AU–237

M.Sc. (Part—I) Semester—I (C.B.C.S. Scheme) Examination

CHEMISTRY (Old)

(Upto Summer–2018)

(Modern Methods of Separation)

Paper—IV

Time : Three Hours] [Maximum Marks : 80

Note :— (1) **All** questions are compulsory and carry equal marks.

(2) Use of scientific calculator is permitted.

1. (a) Differentiate between semimicro and microbalance. 5

(b) What is the purpose of sampling ? Mention methods used for sampling and describe experimental procedure for sampling of liquid and gaseous samples. 6

(c) Describe calibration method of pipette. 5

OR

(p) What is meant by cleaning and calibration of glasswares ? Describe the calibration method for burette. 5

(q) What are the essential features and requirements of a good analytical balance ? 5

(r) What are the general rules for weighing of solids and liquids ? Write a note on the sources of error in weighing. 6

2. (a) Explain what is meant by :

(i) Accuracy

(ii) Precision. 6

(b) Define and explain the following :

(i) Mean

(ii) Median

(iii) Standard deviation. 6

(c) Four results obtained for normality of a solution are 0.1014, 0.1012, 0.1019 and 0.1016. By applying Q-test suggest that whether the value 0.1019 can be rejected or is to be retained ? 4

OR

(p) What are significant figures ? How many significant figures are there in the following numbers :

(i) 0.612

(ii) 70.9

(iii) 0.007

(iv) 900.0

(v) 6.023×10^{23}. 5

(q) Explain the Q-test as applied to decide whether to retain or reject a particular measured value. 5

(r) Explain what is meant by :

(i) Determinate error

(ii) Indeterminate error. 6

3. (a) Discuss principle and technique in TLC (Thin Layer Chromatography). 5

(b) Give comparative account of Gas Chromatography and HPLC. 6

(c) Give principle and applications of electro chromatography. 5

OR

(p) In a paper chromatographic separation the fronts due to three compounds A, B and C were 40, 45 and 55 cms respectively and solvent front is 7.0 cm. Calculate R_f values for all the three compounds present in the mixture. 5

(q) Differentiate between partition chromatography and adsorption chromatography. 5

(r) Explain classification of chromatographic techniques with examples. 6

4. (a) Write notes on :

(i) Liquid ion exchangers

(ii) Chelation ion exchangers. 6

(b) What are strongly and weakly acidic cation exchangers ? Explain. 5

(c) What are chelation ion exchangers ? Discuss various factors which favour ion exchange equilibria. 5

OR

(p) Why are the mixture of Zn(II) and Mg(II) usually separated using anion exchanger rather than cation exchanger ? Explain. 5

(q) Explain the following :

(i) Ion exchange equilibria

(ii) Applications of ion exchanges in metal ion separation. 6

(r) Discuss ion exchange capacity. How is it determined ? 5

5. (a) Write in brief :

(i) Synergistic extraction

(ii) Distribution ratio. 6

(b) Explain why multiple extractions using small volumes of extractant are more efficient than a single extraction using a large volume of the extractant. 5

(c) Discuss factors which favour solvent extraction. 5

OR

(p) What are cryptands ? Give their applications in analytical chemistry. 5

(q) In solvent extraction of uranium with 8-hydroxyquinoline in $CHCl_3$, the volume of aqueous and organic phase were 25 cm^3 each, when the percentage extraction was 99.8%. Calculate distribution ratio. 5

(r) Explain the following :

(i) Dithiozon as an extraction reagent

(ii) Selection of solvent for extraction. 6