Reg. No. | | | | | | | | | |

CAS 556

IV Semester M.Sc. Examination, September/October 2022
(CBCS 2016 – 17 Syllabus)
ANALYTICAL CHEMISTRY
Separation Techniques

Time : 3 Hours Max. Marks : 70

Instructions *: 1) Answer Part – **A** and **any four** questions from Part – **B**.*
*2) Figures to the **right** indicate **marks**.*

PART – A

Answer **all** the following sub-questions. **(9×2=18)**

1. a) What is solvent extraction ? Give any two important applications.

   b) List out factors affecting solvent extraction.

   c) Give the fundamental differences between affinity chromatography and adsorption chromatography.

   d) In a chromatographic separation of low molecular weight butyric acid elutes with retention time of 9.63 min, the column void time is 0.46 min. Calculate the retention factor for butyric acid.

   e) Give the basic principle of capillary zone and capillary gel electrophoresis.

   f) What is gel filtration chromatography ? How does it differ from gel permeation chromatography ?

   g) What is sedimentation velocity ?

   h) What is capillary isoelectric focusing ?

   i) Differentiate between liquid chromatography and gas chromatography.

P.T.O.

PART – B

Answer **any four** questions. **(13×4=52)**

2. a) Discuss the basic principle, types and efficiency of solvent extraction.

   b) 1 gram of benzoic acid dissolved in 100 mL of water is to be equilibrated with 100 mL of ether. The distribution coefficient, K_D is 100 and the dissociation constant, K_a is 6.5×10^{-5}. Calculate the distribution ratio, D, if the aqueous layer is at pH = 3, 5 and 7.

   c) Explain the solvent extraction of a metal ion. **(5+4+4=13)**

3. a) Explain the theory and classifications of electrophoresis.

   b) Describe the factors influencing the electrophoretic phenomena.

   c) Give the methodology of preparation of gel staining and destaining. **(5+4+4=13)**

4. a) Explain the principle and instrumentation of gas chromatography.

   b) What are detectors used in gas chromatography ? Briefly discuss the working principle of TCD.

   c) Write a note on the theory and principle of size exclusion chromatography. **(5+5+3=13)**

5. a) What is ultracentrifugation ? Explain the principle, methodology and applications of ultracentrifugation.

   b) Briefly discuss micellar electrokinetic capillary chromatographic technique.

   c) Explain the basis for electrophoretic separations. **(5+4+4=13)**

6. a) What is synergistic extraction and salting out agent ? Explain with a suitable example.

   b) Differentiate between packed and open tubular columns. Explain their applications in chromatography.

   c) Discuss the capillary electrophoresis method that can be used for uncharged molecules. **(5+4+4=13)**

7. a) Describe the working principle of packed column electro chromatography.

   b) Discuss the significance of migration rate and plate height in capillary electrophoresis.

   c) Explain the applications of GC/MS technique. **(4+5+4=13)**

———————