Unique Paper Code	**:**	**32177904**
Name of Paper	**:**	**Analytical methods in chemistry**
Name of Course	**:**	**B.Sc. (Hons.) Chemistry /B.Sc Prog (Analytical Chemistry)**
Semester	**:**	**VI**
Duration	**:**	**2 Hours**
Maximum Marks	**:**	**75 Marks**

Instructions for the candidates

1. Attempt any **four** questions in all. Question 1 is compulsory.
2. The questions should be numbered in accordance to the number in the question paper.

1. A Explain the followings (any five):
   a. When can be a zero used as significant figure?
   b. Why are spectral interferences less serve in AAS than in FES?
   c. Why is the glass electrode stored in water?
   d. Why is line spectra attained in FES whereas bands in uv-vis spectroscopy?
   e. What is the maximum and minimum value of R_f?
   f. Why are photomultiplier tubes unsuited for the detection of IR radiations?
   g. What is the role of radiation buffer in atomic spectroscopy? (2×5)

B. Give one word for the following: (any five):

   a. Collection of a material from bulk material.
   b. The square of standard deviation.
   c. Reproducibility of results
   d. Comparison of variance
   e. A solution prepared from all the reagents but no analyte.
   f. Process which governs the movement of mobile phase from bottom to top. (1×5)

2. Attempt any four

a. Define gross sample and grab sample with suitable examples. Explain different steps involve during sampling.
b. Crystalline barium chloride was found to contain 12.5% water of crystallization as against the formula $BaCl_2 .2H_2O$ the true value of 12.75%. Estimate the absolute error, relative error and relative accuracy.
c. What are the different sources of systematic errors and how are they minimize.

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d. Describe the various atomization techniques used in AAS. Give two examples of carrier gases used in AAS.

e. Name the factors which affect thermogravimetric curves. Explain the nature of curves in TGA and DTA. (4×5)

3. a. Discuss three types of interferences associated with flame and furnaces. Give one method to correct each type of interference.

   b. Prove that A=2-log % T

   OR

   A solution containing 0.701 mg of solute per 100mL of solvent gives a percent transmittance of 40% in a 1.0 cm cell.

   i. What is the absorbance of solution?

   ii. What would be absorbance and percent transmittance, if 2.0 cm cell is used?

   iii. What would be absorbance and percent transmittance, if the solution were 0.420 mg of solute per 100mL of solvent?

   c. What is the purpose of flame in flame emission spectroscopy? Explain how the choice of flame affects the flame temperature.

   d. What the methods of background correction are in AAS. List any two techniques that are used to correct for background absorption in flame and furnaces. (4×5)

4. a. Why neutralization conductometric titrations are better than potentiometric titrations. And also explain conductometric fails in redox titration.

   b. Classify chromatography on the basis of principle, mechanism and development. Explain the following terms used in chromatographic analysis:

      i. Retention volume

      ii. Retention time

      iii. Retention factor

   c. What are the three techniques used in solvent extraction and explain any one.

   d. Discuss the processes involved in the solvent extraction of metal ions by chelation.

   OR

   90% of a metal chelate is extracted when equal volumes of aqueous and organic phases are used. What will be the percent extracted if the volume of organic phase is doubled?

   (4×5)

5. Differentiate between (any four):

   a. Diagram for single beam spectrophotometer and double beam spectrophotometer

   b. Potentiometric titrations and conductometric titrations

   c. Relative standard deviation and standard deviation of mean

   d. Partition chromatography and adsorption chromatography.

   e. Differential thermal analysis (DTA) and differential scanning calorimetry (DSC). (4×5)

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6. Write short notes on (any five):
    a. Monochromator
    b. Acid error and alkaline error for glass electrode.
    c. Various ways of expressing precision
    d. Sources and detectors used in UV-VIS spectrophotometer
    e. Normal distribution curve for random errors
    f. Selection rules for electronic transitions in molecular spectroscopy. (5×4)

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