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A - (87) SARDAR PATEL UNIVERSITY

M.Sc.Semester-III: Analytical Chemistry **Examination** (CBCS)

April-2015,

Monday, Date: 27.04.2015

Time: 2.30 p.m. to 5.30 p.m., **Paper:** PS03ECHE05

Subject: Separation Methods

Total Marks: 70

N.B.: i) The numbers of the marks carried by each question is indicated at the end of the question
ii) Assume suitable data if considered necessary and indicate the same clearly.

Q.1 Highlight the correct option [08]

i) Capacity of resin depends on _____
a) Porosity **b)** Rigidity
c) Nature functional group **d)** Number of functional group

ii) Give the name of suitable separation technique used for separation of bio- molecules
a) Ion exchange **b)** Electrophoresis
c) GC **d)** GC-MS

iii) Which one of the following works as mobile phase in SFC
a) $CDCl_3$ **b)** CO_2
c) CO **d)** SO_2

iv) Which of the following is used as a detector in SFC over HPLC?
a) FID **b)** TCD
c) ECD **d)** None

v) Speed of separation with conventional L.C. is _____
a) High **b)** moderate
c) Low **d)** low and moderate

vi) Corrected retention volume can be express as
a) $V_R = t_R \times F$ **b)** $V_R = t_R \times F_c$
c) $V_R = t_R + F$ **d)** $V_R = t_R / F$

vii) TLC technique is _____ of HPLC.
a) Plan **b)** Pilot plan
c) Map **d)** Verification

viii) Paper chromatography is an example of_____ chromatography.
a) Adsorption **b)** Partition
c) Normal phase **d)** Reverse phase

Q.2 **a)** Attempt any **SEVEN** [14]

i) Discuss the principle and importance of solvent extraction.
ii) Give brief note on normal and reverse phase chromatography.
iii) Explain the basic adsorption isotherm for LLC and GLC technique.
iv) How to control trailing in chromatography?
v) Why HPLC is superior over GC?
vi) Explain briefly the SFC and SFE.
vii) Explain the characteristics of ideal detector.

viii) Explain the iso electrical focusing in electrophoresis.
ix) Give the advantages of TLC over PC.

Q.3 **a)** Discuss the various types of PC and its applications. [06]

b) How TLC plates are prepared? Distinguish the TLC and HPTLC. [06]

OR

b) Give the detail note on factor affecting column efficiency.

Q.4 **a)** Give the instrumental diagram of SFC and explain its advantages. [06]

b) Give the instrumental diagram of GC and explain the function of flow meter and sample splitter. [06]

OR

b) Describe the mechanism of extraction. Explain the application of solvent extraction.

Q.5 **a)** Discuss the instrumentation of GC and explain the sample injection port and capillary column. [06]

b) Answer the following [06]

i) Explain the resolution of peak in chromatography. A 4.20 meter column has a height equivalent to a theoretical plate 0.70 mm. If the flow rate is 32.5 mL/min. calculate the base width in second of a peak for a solute having retention time.
a) 38 Sec. b) 1 min. and 4 Sec. and c) 3 min. and 28 Sec. .

ii) Explain the principle and working of UV detector used in HPLC

OR

b) Answer the following

i) Give the note on rate theory and plate theory. Explain limitation of plate theory.

ii) Give the comparison between TCD and FID. Explain the therm-ionic detector.

Q.6 **a)** Discuss various types of ion exchanger. Explain the principle and selectivity of ion exchange chromatography. [06]

b) Answer the following [06]

i) Explain the principle of electrophoresis. Discuss continuous flow electrophoresis.

ii) Give the detail note on applications of ion exchange chromatography.

OR

b) Answer the following

i) Explain the principle and mechanism of SEC.

ii) Some 1gm. dry resin equilibrates with 30 mL. 0.1 M $Mg(NO_3)_2$. After this equilibration a 10 mL. aliquot of solution require 2 mL. 0.011 M EDTA for titration. Calculate distribution co-efficient (K_D).

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