

3. (a) In what way TLC is superior to other chromatographic techniques ? 5
- (b) Describe the following detectors used in GC
- (i) Flame ionization detector.
- (ii) Rare gas detectors. 6
- (c) Draw a neat diagram of HPLC set up and explain it. 5

OR

- (p) Describe columns and column materials used in GC. 5
- (q) Define — Plate height and resolution.
Calculate the number of plates using the following data (in terms of distance) :—
Retention time = 52.3 mm.
Width at the base of the peak = 8.0 mm. 6
- (r) Write brief note on electrochromatography. 5
4. (a) What are ion exchange resins ? How are they classified ? 5
- (b) Give applications of ion exchange resins. 5

First Semester M. Sc. (Part - I) Examination
(C.B.C.S.)

CHEMISTRY

Paper - IV

(Modern Methods of Separation)

P. Pages : 6

Time : Three Hours]

[Max. Marks : 80

- Note : (1) All questions are compulsory and carry equal marks.
(2) Use of calculator/log table is permitted.

1. (a) Describe the classification of analytical methods. Also give examples of each type. 5
- (b) What are micro and semimicro balances ? Explain the working of electronic balance. 5
- (c) 25 ml pipette is calibrated using steel weights. The weight of the delivered volume was 24.971 g. What is the volume of the pipette at 25 and 20 °C if 1 g of water has a volume of 1.004 ml and 1.0028 ml respectively ? 6

OR

(p) Describe the method of sampling of gases and particulates. 5

(q) Explain the use of the followings :—

(i) Desiccators.

(ii) Wash bottles.

(iii) Furnaces and ovens. 6

(r) 5 ml of conc. HCl were diluted to 100 ml. 10 ml of this solution was further diluted to 250 ml and 25 ml of this solution when titrated with 0.05 N NaOH, required 15 ml for neutralization using methyl orange indicator. Calculate the normality of conc. HCl. 5

2. (a) What are significant figures ? State the rules for determining significant figures. 5

(b) Explain the following terms :—

(i) Accuracy and Precision.

(ii) Average deviation and Standard deviation. 6

(c) Calculated values by two different methods are given below —

Method - 1	Method - 2
127	130
125	128
123	131
130	129
131	127
128	125
129	

Find out if there is significant difference in the precision of the two methods. (Tabulated F values for $v_1=6$ and $v_2=5$ is 4.95) 5

OR

(p) What do you mean by errors in analysis ? Describe different types of errors. 5

(q) Write a note on rejection of data based on Q test. 5

(r) Calculate 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

- (c) Define ion exchange capacity.

In an experiment to find ion exchange capacity, 20 ml of effluent required 15 ml of 0.05 N NaOH for titration. Calculate ion exchange capacity if total volume of effluent is 250 ml and the weight of resin is 0.56 g.

6

OR

- (p) Explain the theory of ion exchange resin.

5

- (q) What are the conditions for a polymer to act as ion exchange resin ?

5

- (r) Draw a schematic structure of strongly basic anion exchange resin. Also state how it is prepared.

6

5. (a) What is solvent extraction ? State the factors which favour solvent extraction.

5

- (b) Explain the use of following reagents in solvent extraction :

(i) 8 - Hydroxyquinoline 'and

(ii) Dithiodicarbamates.

5

- (c) A certain solvent system has a distribution ratio of 50. If 200 mg of a solute is dissolved in 100 ml of water and extracted by 25 ml of organic solvent four times, find out the percent extraction for the system.

6

OR

- (p) Write in brief on — Crown ethers and Calixarenes. 5
- (q) Explain synergistic extraction with suitable example. 5
- (r) Arsenic (III) is extracted 70% from 7 M HCl into an equal volume of toluene. What percentage will remain extracted after three individual extractions with toluene ? 6

