - (a) generates colored spectrums
 - (b) can determine the concentration
 - (c) can be used to make light visible
 - (d) all the above
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. In gas chromatography, the basis for separation of the components of the volatile material is the difference in
 - (a) partition coefficients
 - (b) conductivity
 - (c) molecular weight
 - (d) molarity
5. Which gas has high thermal conductivity?
 - (a) Nitrogen
 - (b) Hydrogen
 - (c) Helium
 - (d) Carbon dioxide

6. The principal source of volatile organics (Hydrocarbons) is
- (a) Transportation (b) Industrial processes
(c) Stationary fuel combustion (d) Volcanoes
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. If the pH value of the solution is 5, what will be the concentration of H⁺ ions
- (a) 10^{-0.2} gm/lit (b) -0.2 gm/lit
(c) 0.2 gm/lit (d) 10⁻⁵ gm/lit
9. The primary signal of an NMR spectrum is called
- (a) signal (b) Fourier Transformation
(c) FID (d) Laplace Transformation
10. Which one measures the mass-to-charge ratio of ions to identify and quantify molecules in simple and complex mixtures?
- (a) GM Counter (b) SEM
(c) TEM (d) Mass spectrometer

PART - B (5 x 2 = 10 Marks)

11. State Beer-Lambert Law.
12. What is the principle of gas chromatography?.
13. Give the methods of measurements of Oxygen.
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) Explain about the functioning of Magnetic wind based oxygen analyzer with its neat diagram. (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) With the complete details of electrodes used, explain about pH measurement. (16)

20. (a) Explain about the following: (i) GM Counter and (ii) Proportional counter. (16)

Or

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