



HDU-003-1103001

Seat No. _____

M. Sc. (Chemistry) (Sem. III) (CBCS) Examination

November / December – 2017

C-301 : Advance Chromatographic Techniques

(Common for All Branches) (New Course)

Faculty Code : 003

Subject Code : 1103001

Time : $2\frac{1}{2}$ Hours]

[Total Marks : 70

- Instructions :** (1) All questions carry equal marks.
(2) All five questions are compulsory.

1 Answer the following : (any seven) 14

- (a) What are bulk property and solute property detectors? Give their name used in HPLC.
- (b) List the applications of GC-MS and discuss any two.
- (c) Give the principle of GSC and GLC.
- (d) Explain total volume of gel bed (V_t) and solvent volume inside the gel particles (V_i).
- (e) Discuss the advantage of HPTLC over a TLC.
- (f) How will you determine molecular weight by gel chromatography?
- (g) What is ion exchange chromatography? Explain the anion exchangers.
- (h) Explain : (i) R_{st} and hR_f (ii) Solvent frontline (iii) Elution (iv) Effluent.
- (i) Give the principle of gel chromatography and explain void volume and elution volume.
- (j) Why high purity gas is required in GC? What are the impurities present in gases?

2 Answer the following : (any **three**) **14**

- (a) What is super critical fluid chromatography? Give the characteristics of supercritical fluid and discuss instruments of it with diagram.
- (b)
 - (i) What is guard column and why it used?
 - (ii) Why degassing is required for mobile phase?
 - (iii) What is C₈ and C₁₈ column? Why these columns used in HPLC?
- (c) Explain the principle of TCD, FID, ECD, PDA and RI detectors.
- (d) Discuss the Spot verses Band shape sample application in HPTLC.

3 Answer the following : **14**

- (a) What is flame ionization detector? Give its principle and explain its functioning with diagram. Also list the characteristics gas used with this detector and what type of sample are used ?
- (b) In a liquid column chromatography separation of two components A and B achieved. The following data are recorded :
 - (i) Length of column packing = 25.7
 - (ii) Flow rate = 0.313 ml/mts.
 - (iii) V_m = 13.7 ml
 - (iv) V_s = 0.164 ml
 - (v) The retention time and peak width data are as under :

Sr. No.		Residence time (min.)	Peak width (sec)
1	Unretained	3.1	-
2	A	5.4	24.6
3	B	14.1	69.6

Calculate :

- (i) Number of plate from each peak.
- (ii) Plate height for column.
- (iii) Retention factor for A and B
- (iv) Resolution and selectivity.

OR

- 3** (a) Explain band broadening phenomena and explain Van-deemter equation.
- (b) A two component pharmaceutical product was separated using 15.02 cm long HPLC column yielding following retention time and peak width data are as under :

Sr. No.	Component time	Retention time	Peak-width	Half peak width
1	Paracetamol	7.73 min	0.65 min	0.3 min
2	Analgin	8.63 min	0.73 min	0.34 min

If the solvent showed up a peak at 1.37 min ; calculate

- (i) Capacity factors for each component.
- (ii) Number of plates using peak width and half peak width.
- (iii) The resolution of the two compounds using full peak width and half peak width.

4 Answer the following : (any **two**) **14**

- (a) Explain the Plate theory with example.
- (b) What are the difficulty arise in coupling of LC with MS ? Discuss the particle beam (PB) Interface device of LC-MS.
- (c) Discuss the general characteristic of stationary phase for planner chromatography.

5 Answer the following : (any **two**)

14

- (a) Give the name of different gel chromatographic techniques and describe the gel filtration chromatography.
- (b) Describe the types of matrix used in ion exchange chromatography in details.
- (c) Draw the block diagram of HPLC. Enlist the detectors and column used in HPLC. Give the advantages of HPLC over GC.
- (d) Write note on gel matrix used in gel chromatography.
