

This question paper contains **3** printed pages]

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S. No. of Question Paper : **3015**

Unique Paper Code : **2173522008**

Name of the Paper : **DSE : Analytical Methods in Chemistry**

Name of the Course : **B.Sc. (Prog.)**

Semester : **IV/VI**

Duration : **2 Hours**

Maximum Marks : **60**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any *four* questions.

Each question carries **15** marks.

1. (a) Define resolution (R_s) and derive its expression. Two peaks have retention time 5 min and 6 min with peak widths 0.5 min each. Calculate resolution.
(b) Discuss all sources of error in analytical chemistry.
(c) What are the various methods of introduction of sample in atomic absorption spectroscopy ? 5,5,5
2. (a) Differentiate between determinant and indeterminate errors. Also give an example of each.

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- (b) What are some transitions forbidden ? Explain the role of symmetry and quantum mechanical restrictions.
- (c) Define retention factor (R_f). What is its significance in a chemical analysis ? 5,5,5
3. (a) Describe the various equilibrium process involved in the solvent extraction of metal chelate. Mention the condition for the better extraction of metal chelates.
- (b) Draw the block diagram of a double beam spectrophotometer and explain its working.
- (c) Analysis of a sample of iron gave the following % values for the iron content :
22.62, 22.75, 22.78. 22.83, 22.73, 22.79 22.87, 22.84, 22.92, 22.93 and 22.94.
Calculate the mean, median and standard deviation of the data. 5,5,5
4. (a) Explain batch, continuous and counter current techniques used in solvent extraction.
- (b) Calculate the molar absorptivity of 2×10^{-4} M solution having 0.5 absorbance when placed in a cell of path length of 10 mm path length.
- (c) Explain the Job's method for spectrophotometric studies of complex ions. 5,5,5

5. (a) Draw a labelled diagram of Hollow Cathode Lamp. Explain its construction and working.
- (b) Differentiate between metal-rich complexes and ligand-rich complexes in terms of composition, stability and spectrophotometric behavior.
- (c) How to differentiate between liquid-liquid extraction and solid-liquid extraction ? 5,5,5
6. (a) What are the different factors which affect the solvent extraction ?
- (b) Describe different sample introduction techniques (nebulization, electrothermal methods). How does nebulization efficiency affect analytical results ?
- (c) Write a short note on ion exchange chromatography. 5,5,5