WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 5th Semester Examination, 2020, held in 2021

CEMADSE02T-CHEMISTRY (DSE1/2)

Time Allotted: 2 Hours | Full Marks: 40

The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.

Answer *three* questions taking *one* from each unit

UNIT-I

1. (a) Define accuracy and precision. 3

   (b) Calculate the mean and the standard deviation of the following set of analytical results 15.67g, 15.69g and 16.03g. 2

   (c) What is the basic principle of mole ratio method for determining stoichiometry of metal ligand complexes? 3

   (d) What are the advantages of a double beam spectrophotometer over a single beam spectrophotometer? 3

   (e) Differentiate between total consumption burner and premix chamber burner. 3

   (f) What is the use of chopper in AAS? 2

2. (a) Good precision does not guarantee accuracy — Explain. 2

   (b) What do you mean by ‘systematic error’ and ‘random error’? 2

   (c) What is the role of flame in atomic absorption spectrometry? Mention two fuel-oxidant gas mixture used for producing flame in atomic absorption spectrometer. 2+2

   (d) What is the function of monochromator used in various spectrophotometer? 2

   (e) Which is the most common light source used in atomic absorption spectrometer? 1

   (f) Describe the structure of a hollow cathode lamp used as a source of Atomic Absorption Spectroscopy. 2

   (g) What is the main difference between Flame Emission Spectrometry and Atomic Absorption Spectroscopy? 1

   (h) What are the methods of removal of chemical interferences in AAS? 2

UNIT-II

3. (a) What is thermogravimetric analysis? Describe the different steps in thermogravimetric analysis of calcium oxalate monohydrate. 2+2

   (b) What are the basic requirements of a reference electrode in potentiometric measurements? 2

   (c) Mention two errors that affect pH measurements with glass electrodes. 2

   (d) What is liquid junction potential? How can we minimize the liquid junction potential? 2+2

4. (a) What type of information can be obtained from thermogravimetric analysis? What are the main components of TGA apparatus? Discuss. 2+2

   (b) What are the indicator electrode and reference electrode in a typical pH measuring cell? Describe the basic constituents of the indicator electrode. 2+2

   (c) Discuss the nature of curve for the conductometric titration of a mixture of acetic acid and hydrocholoric acid by sodium hydroxide. What is dilution effect and mention steps taken to avoid the same. 2+2

UNIT-III

5. (a) How can you classify chromatographic techniques on the basis of the type of equilibrium process involved? Give examples of each type. 2

   (b) What do you mean by 'R_f value'? What are the maximum and minimum R_f values possible? Justify your answer. 2+2

   (c) Why masking agents are used in solvent extraction by chelation process? 2

   (d) What is HPLC? Discuss. 2

   (e) Why in solvent extraction distribution ratio is more meaningful term than distribution coefficient? 2

6. (a) Define stationary phase and mobile phase in chromatography. 2

   (b) What is partition coefficient of a solute in chromatography? 2

   (c) Name the basic components of gas chromatography instrument. Which gases are used as carrier gases? 3

   (d) R_f values of three amino acids X, Y and Z are 0.14, 0.38 and 0.72 respectively. Which one of these amino acids in their TLC separation will occur on the top and which one at the bottom? Explain your choice. 2

   (e) Explain in detail the mechanism of extraction by solvation process. 3

N.B. : *Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.*

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