

M.Sc. (Part-I) Semester-I (CBCS Scheme) Examination
CHEMISTRY (NEW)
MODERN METHODS OF SEPARATION
Paper-IV

Time : Three Hours]

[Maximum Marks : 80

N.B. :— (1) All questions are compulsory and carry equal marks.
(2) Use of scientific calculator is permitted.

1. (a) What are instrumental methods of analysis ? Explain their classification with examples. 6
(b) What care should be taken while using an analytical balance ? Discuss the errors that may be incorporated while weighing. 5
(c) Give an account of storage and transport of samples. 5

OR

- (p) How are immiscible and flowing liquids sampled ? 5
(q) 5 ml of 11.6N HCL was diluted to 250ml. 25ml of this solution was titrated with 0.5N NaOH solution. Calculate the titre value. 5
(r) Discuss the safety aspects required in handling of hazardous materials with suitable examples. 6
2. (a) What are significant figures ? State the rules of computation of significant figures. 5
(b) Explain the following terms :
(i) Accuracy and Precision
(ii) Average deviation and standard deviation. 5
(c) In a gravimetric estimation of Zinc as Zinc Pyrophosphate $\text{Zn}_2\text{P}_2\text{O}_7$, the following results were obtained.

Sample	Wt. of sample(g)	$\text{Zn}_2\text{P}_2\text{O}_7$ obtd.(g)
1	2	0.743
2	1	0.370
3	0.5	0.183
4	0.25	0.090

If the sample contained 16% Zn, calculate the absolute error and the relative error in ppt. Comment on the result. (Zn = 65.4, P = 31, O = 16). 6

OR

- (p) Explain the various types of errors involved in chemical analysis with examples of each type. 5
(q) Calculate the mean, mean deviation and standard deviation for the following ten results obtained for a given method :
8.75, 8.98, 9.25, 8.56, 9.20, 9.59, 9.14, 8.68, 8.79, 9.45. 6

- (r) What is **correlation coefficient** ? How does the value of 'r' affect the linearity of a straight line ? 5
3. (a) What is counter current extraction ? Describe the principles of Craig counter current extraction. 5
- (b) What are ion exchange resins ? How are they classified ? 6
- (c) In solvent extraction of Uranium with 8-hydroxyquinoline in CHCl_3 , the values of aqueous and organic phase were 25 cm^3 , when the percentage extraction was 99.8%. Calculate the distribution ratio. 5

OR

- (p) Explain the use of anion exchange resin in the separation of Chloride and Bromide. 5
- (q) What do you understand by synergistic extraction ? Discuss the conditions and mechanism for synergistic extraction. 5
- (r) Write notes on :
- (i) Liquid ion exchangers
- (ii) Chetation ion exchanges. 6
4. (a) Explain with the help of block diagram the principle and instrumentation of HPLC. 6
- (b) What does partition and adsorption chromatography mean in HPLC ? 5
- (c) Discuss the split and splitless injection system in Gas chromatography. 5

OR

- (p) Explain the various types of detectors used in Gas chromatography. 6
- (q) What is Gas Solid chromatography ? Discuss the merits of GSC over GLC. 5
- (r) Why is mobile phase gradient elution used in HPLC ? 5
5. (a) What precautions must be taken while storing and working with hazardous chemicals ? 5
- (b) What are chemical weapons ? How are they classified ? 5
- (c) Give an account of the explosive properties of :
- (i) RDX
- (ii) Dynamite and
- (iii) Gunpowder. 6

OR

- (p) How are the chemicals recycled and reused in the laboratory ? 5
- (q) Write in brief :
- (i) Safety procedures while working with gases.
- (ii) Incineration of hazardous chemicals. 6
- (r) Give an account of preparation and explosive properties of :
- (i) Lead azide and
- (ii) RDX. 5