**Reg. No. :** | | | | | | | | | | |

## Question Paper Code: 45505

B.E. / B.Tech. DEGREE EXAMINATION, MAY 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. 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. 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. Paramagnetic oxygen analyser is a _____ kind of oxygen measurement.

   (a) physical method (b) chemical method
   (c) electrochemical-oxygen analyzer (d) analytical method

6. Which gas has high thermal conductivity?

(a) Nitrogen (b) Hydrogen
(c) Helium (d) Carbon dioxide

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. 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. Give the methods of measurements of Oxygen.

14. Define ion-selective electrode. List its types.

15. Why do we go for a solid state detector?

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) Explain with a neat sketch, the principle and basic parts of a gas chromatography. (16)

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

Or

(b) Explain about the functioning of Magnetic wind based oxygen analyzer with its neat diagram. (16)

19. (a) With the complete details of electrodes used, explain about pH measurement. (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)

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