

[This question paper contains 2 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 7936

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Unique Paper Code : 2173550009

Name of the Paper : DSE- Advance Analytical Techniques for Inorganic Compounds

Name of the Course : B.Sc. (Hons.) Chemistry

Semester : VIII

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any four questions in all.
3. All questions carries equal marks
4. The questions should be numbered in accordance to the number in the question paper

1. a. Give one-line answers (any 10):

(1×10)

- i. ICP-AES is more sensitive than flame AES.
- ii. What are common impurities present in solvents.
- iii. EPR more suitable than NMR for studying free radicals.
- iv. UV-Vis spectroscopy is used for quantitative analysis.
- v. Quadrupole splitting occurs only in non-spherical environments.
- vi. Double beam spectrophotometers are more accurate.
- vii. Symmetric molecules sometimes show no IR absorption.
- viii. Smaller particle size improves separation in column chromatography.
- ix. Fingerprint region is unique.
- x. Stronger bonds absorb at higher frequencies in IR spectra
- xi. Polar compounds elute slower in normal phase chromatography.
- xii. What type of radiation is used in Mössbauer and EPR spectroscopy?
- xiii. Which burner provides better flame stability in FES?

- b. Describe the types of interactions responsible for spectral splitting in EPR. (5)

P.T.O.

2. Write short notes on (any three): (3×5)
- Advance drying techniques
 - Resolution of column chromatography
 - FT-IR interferometer (Michelson interferometer)
 - Broadening of atomic spectral lines in AES
 - Zero Field splitting in EPR
3. Give reasons (any five) (5×3)
- Why are some drying agents unsuitable for certain solvents?
 - Why do only paramagnetic substances show EPR spectra?
 - Why do conjugated systems absorb at longer wavelengths?
 - Why is regeneration of resin necessary?
 - Why is recoil-free emission essential for Mössbauer spectroscopy?
 - Why is the premix burner preferred in AAS?
4. Distinguish between the followings (any three): (3×5)
- Normal phase chromatography and reverse phase chromatography
 - Total consumption burner and premix chamber burner
 - Retention time and Retention volume
 - EPR spectroscopy and Mössbauer spectroscopy
 - Absorption atomic spectra and emission atomic spectra
5. Attempt any three: (3×5)
- Why is drying of solvents necessary? Describe different techniques for drying of solvents and their principles.
 - Discuss different types of electronic transitions and their relative energies occur in UV-Vis spectroscopy?
 - Explain Hooke's law as applied to IR spectroscopy. Describe different types of molecular vibrations.
 - Describe the hyperfine interactions (isomer shift, quadrupole splitting, magnetic splitting) in Mössbauer spectroscopy.
6. Explain in brief (any three) (3×5)
- Background correction in AAS
 - Explain the preparation, purification, and handling of laboratory reagents in detail.
 - Describe the mechanism of cation exchange with suitable equations.
 - Write a note on g-value and its significance.
 - Explain how IR spectroscopy is used for:
 - Functional group identification
 - Structure elucidation