

**POST GRADUATE DIPLOMA IN  
ANALYTICAL CHEMISTRY (PGDAC)**

**Term-End Examination**

**June, 2023**

**MCH-002 : SEPARATION METHODS**

*Time : 3 Hours*

*Maximum Marks : 75*

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**Note :** (i) *Attempt any **five** questions.*

(ii) *Marks allotted to parts are indicated on  
R.H.S.*

1. (a) Define the process of separation. List any *six* properties used for separation. 5
- (b) Explain classification of separation methods based on rate processes giving suitable examples of each type. 5
- (c) Under what conditions distribution co-efficient, thermodynamic distribution coefficient and distribution ratio, in a solvent extraction process are the same ? 5

**P. T. O.**

2. (a) Explain with the help of a labelled chromatogram, the terms : 5
- (i) Dead time
  - (ii) Retention time
  - (iii) Retention factor
- (b) Explain the term number of theoretical plates. Give mathematical expression to calculate it. 5
- (c) How does the type of functional group as well as the valence and nature of exchanging ions affect resin selectivity ? Explain. 5
3. (a) What are metal chelates ? Give any *two* examples of chelating agents. What assumptions are made in arriving at the distribution constant of the complex,  $\underline{K}_{Dx}$  ? 5
- (b) What are masking agents ? Discuss their role in extraction. 5
- (c) What is a diluent ? Give its *one* example. What are the uses of diluents ? 5

4. (a) Briefly explain the synthesis of cation exchangers giving suitable examples. 5
- (b) Briefly describe the technique of paper chromatography. Give the expression for the retardation factor. 5
- (c) Discuss the applications of paper chromatography. 5
5. (a) How can you separate a mixture of protein, sucrose and calcium chloride from the aqueous solution to its components using a combination of membrane processes ? 5
- (b) Compare the techniques of gas chromatography and HPLC. 5
- (c) Give any *five* advantages of HPLC. 5
6. (a) Discuss the working of a flame ionisation detector. Give its *two* applications. 5
- (b) Briefly describe different types of adsorbents used in liquid-solid chromatography. 5
- (c) Explain the technique of frontal analysis. 5

7. (a) What are the requirements of a suitable internal standard in the quantitative analysis using internal standardisation method ? 5
- (b) Discuss Donnan effect. 5
- (c) Briefly explain the important properties of gels. 5
8. (a) Discuss the unique features of size exclusion chromatography. 5
- (b) What is capillary electrochromatography ? Give its advantages over the parent technique. 5
- (c) Explain the principle and the process of SDS-PAGE gel electrophoresis. 5