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Question Paper Code : 55904

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

Fifth Semester

Chemical Engineering

15UCH504- INSTRUMENTAL METHODS OF ANALYSIS

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Spectroscopy deals with interaction of electromagnetic radiation with matter. What is the speed of this radiation in vacuum in m/s? CO1- R
(a) 6×10^8 (b) 5×10^8 (c) 7×10^8 (d) 3×10^8
2. Frequency spectrum of noise occupies a band that is _____ the signal spectrum. Choose the most appropriate option. CO1- R
(a) Narrow than (b) Wider than (c) Different from (d) Same as
3. Beer Lambert's law gives the relation between which of the following? CO2- R
(a) Reflected radiation and concentration (b) Scattered radiation and concentration
(c) Energy absorption and concentration (d) Energy absorption and reflected radiation
4. Which of the following is not a source used in Mid Infrared Spectrophotometer? CO2- R
(a) Nernst glower (b) High pressure mercury arc lamp
(c) Globar (d) Nichrome wire
5. NMR spectroscopy is used for determining structure in which of the following materials? CO3- R
(a) Radioactive materials (b) Insoluble chemical compounds (c) Gases (d) Liquids

6. Mass spectrometers are used to determine which of the following? CO3- R
 (a) Relative mass of atoms (b) Composition in sample
 (c) Concentration of elements in sample (d) Properties of sample
7. Chromatography is a physical method that is used to separate and analysis? CO4- R
 (a) Simple mixtures (b) Complex mixtures (c) Viscous mixtures (d) Metals
8. Liquid chromatography can be performed in which of the following ways? CO4- R
 (a) Only in columns (b) Only on plane surface
 (c) Either in columns or on plane surfaces (d) Neither in columns nor on plane surfaces
9. Which of the following is not the characteristic of a reference electrode? CO5- R
 (a) Its output potential is dependent on the composition of the solution
 (b) It must have a known output potential
 (c) It must have a constant output potential
 (d) It is employed in conjunction with the indicator or working electrode
10. In polarographic cell when potential is applied , oxygen is reduced at CO5- R
 _____ when KCl is present
 (a) Anode (b) Cathode (c) Electrolyte (d) Both the electrode

PART – B (5 x 2= 10 Marks)

11. Calculate the frequency of radiation whose wave length is 400nm. Explain its CO1- App
 wave length in Wave number.
12. State Beer's law CO2- R
13. What is meant by chemical shift? CO3- R
14. What is meant by retention time? CO4- R
15. Explain Reference Electrodes for potentiometry? CO5- R

PART – C (5 x 16= 80Marks)

16. (a) (i) Explain briefly about electromagnetic radiation and their CO1- U (8)
 properties.
 (ii) Explain briefly about the radiation transducer. CO1- U (8)

Or

- (b) (i) Explain the various types of spectra. CO1- U (8)
- (ii) Explain briefly atomic absorption and molecular absorption. CO1- U (8)
17. (a) Derive Beer-Lambert's law and give the limitations and deviations from its. CO2- U (16)
- Or
- (b) Explain the experimental study of Raman effect with neat sketch and its application. CO2- U (16)
18. (a) Explain the theory and Experimental arrangement of Nuclear Magnetic Resonance. CO3- U (16)
- Or
- (b) Explain the theory of electron spin Resonance spectroscopy. CO3- U (16)
19. (a) Explain the following CO4- U (8)
- (i) Effect of column length on resolution
- (ii) Effect of mobile phase composition CO4- U (8)
- Or
- (b) Explain the principle of high pressure liquid chromatography and its applications. CO4- U (16)
20. (a) Explain the working principle of scanning probe microscopy and mention its applications. CO5- U (16)
- Or
- (b) Explain the principle, construction and working of atomic force microscope with schematic diagram, mention any two applications, what are the advantages of AFM over STM. CO5- U (16)

