

Ex/SC/CHEM/UG/DSE/TH/01/2022(S)

B. SC. CHEMISTRY EXAMINATION, 2022

(3rd Year, 6th Semester, CBCS, Supplementary)

CHEMISTRY

PAPER – DSE/CHEM/TH/01

INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

Time : Two hours

Full Marks : 40

(20 marks for each unit)

Use a separate answer script for each unit.

UNIT – 6012-I

1. Tick (✓) the more appropriate answer to the following statements. 1×3
 - I. The Electromagnetic Radiation that causes deformation of Nucleus is
 - a) Visible radiation
 - b) Microwave radiation
 - c) Infra-Red Radiation
 - d) γ -Ray radiation
 - II. Radiation Source in AAS is
 - a) Electrodeless Discharge Lamps
 - b) Tungsten Lamps
 - c) Vapor Discharge Lamps
 - d) Hollow Cathode Lamps

[Turn over

[2]

- III. The spectral origin in Atomic Spectra is
- Atomic vibration of the volatile sample.
 - Valence electron promotion in molecule or ion
 - Dissociation of bonds in molecule
 - Electron promotion in the atomic energy states
2. Answer **any two** questions : 2×2
- Explain with reasons for the origin of Atomic Absorption Spectra and its broadening.
 - Account on the interferences in ICP.
 - Discuss McLafferty Rearrangement in Mass Spectrometry.
3. Define error in analytical chemistry and classify. How do you quantitatively analyze determinant errors? 3
4. a) What is the basic principle of ESCA? How is it different from EPMA?
- Derive the required relation involving magnetic flux density and angular momentum of nucleus assuming nucleus being a charge particle in spinning motion.
 - What is isotopic dilution method? Give an example. (1+2)+5+2
5. a) Mention one major reason why “chromatography” got introduced as an important analytical technique. How did it get its name? 1 + $\frac{1}{2}$

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- What is the difference between normal phase and reversed phase liquid chromatography? What led to the development of reversed phase liquid chromatography? 1+1
 - What is the basis for the separation of stereoisomers using chiral chromatography? What is a major drawback of chiral bonded stationary phases in the above chromatography? 1 $\frac{1}{2}$ +1
 - Discuss the role of the ionization chamber and ion collector in mass spectrometry. 1+1
 - It is said that mass spectrometry besides having other utilities, establishes relative abundance of different isotopes of an element — Explain. 2
6. a) What are the methods to improve signal to noise (S/N) ratio of a UV-V is spectrometer? 2
- b) Write a short notes (**any one**) : 3
- Prism monochromator,
 - Michaelson Interferometer,
 - Photomultiplier tube (PMT) detector
- c) What are the advantages of FT-IR spectrometer over dispersive IR spectrometer? 2
- d) Draw a schematic diagram of the double beam UV-V is spectrometer with clear depiction of the optical components. 3