

**M. Sc. (Semester-III) Examination**

*APRIL-2015*

**Paper-IX Advanced Instrumental Chromatographic Techniques Code: 3492 and 3497**

**Time: 2.5 hours**

**Marks: 70**

**All questions carry equal marks**

- Q-1** (i) Explain the terms involved in "Van Demeter equation" 14  
(ii) Give an account of different types of capillary columns used in GC.  
(iii) Give a schematic diagram of GC instrument with proper labeling on it.
- OR**
- Q-1** (i) What is distribution coefficient? Explain with suitable example. 14  
(ii) Substance A and B have retention time 16.40 and 17.63 min. respectively. On a column of 30 cm an un-retained species passes through the column in 1.30 min. The peak width (at base) for A and B are 1.11 min. and 1.21 min. Calculate (1) Column resolution, (2) Average no. of plates, (3) Plate height.  
(iii) What do you mean by micro-flash vaporizer technique?
- Q-2** Attempt any three of following 14  
(i) Give schematic diagram of HPLC instrument with proper labeling.  
(ii) Describe size exclusion mode of separation in HPLC.  
(iii) How will you differentiate the terms "isocratic" and "gradient" in HPLC?  
(iv) Discuss the type of stationary phase particles used in HPLC.  
(v) Discuss polarity index of various solvent used for separation in HPLC.
- Q-3** (i) Give an account of Electrophoresis. Explain various capillary electrophoresis methods. 14  
(ii) Explain the mode of separation taking place in the Electrophoresis with suitable mechanism.
- OR**
- Q-3** (i) What is solvent extraction? Give its principle and explain its mechanism for weak acid (HA) for equilibrium constant. 14  
(ii) Give a brief account of analytical ultracentrifugation and show its differences with preparative ultracentrifugation method.

- Q-4** (i) Define the term “GPC” with suitable example. **14**  
(ii) Define: (1) Elution (2) Mobile Phase (3) Stationary Phase (4) Elution  
(5) Distribution constant

**OR**

- Q-4** (i) What is hyphenated technique? Give an account of headspace –GC technique. **14**  
(ii) Explain electro-spray ionization source for ionizing the substances.

- Q-5** **Attempt any two of the following** **14**  
(i) What is the difference between a concentration sensitive and mass flow sensitive detector?  
(ii) Explain in brief (1) Flame ionization detector (2) Electrochemical detector  
(iii) Give comparison of TLC and HP-TLC techniques  
(iv) Explain the working of LC-MS in detail.