5903

Unique Paper Code	**: 2173522008**
Name of the Paper	**: DSE-Analytical Methods in Chemistry**
Name of the Course	**: B.Sc. Life Science with Chemistry**
Semester	**: IV / VI**
Duration	**: 2 hours**
MaximumMarks	**: 60**

Attempt any four questions, each question carries 15 marks.

1.a) Analysis of a sample of iron gave the following % values for the iron content: 22.64, 22.54, 22.61, and 22.53. Calculate the standard deviation and variance of the data. What is sampling? What is its importance in chemical analysis?
b) Define precision in analytical chemistry. How is it different from accuracy? Explain with an example.
c) Differentiate between :
1. absolute and relative uncertainty
2. systematic error and random error **(5,5,5)**

2. a) Describe the principle and workings of a flame emission spectrometer with the help of a labelled diagram. Also, mention its key applications.

b) Explain the working principle of a hollow cathode lamp with the help of a suitable diagram.

c) Explain the types of interferences generally produced in AAS. Give one method to correct each type of interference. (5,5,5)

3. a) Define chromatography. Explain the following terms used in chromatographic analysis:

(i) Retardation factor
(ii) Retention time
(iii) Resolution of a chromatographic separation.

b) Give the principle behind solvent extraction. What is distribution ratio, D

c) Explain paper chromatography taking the example of the separation of Co^{2+} and Ni^{2+} ions. **(5,5,5)**

4. Write short notes on (any three): **(5,5,5)**

i) Adsorption and Partition chromatography

ii) Cation and anion exchange resin

iii) Photomultiplier tube

iv) Prisms and Gratings

5. a) How does a double-beam spectrophotometer differ from a single-beam spectrophotometer? Draw a systematic diagram for a double-beam spectrophotometer and explain its working principle.

b) Sketch out the electromagnetic spectrum. Describe the fundamental laws of spectroscopy.

c) What is meant by the absolute error (E) and relative error (E_r) of a measurement? In two separate determinations, the concentration of iron in a given sample was found to be 20.17ppm and 19.80 ppm. If the accepted value is 20.00ppm, Calculate E and E_r as % in the two determinations. **(5,5,5)**

6. a) Define significant figures. How many significant figures does each of the following numbers have?

a. 2.5430
b. 0.0221
c. 2.5×10^7

b) Explain the processes that occur when a sample is injected into the flame in Atomic Absorption Spectroscopy (AAS).

c) What are the various oxidants used in AAS? How does the combination of fuel gases and oxidants affect flame temperature? **(5,5,5)**