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MCH-002

P.G. DIPLOMA IN ANALYTICAL CHEMISTRY (PGDAC)

00705 **Term-End Examination**

June, 2018

MCH-002 : SEPARATION METHODS

Time : 3 hours *Maximum Marks : 75*

Note : *Attempt any* ***five*** *questions. All questions carry equal marks.*

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1. (a) Give any five differences between paper chromatography and thin layer chromatography. 5

(b) What are the various separation methods based on surface activity, molecular geometry and electro-migration ? Explain the principle involved in any one of these with suitable example. 5

(c) Enumerate the criteria for the selection of various separation methods and describe any one of these emphasizing its importance. 5

2. (a) State 'distribution law'. Show that benzoic acid in benzene remains in dimeric form whereas in water it becomes benzoate ion. 5

(b) Enumerate various extraction equilibria and explain extraction of metal chelates. 5

(c) Define percent extraction. For a two component system, distribution coefficient (D) was found to be 3·6. Calculate percent extraction. 5

3. (a) List the requirements of an ideal support material ford liquid-liquid partition chromatography. 5

(b) Explain the term separation factor (α). Calculate α value; given t_m = 2·15 min, t_x = 5·32 min and t_y = 7·53 min. 5

(c) What is the Van Deemter equation ? Draw the nature of plot between linear flow rate (x) and plte height *(H)* for a gas chromatograph. Explain all three terms of the equation briefly. 5

4. (a) Draw a labelled sketch of a liquid chromatographic set-up. Give three important features of the columns used. 5

(b) What is planar chromatography and what are the techniques it includes ? Explain the basic principle underlying paper chromatography. 5

(c) Draw a labelled block diagram of a typical gas chromatograph. List the various carrier gases used. 5

5. (a) Explain how liquid phase percentage affects resolution of a two component mixture. Draw a suitable illustration. 5

(b) Explain the important adspects of chiral chromatography. 5

(c) What are the advantages of addition polymeric resins over their condensation counterparts ? 5

6. (a) Differentiate between adsorption and ion-exchange processes. 5

(b) Compare gas chromatography with HPLC along with limitations and advantages of each technique. 5

(c) Describe the important characteristics of a useful ion-exchanger. 5

7. (a) Explain the basic principle of size exclusion chromatography. 5

(b) Describe briefly the analytical applications of gel filtration chromatography. 5

(c) Discuss the role of masking agents in solvent extraction. 5

8. Write notes on any ***three*** of the following with suitable illustrations or examples wherever possible : *3×5=5*

(a) Reverse Osmosis and its applications

(b) Slab Electropdhoresis

(c) Dialysis

(d) Ion Selective Membrane Electrodes