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

## Question Paper Code: 45505

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2019

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 units of an IR spectrometer on the X-axis is

   (a) meter (b) centimeter (c) per meter (d) per centimeter

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. 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. The primary signal of an NMR spectrum is called

(a) signal (b) Fourier Transformation
(c) FID (d) Laplace Transformation

PART - B (5 x 2 = 10 Marks)

11. State Beer-Lambert Law.

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) (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) 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 following: (i) GM Counter and (ii) Proportional counter. (16)

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