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**Question Paper Code: 45505**

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 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. 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. 3. 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
4. HPLC stands for  
(a) High Pulse Liquid Chromatography  
(b) High Priority Liquid Chromatography  
(c) Highly Placed Liquid Chromatography  
(d) High Pressure Liquid Chromatography

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<sup>+</sup> ions
- (a) 10<sup>-0.2</sup> gm/lit (b) -0.2 gm/lit  
(c) 0.2 gm/lit (d) 10<sup>-5</sup> 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. State the principle of working of an infra-red gas analyzer.
14. Define pH and classify its values.
15. Why do we go for a solid state detector?

PART - C (5 x 16 = 80 Marks)

16. (a) With the aid of neat sketches, describe the operation of single beam and double beam spectrophotometers. (16)

Or

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

17. (a) Explain with a neat sketch, the principle and basic parts of a gas 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) (i) Briefly explain about the principle of dissolved oxygen analyzer. (8)

(ii) How will you use the sodium analyzer? Explain with its neat diagram. (8)

Or

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

