



HK-003-010301

Seat No. _____

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

May / June - 2017

Chemistry : C-OP - 301

(Separation Techniques) (Old Course)

(Common for all Branch)

Faculty Code : 003

Subject Code : 010301

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

[Total Marks : 70

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

1 Answer any seven of the following : **14**

- (a) What is a C_8 and C_{18} column ? Why they commonly used in HPLC ?
- (b) List the applications of LC-MS and discuss any two.
- (c) List the sample introduction system used in HPLC. Which one is generally used ? Why ?
- (d) What is meant by bulk property and solute property detections ? List the detectors based on this property of HPLC and GC.
- (e) Differentiate TLC and HPTLC.
- (f) What is silylation ? Why it is necessary ?
- (g) What is temperature programming analysis and how does this differ from isothermal analysis ?
- (h) Explain :
 - (i) Mobile phase and Stationary phase
 - (ii) Normal Phase Chromatography
 - (iii) Reverse Phase Chromatography.
- (i) Mention the name of separation techniques. Define Chromatography and classify them.
- (j) You have a peak with retention time 407 second, a base width of 13 second and column length of 12.2 meter. Find the number of plates and plate height.

- 2** Answer any three of the following : **14**
- (a) Explain the principle of GC. Draw the block diagram of GLC and labeled each component of it. Differentiate packed and Capillary column.
 - (b) How will you purify the carrier gas used in GC ? Explain GC inlet system and explain with importance of split and splitless system.
 - (c) Explain the principle of TCD, FID and ECD.
 - (d) Differentiate :
 - (i) GLC and HPLC
 - (ii) GSC and GLC.

- 3** Answer the following : **14**
- (a) Draw the hypothetical chromatogram and explain each terms involve in it interpretation.
 - (b) Compound A and B have retention times of 16.40 and 17.63 min respectively, on a 30.0 column. An unretained species passes through the column in 1.30 min. The peak width (at base) for A and B are 1.11 and 1.21. Calculate :
 - (i) Column Resolution
 - (ii) Plate height
 - (iii) Average number of plates in column and
 - (iv) Length of column required to achieve a resolution of 1.5.

OR

- 3** (a) What is supercritical fluid chromatography ? Give the characteristic of super critical fluid.
- (b) Discuss with diagram the instrumentation of SFC.

- 4** Answer any two of the following : **14**
- (a) Give an account on rate theory.
 - (b) Write a note on Ion exchange chromatography.
 - (c) What are the difficulty arise in coupling of GC with MS. Discuss interface of GC-MS.

5 Answer any two of the following :

14

- (a) Draw the labelled diagram of HPLC. Give the principle of UV-Visible, fluorescence and diode array detectors and discuss any one in detail.
- (b) Define :
 - (i) Capacity factor
 - (ii) Resolution
 - (iii) HETP
 - (iv) Number of theoretical plates
 - (v) Van Deemter equation
 - (vi) Gradient elution and isocratic elution.
- (c) List the criteria for mobile phase selection in HPLC. Why it is necessary the filter and degassing the mobile phase ? Explain the role of guard column. Answer in brief :
 - (i) Explain : Noise, drift, S/N ratio and quantification techniques used in HPLC.
 - (ii) Give the concept of selectivity, sensitivity, LOD and LOQ for detectors.
